Educator Development Journal
*Volume 4, Nomor 2, September 2026*

*ISSN : 2985-718X*
*Doi. https://doi.org/10.22373/edj.009* *https://publication.ar-raniry.ac.id/index.php/edj*

**Dina Wahyuni[1)], Wati Oviana[2)], Misbahul Jannah[3)].**

[1-3)] Universitas Islam Negeri Ar-Raniry Banda Aceh

Email: wati.oviana@ar-raniry.ac.id

# The Effect of the Science Technology Society Model on the Critical Thinking Skills of Fifth-Grade Students at a Madrasah Ibtidaiyah

**Article Info**

**Article Information**
Received : 30-07-2026
Revised : 31-07-2026
Accepted : 15-08-2026

**Keywords:** Science Technology Society (STS) Model, Science, Elementary School, Critical Thinking Skills

**Abstract :**

Science learning in elementary schools plays an important role in developing students' critical thinking skills. However, students' critical thinking skills are still relatively low. To support the improvement of these skills, the Science Technology Society (STS) Model can be used as an alternative learning approach. This study aims to analyze the effect of implementing the Science Technology Society (STS) Model on the critical thinking skills of fifth-grade students at MIT Menara Baro. This study employed a quantitative approach using a quasi-experimental research design. The design used was a Nonequivalent Pretest Posttest Control Group Design, involving an experimental class and a control class. The research instrument was a critical thinking skills test administered through a pretest and posttest. Data analysis was conducted using normality, homogeneity, and Mann–Whitney tests. The results showed that the mean pretest and posttest scores of the experimental class were 41.25 and 87.50, respectively, while those of the control class were 47.50 and 54.50, respectively. The Mann–Whitney test resulted in an Asymp. Sig. (2-tailed) value of 0.000 ($p < 0.05$). Therefore, it can be concluded that the implementation of the Science Technology Society (STS) Model had a significant effect on the critical thinking skills of fifth-grade students at MIT Menara Baro.

## INTRODUCTION

Science and Social Studies (IPAS) learning in elementary schools plays an important role in developing students' knowledge, skills, scientific attitudes, and thinking abilities. Through IPAS learning, students are expected to understand scientific concepts while connecting them with various phenomena encountered in

everyday life. However, the learning process in elementary schools still tends to be teacher-centered, so students' active involvement has not been optimal. This condition affects the development of students' critical thinking skills, which have not yet reached their maximum potential (Oviana & Hayatillah, 2025). Therefore, (Rini Fauziah, Hadiyanto, Yavelma Miaz, 2020) argue that more active and meaningful learning is needed to develop students' critical thinking skills.

Critical thinking is one of the important competencies that students need to possess in the twenty-first century. Facione (Facione, 1990) states that learning should be able to develop students' critical thinking skills, while Ennis (Ennis, 1996) defines critical thinking as reasonable and reflective thinking aimed at determining what to believe or do. With these skills, students are able to analyze information, evaluate arguments, draw conclusions, and solve problems logically.

Based on initial observations of IPAS learning in fifth grade at MIT Menara Baro, some students were still having difficulty understanding problems in their surrounding environment and explaining their relationship to the material being studied. When presented with problems related to everyday life, students tended to provide simple answers and still needed guidance to give reasons and determine solutions. This condition indicates that students' abilities to analyze problems and provide explanations based on learned concepts still need to be developed.

One learning model that can be used is the Science Technology Society (STS) Model. The STS Model is a learning model that connects science concepts with technological developments and problems found in community life. According to (Jayadiningrat et al., 2022) STS learning demonstrates a relationship with real-life contexts, enabling students to understand concepts through problems in their surroundings and become more actively involved in the learning process.

The STS Model consists of several stages, namely invitation, exploration, explanation, and taking action (Trianto, 2010). The invitation stage directs students to recognize and formulate problems related to everyday life; the exploration stage provides opportunities for students to seek information and conduct observations; the explanation stage guides students in explaining their findings and connecting them with science concepts; while the taking action stage encourages students to determine solutions or actions related to the problems identified. These stages provide

opportunities for students to analyze problems, evaluate information, draw conclusions, and provide explanations, thereby supporting the development of critical thinking skills.

The implementation of the STS Model in IPAS learning is considered capable of creating a more contextual learning experience. According to (Cakrawala, 2023) through activities involving problem identification, information analysis, and solution seeking for problems in the surrounding environment, students are trained to use critical thinking skills during the learning process. Thus, students do not merely understand scientific concepts theoretically but are also able to apply them in everyday life.

