MIKAILALSYS
Journal of Multidisciplinary Sciences

e-ISSN : 2987-2286
p-ISSN : 2987-3924

Index: Harvard, Boston, Sydney, Copernicus, Sinta 4, Scilit, Semantic, Google, etc

https://doi.org/10.58578/mikailalsys.v4i2.11211

Improving Elementary Students' Critical Thinking through Problem Solving Assisted by Questions Box Challenge in Science Learning

Nelin Maghfiroh & Ela Suryani
Ngudi Waluyo University, Indonesia
nelinnm19@gmail.com; elasuryani@unw.ac.id

Article Info:

Submitted:	Revised:	Accepted:	Published:
May 29, 2026	Jun 26, 2026	Jul 8, 2026	Jul 13, 2026

Abstract

Critical thinking remains a major challenge in elementary science education, as many students experience difficulty identifying problems, selecting relevant information, justifying their reasoning, and drawing logical conclusions. This study aimed to examine differences in critical thinking skills between students taught through the Problem-Solving learning model assisted by Questions Box Challenge media and those receiving conventional instruction, as well as to determine the model's effect on critical thinking skills. A quantitative quasi-experimental approach with a nonequivalent control group design was employed. The participants comprised 50 fifth-grade students at SD Negeri Harjosari 01, with 25 students in Class V-A assigned to the experimental group and 25 students in Class V-B assigned to the control group. The study was conducted from May to July 2026 over three learning sessions on the human respiratory system. Data were collected through essay-based pretests and posttests, questionnaires, observations, interviews, and documentation. The test instrument consisted of 15 items developed according to Ennis' critical thinking indicators. Data were analyzed using normality and homogeneity tests, an

Mikailalsys is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License

independent-samples t test, and simple linear regression. The experimental group achieved a higher mean posttest score than the control group (75.60 vs. 63.00), and the independent-samples t test indicated a statistically significant difference between the groups ($p < .001$). Regression analysis further demonstrated a significant effect ($t_{count} = 8.059 > t_{table} = 2.011$, $p < .001$), with the learning model explaining 57.5% of the variance in students' critical thinking skills. These findings demonstrate that integrating problem-solving stages with question-based media can effectively strengthen students' abilities to interpret problems, analyze relevant information, justify responses, and formulate logical conclusions. The study contributes empirical evidence supporting interactive problem-solving instruction as a practical strategy for improving critical thinking in elementary science classrooms.

Keywords: Critical Thinking Skills; Elementary Science Education; Problem-Solving Learning; Questions Box Challenge; Quasi-Experimental Study

INTRODUCTION

Critical thinking is an essential skill in elementary education because students are expected to examine information, identify problems, explain reasons, and draw logical conclusions. Science learning provides an appropriate context for developing this skill because its topics are closely related to natural phenomena and students' daily experiences. Science learning can train students to observe events and explain natural phenomena through relevant concepts (Adella et al., 2022). Critical thinking is also important for elementary students in facing twenty-first-century learning demands (Azura et al., 2023).

The human respiratory system is a science topic that is close to students' lives. Students often encounter situations such as breathing faster after running, coughing because of dust, or feeling uncomfortable near vehicle smoke (Julianti et al., 2025). These situations can be used as learning contexts that encourage students to analyze causes, select relevant information, and provide reasoned answers. Learning on the respiratory system needs to connect scientific concepts with students' concrete experiences (Pane, 2024). Science learning should also guide students to formulate answers based on logical reasons (Pratiwi & Setyaningtyas, 2020).

Preliminary findings at SD Negeri Harjosari 01 showed that fifth-grade students' critical thinking skills still needed improvement. The preliminary study used essay questions related to the human respiratory system and referred to Ennis' critical thinking indicators. Class V-A obtained an average score of 16.53%, while Class V-B obtained 22.93%. The

lowest indicators in Class V-A were advanced clarification at 9.33% and strategies and tactics at 8.00%. Class V-B showed a slightly higher result, but inference and advanced clarification were still low at 18.67%. Critical thinking assessment requires clear indicators so that students' reasoning can be measured more precisely (Ennis, 2011). The indicators used in this study also followed the development of critical thinking instruments based on Ennis' framework (Setyawan, 2022).

Teacher interviews and classroom observations supported the preliminary findings (Hidayati et al., 2023). Science learning was still commonly conducted through teacher explanation, question-and-answer activities, and assignments. Student participation was uneven, and some students tended to wait for teacher direction before answering questions. Many students also gave short answers without explaining the relationship between the problem and the science concept. This condition indicates that learning needs to provide more opportunities for students to read about problems, discuss ideas, explain reasons, and draw conclusions.

Problem Solving was selected because this model places problems at the center of learning. Students are guided to understand problems, predict answers, collect information, analyze data, arrange solutions, and conclude the results. Problem Solving provides a structured learning sequence that helps students process information before making conclusions (Gustia et al., 2022). The model is also suitable for elementary science learning because it trains students to define problems and find appropriate solutions (Karmila & Samosir, 2023).