Several previous studies have shown that the STS Model has a positive effect on students' critical thinking skills. (Zainuddin & Nabilla, 2024) stated that implementing the STS Model was able to improve elementary students' critical thinking skills, particularly in analysis and conclusion-drawing. Similar results were found by (Sri Evariani et al., 2017) who reported that STS learning significantly improved critical thinking skills through learning activities that connected subject matter with real problems in society. In addition (Khairiyah & Rini, 2024) ) showed that problem-based learning was also effective in improving students' critical thinking skills. Although various studies have shown that the STS Model can improve critical thinking skills, most studies have been conducted at different educational levels, subjects, and student characteristics. Research on the implementation of the STS Model in fifth-grade IPAS learning at a Madrasah Ibtidaiyah, particularly at MIT Menara Baro, remains very limited. Therefore, this study was conducted to obtain empirical evidence regarding the effect of the STS Model on the critical thinking skills of fifth-grade students in IPAS learning at MIT Menara Baro. Based on this description, the objective of this study is to analyze the effect of the Science Technology Society (STS) Model on students' critical thinking skills in fifth-grade IPAS learning at MIT Menara Baro.

**RESEARCH METHOD**

This study employed a quasi-experimental method using a Nonequivalent Pretest Posttest Control Group Design involving two groups, namely an experimental class and a control class. Both groups were given a pretest to analyze students' initial

critical thinking skills. Subsequently, the experimental class received treatment using the Science Technology Society (STS) learning model, while the control class received conventional learning. After the treatment, both groups were given a posttest to determine the effect of implementing the STS Model on students' critical thinking skills.

The study was conducted at MIT Menara Baro during the second semester of the 2025/2026 academic year. The research sample consisted of fifth-grade students selected using purposive sampling, with Class V-A designated as the experimental class and Class V-B as the control class. The research instrument was a critical thinking skills test in the form of case-based essay questions on the Harmonious Ecosystem material. The instrument was developed based on Facione's critical thinking indicators, consisting of interpretation, analysis, evaluation, inference, and explanation (Susilowati & Sajidan, 2018). The test was administered before and after the treatment to measure changes in students' critical thinking skills. Before being used in the study, the test instrument was validated by expert validators to assess the suitability of its content, indicators, and language.

Data analysis was conducted using SPSS and included the Shapiro–Wilk normality test, Levene's Test for homogeneity, and the Mann–Whitney test for hypothesis testing. The hypotheses consisted of $H_0$, stating that there was no effect of implementing the Science Technology Society (STS) Model on students' critical thinking skills, and $H_a$, stating that there was an effect of implementing the Science Technology Society (STS) Model on students' critical thinking skills. The decision criterion was that $H_0$ was rejected and $H_a$ was accepted when the significance value was $< 0.05$.

## RESULTS AND DISCUSSION

### Research Results

### Description of Students' Critical Thinking Skills Data

Students' critical thinking skills data were obtained from the pretest and posttest results of the experimental and control classes. Descriptive analysis was conducted to provide an overview of students' critical thinking skills before and after learning. The analysis included the mean, standard deviation, minimum value, and maximum value.

Table 1. Descriptive Statistics of Critical Thingking Skills

**Descriptive Statistics**

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Pretest Eksperimen | 12 | 30.00 | 60.00 | 41.25 | 8.82 |
| Posttest Eksperimen | 12 | 80.00 | 95.00 | 87.50 | 5.43 |
| Pretest Kontrol | 10 | 40.00 | 75.00 | 47.50 | 10.86 |
| Posttest Kontrol | 10 | 40.00 | 60.00 | 54.50 | 5.98 |
| Valid N (listwise) | 10 | | | | |

Based on the table, the mean critical thinking score of students in the experimental class before treatment was 41.25, with a standard deviation of 8.82. After learning using the Science Technology Society (STS) Model, the mean increased to 87.50, with a standard deviation of 5.44. Meanwhile, in the control class, the mean pretest score was 47.50, with a standard deviation of 10.87, and increased to 54.50, with a standard deviation of 5.99 on the posttest. These results indicate that the increase in the mean critical thinking score in the experimental class was greater than that in the control class. In the experimental class, the mean increased by 46.25 points, while in the control class it increased by 7.00 points. The data were then analyzed using prerequisite tests and hypothesis testing to determine the effect of the STS Model on students' critical thinking skills.

The students' critical thinking skills data were obtained through tests administered before treatment (pretest) and after treatment (posttest). The mean pretest and posttest scores of students in the experimental and control classes are presented below.

Table 2. Mean Score of Pretest and Posttest

| Kelas | Rata-rata Pretest | Rata-rata Posttest |
|---|---|---|
| Eksperimen | 41,25 | 87,50 |
| Kontrol | 47,50 | 54,50 |

Based on the table, the mean pretest score of the control class was 47.50 and increased to 54.50 on the posttest. Meanwhile, the mean pretest score of the

experimental class was 41.25 and increased to 87.50 on the posttest. These results show that the increase in students' critical thinking skills in the experimental class was higher than in the control class after the Science Technology Society (STS) learning model was implemented.

To obtain a more detailed description of students' critical thinking skills, an analysis was conducted based on five critical thinking indicators adapted from Facione, namely interpretation, analysis, evaluation, inference, and explanation. This analysis aimed to determine students' achievement on each critical thinking indicator after the implementation of the Science Technology Society Model. The percentage for each indicator was calculated based on students' scores relative to the maximum score for each indicator.

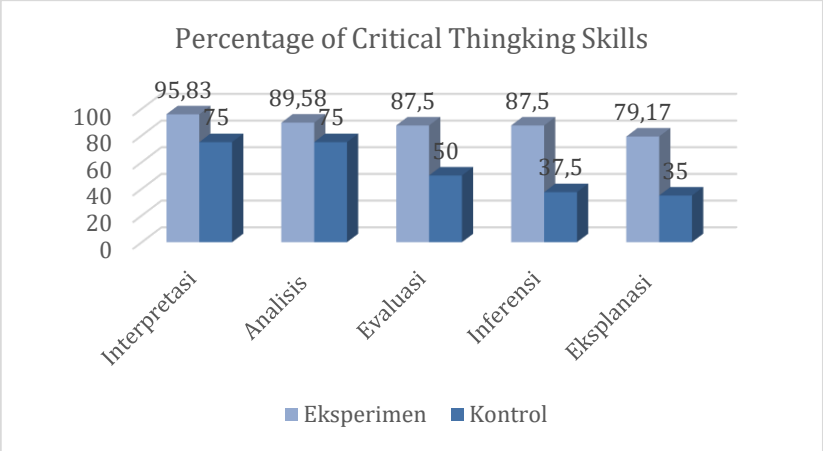


Figure 1. Percentage of Critical Thingking Skills in the Posttest

All critical thinking indicators in the experimental class obtained higher percentages than those in the control class. In the experimental class, the interpretation indicator reached 95.83%, analysis 89.58%, evaluation and inference 87.50% each, and explanation 79.17%. Meanwhile, in the control class, interpretation and analysis each reached 75%, evaluation 50%, inference 37.50%, and explanation 35%.

The highest achievement in the experimental class was the interpretation indicator at 95.83%, while the lowest was explanation at 79.17%. In the control class, interpretation and analysis were the highest indicators, each at 75%, while explanation was the lowest at 35%. The largest difference between the two classes occurred in inference, at 50 percentage points, followed by explanation at 44.17 points, evaluation at 37.50 points, interpretation at 20.83 points, and analysis at 14.58 points. These results

indicate that the experimental class achieved higher critical thinking performance on all indicators than the control class

**Normality Test**

The normality test was conducted using the Shapiro–Wilk test with the assistance of SPSS.

Table 3. Normality Test Results

**Tests of Normality**

| | | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|---|
| | Kelas | Statistic | df | Sig. | Statistic | df | Sig. |
| Hasil | Posttest B (Kontrol) | .333 | 10 | .002 | .778 | 10 | .008 |
| | Posttest A (Eksperimen) | .261 | 12 | .024 | .869 | 12 | .063 |

a. Lilliefors Significance Correction

The significance value for the control-class posttest was 0.008 (< 0.05), indicating that the data were not normally distributed. Meanwhile, the significance value for the experimental-class posttest was 0.063 (> 0.05), indicating that the data were normally distributed. Because one group, namely the control class, had non-normally distributed data, the hypothesis was tested using the nonparametric Mann–Whitney test

**Homogeneity Test**

The homogeneity test was conducted to determine the equality of variances between the experimental and control classes

Table 4. Homogeneity Test Results

**Test of Homogeneity of Variance**

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Nilai | Based on Mean | .267 | 1 | 20 | .611 |
| | Based on Median | .123 | 1 | 20 | .729 |
| | Based on Median and with adjusted df | .123 | 1 | 19.677 | .730 |
| | Based on trimmed mean | .465 | 1 | 20 | .503 |

Based on the test results, the significance value was 0.611 > 0.05. Therefore, the data from the two groups had homogeneous variances.

**Hypothesis Test**

Hypothesis testing was conducted using the Mann–Whitney test because one of the research groups had non-normally distributed data. This test was used to determine whether there was a difference in students' critical thinking skills between the experimental class, which received learning using the Science Technology Society (STS) Model, and the control class, which did not receive the STS Model.

Table 5. Mann-Whitney Test Results

**Ranks**

| | Kelas | N | Mean Rank | Sum of Ranks |
|---|---|---|---|---|
| Nilai | Postest Kontrol | 10 | 5.50 | 55.00 |
| | Postest Eksperimen | 12 | 16.50 | 198.00 |
| | Total | 22 | | |

**Test Statistics[a]**

| | Nilai |
|---|---|
| Mann-Whitney U | .000 |
| Wilcoxon W | 55.000 |
| Z | -4.013 |
| Asymp. Sig. (2-tailed) | .000 |
| Exact Sig. [2*(1-tailed Sig.)] | .000[b] |

a. Grouping Variable: Kelas
b. Not corrected for ties.

Based on the test results, the Asymp. Sig. (2-tailed) value was 0.000 < 0.05. Thus, $H_0$ was rejected and $H_a$ was accepted. These results indicate that the Science Technology Society (STS) Model had an effect on students' critical thinking skills in IPAS learning in fifth grade at MIT Menara Baro. In addition, the mean rank was 16.50 for the experimental class and 5.50 for the control class, indicating that students' critical thinking skills in the experimental class were higher than those in the control class.

**Discussion**

The results showed that students' critical thinking skills in the experimental class increased more substantially than those in the control class. The mean score in the experimental class increased from 41.25 on the pretest to 87.50 on the posttest, while the control class increased from 47.50 to 54.50. The Mann–Whitney test showed an Asymp. Sig. (2-tailed) value of 0.000 < 0.05, indicating a significant difference in critical thinking skills between the experimental and control classes. These findings

indicate that implementing the Science Technology Society (STS) Model provided a learning experience that better supported the development of students' critical thinking skills. This finding is consistent with (Amilia et al., 2022) who reported an effect of the STS learning model on students' critical thinking skills.

The improvement in critical thinking skills in this study was related to the implementation of the STS Model stages in the Harmonious Ecosystem material, particularly environmental cleanliness. At the invitation stage, students were presented with waste-related problems that were close to their everyday lives, requiring them to understand and identify the problems. At the exploration stage, students sought information about the causes and impacts of waste on the environment and discussed them in groups. These activities encouraged students to analyze information and relate it to ecosystem conditions. At the explanation stage, students presented their thoughts about the relationship between waste, environmental cleanliness, and ecosystem balance. At the taking action stage, students determined solutions or actions that could be taken to maintain environmental cleanliness. Thus, STS learning activities provided opportunities for students to use critical thinking skills through the processes of understanding problems, analyzing information, evaluating solutions, drawing conclusions, and explaining their ideas.

The posttest results for each indicator showed that the experimental class achieved higher performance than the control class. Interpretation was the highest indicator in the experimental class at 95.83%, followed by analysis at 89.58%, and evaluation and inference at 87.50% each. These achievements indicate that STS learning activities involving waste-related problems helped students understand and identify problems, analyze information about the causes and impacts of waste, evaluate solutions, and draw conclusions. Meanwhile, explanation reached 79.17% and was the lowest indicator in the experimental class, although it was still higher than the control class, which reached 35%. This finding is consistent with (Salamah et al., 2022) who developed a digital student worksheet based on critical thinking skills for the fifth-grade ecosystem theme and showed that ecosystem material can be developed through learning oriented toward critical thinking skills.

The relationship among the STS Model, critical thinking skills, and the Harmonious Ecosystem material can be seen through the use of waste-related

problems as the learning context. Students did not merely study environmental cleanliness as a concept but also understood that waste can affect environmental conditions and ecosystem balance. This finding is consistent with (Angel et al., 2025) who showed that learning models connecting ecosystem material with sustainability contexts can improve the critical thinking skills of fifth-grade students. The use of environmental problems in learning provides opportunities for students to connect the concepts they learn with real conditions around them. Therefore, implementing the STS Model in learning about environmental cleanliness and waste not only helps students understand ecosystem material but also creates a learning experience that encourages them to directly use critical thinking skills. The results of this study strengthen previous findings that learning integrating science with real-life problems and everyday contexts can serve as an effective context for developing students' critical thinking skills.

**CONCLUSION**

Based on the research results, it can be concluded that the Science Technology Society (STS) Model had a significant effect on the critical thinking skills of fifth-grade students at MIT Menara Baro. This is evidenced by the Mann–Whitney test, which showed a significance value of $0.000 < 0.05$, indicating that $H_0$ was rejected and $H_a$ was accepted. In addition, the mean posttest score of the experimental class was higher than that of the control class. The implementation of the STS Model was able to improve students' critical thinking skills because it actively involved students in identifying problems, analyzing information, evaluating alternative solutions, and drawing conclusions based on problems related to everyday life. Therefore, the Science Technology Society (STS) Model can be recommended as an alternative learning model for improving students' critical thinking skills in elementary IPAS learning

**REFERENCES**

Amilia, R., Wirahayu, Y. A., & Hartono, R. (2022). *Pengaruh model pembelajaran Sains Teknologi Masyarakat ( STM ) berbantuan buku teks digital terhadap kemampuan berpikir kritis siswa*. *2*(2), 104–115. https://doi.org/10.17977/um063v2i22022p104-115

Angel, T., Amsal, W., Putri, R., Haerani, R., Suhartini, E., Fkip, P., & Mulawarman, U. (2025). *1 , 2 , 3 123*. *10*, 271–279.

Cakrawala, R. (2023). "Penerapan Model Pembelajaran Sains Teknologi Masyarakat dalam Pembelajaran IPA di SD,." *Jurnal Pendidikan Guru Sekolah Dasar 7, No. 2*, 132–135.

Ennis, R. H. (1996). Critical Thinking (Upper Saddle River,. *NJ: Prentice Hall*, 25.

Facione, P. A. (1990). Critical Thinking : A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction Executive Summary " The Delphi Report. *The California Academic Press*, *423*(c), 1–19. http://www.insightassessment.com/pdf_files/DEXadobe.PDF

Jayadiningrat, M. G., Widiana, I. W., Tria Ariani, N. W., & Widiani, N. K. (2022). Model Pembelajaran Sains Teknologi Masyarakat (STM) DAN Penilaian Autentik terhadap Hasil Belajar Siswa. *Jurnal Pedagogi Dan Pembelajaran*, *5*(3), 394–402. https://doi.org/10.23887/jp2.v5i3.50268

Khairiyah, A., & Rini, T. P. W. (2024). Meningkatkan Keterampilan Berpikir Kritis Menggunakan Model Problem Based Learningdi Kelas V Sd. *Jurnal Review Pendidikan Dan Pengajaran*, *7*(4), 12801–12807.

Oviana, W., & Hayatillah, R. (2025). *Upaya Menumbuhkan Keterampilan Proses Sains Siswa Sekolah Dasar Melalui Implementasi Model Etno Inkuiri*. 1–11. https://doi.org/10.26811/hzv1t479

Rini Fauziah, Hadiyanto, Yavelma Miaz, Y. F. (2020). Pengaruh Model Sains Teknologi Masyarakat terhadap Aktivitas dan Hasil Belajar Siswa di Sekolah Dasar. *Jurnal Basicedu*, *5*(5), 3(2), 524–532. https://journal.uii.ac.id/ajie/article/view/971

Salamah, U. U., Eko, S., Widoyoko, P., & Ngazizah, N. (2022). *Pengembangan Lembar Kerja Siswa Digital Berbasis Critical Thinking Skill Pada Tema Ekosistem Kelas V Sekolah Dasar*. *8*(2), 687–695. https://doi.org/10.31949/educatio.v8i2.2152

Sri Evariani, N. G. A. M., Kertih, I. W., & Akhmad Haris, I. (2017). Model Pembelajaran Sains Teknologi Masyarakat (Stm), Keterampilan Berpikir Kritis, Dan Prestasi Belajar Ips. *Jurnal Pendidikan IPS Indonesia*, *1*(1), 38–46. https://doi.org/10.23887/pips.v1i1.2823

Susilowati, Sajidan, M. R. (2018). *KEEFEKTIFAN PERANGKAT PEMBELAJARAN BERBASISINQUIRYLESSONUNTUK MENINGKATKAN KETERAMPILAN BERPIKIR KRITIS SISWA*. *22*(1), 49–60.

Trianto. (2010). *Model Pembelajaran Terpadu: Konsep, Strategi, dan Implementasinya dalam KTSP*. Jakarta: Bumu Aksara.

Zainuddin, Z., & Nabilla, D. (2024). Penerapan Model Sains Teknologi Dan Masyarakat (STM) Untuk Menigkatkan Kemampuan Berpikir Kritis Siswa Sekolah Dasar. *Science and Education Journal (SICEDU)*, *3*(3), 290–298. https://doi.org/10.31004/sicedu.v3i3.213