Questions Box Challenge was used as supporting media in this study. This medium consists of a box containing question cards or challenge cards related to the human respiratory system. Students take question cards, read the problem, discuss possible answers, explain reasons, and formulate conclusions. Question Box media can help elementary students participate more actively in learning activities (Afifah et al., 2020). Question-based media can also support science learning because students are invited to respond to problems through discussion and reasoning (Zulherman et al., 2021). Learning media that actively involve students can increase participation and create more meaningful learning experiences in elementary classrooms (Suryani & Rini, 2023).

Previous studies have used Problem Solving with various media, such as mind mapping, Canva, miniature media, cards, and comics. Janah & Suryani (2022) found that

Problem Solving assisted by mind mapping influenced students' conceptual understanding. Mekarsariningtyas & Rizqi (2024) reported that Problem Solving assisted by Canva affected elementary students' problem-solving ability. Astuti et al. (2023) showed that Problem Solving assisted by miniature water cycle media improved fifth-grade students' critical thinking skills. Limited studies, however, specifically combine Problem Solving with Questions Box Challenge to improve elementary students' critical thinking in science learning. This study aimed to examine the difference in critical thinking skills between students taught through Problem Solving assisted by Questions Box Challenge and students taught through conventional learning. This study also examined the contribution of Problem Solving assisted by Questions Box Challenge to fifth-grade students' critical thinking skills.

METHODS

This study used a quantitative approach with a quasi-experimental method. The research design was a nonequivalent control group design. This design involved an experimental group and a control group. Both groups were given a pretest before learning and a posttest after learning. The experimental group learned through Problem Solving assisted by Questions Box Challenge, while the control group learned through conventional instruction. The nonequivalent control group design is appropriate when existing classes are used as research groups (Sugiyono, 2019).

The study was conducted at SD Negeri Harjosari 01 in May-July 2026 through three meetings on the human respiratory system. The sample consisted of 50 fifth-grade students. Class V-A, consisting of 25 students, was assigned as the experimental group because its preliminary critical thinking score was lower. Class V-B, consisting of 25 students, was assigned as the control group. The sampling technique was purposive sampling because the groups were selected based on preliminary data and research needs. Purposive sampling allows researchers to determine samples based on specific considerations related to the research objectives (Sugiyono, 2021).

The independent variable was Problem Solving assisted by Questions Box Challenge. The dependent variable was students' critical thinking skills. Critical thinking was measured using five indicators: elementary clarification, basic support, inference, advanced clarification, and strategies and tactics. These indicators represent students' ability to identify

problems, select information, draw conclusions, explain reasons, and determine appropriate actions (Betu' et al., 2024).

The learning procedure in the experimental group followed the Problem Solving stages. The teacher first introduced a problem related to the human respiratory system. Students then took a question card from Questions Box Challenge, identified the main problem, predicted possible answers, collected information, discussed the answer, and presented conclusions. The control group learned the same topic through teacher explanation, question-and-answer activities, and assignments.

Data were collected through test and non-test techniques. The test technique used essay-based pretest and posttest questions. The instrument consisted of 15 valid essay items, with three items for each critical thinking indicator. Non-test techniques included questionnaires, observation, teacher interviews, and documentation. The questionnaires were used as supporting data, while observation recorded the implementation of learning.

Instrument quality was examined through expert validation, validity testing, reliability testing, difficulty level analysis, and discriminating power analysis. Expert validation showed that the critical thinking test obtained an average validity score of 4.88. The Questions Box Challenge media obtained an average validity score of 5.00. The reliability test showed a Cronbach's Alpha value of 0.941 for the critical thinking test. The student critical thinking questionnaire obtained 0.746, while the student response questionnaire obtained 0.747. These results indicate that the instruments were valid and reliable.

Data were analyzed using IBM SPSS Statistics 26. The prerequisite tests consisted of Shapiro-Wilk normality test and Levene's homogeneity test. The independent sample t-test was used to examine differences between the experimental and control groups. Simple linear regression was used to examine the contribution of Problem Solving assisted by Questions Box Challenge to students' critical thinking skills. The significance level used in this study was 0.05.

RESULTS

1. Preliminary Data on Students' Critical Thinking Skills

The preliminary study was conducted to identify the initial condition of students' critical thinking skills before the research treatment. The results are presented in Table 1.

Table 1. Preliminary Critical Thinking Skills of Fifth-Grade Students

Critical Thinking Indicator	Class V-A	Class V-B	Average
Elementary clarification	25.33%	24.00%	24.67%
Basic support	22.67%	29.33%	26.00%
Inference	17.33%	18.67%	18.00%
Advanced clarification	9.33%	18.67%	14.00%
Strategies and tactics	8.00%	24.00%	16.00%
Average	16.53%	22.93%	19.73%

Table 1 shows that the preliminary critical thinking skills of both classes were still low. Class V-A obtained an average score of 16.53%, while Class V-B obtained 22.93%. The lowest indicators were advanced clarification and strategies and tactics. These findings indicate that students had difficulty explaining reasons and determining appropriate actions based on science problems. The preliminary result became the basis for selecting Class V-A as the experimental group and Class V-B as the control group.

2. Difference in Critical Thinking Skills Between Experimental and Control Groups

An independent sample t-test was conducted to determine whether there was a significant difference in students' critical thinking skills between the experimental and control groups. The results are presented in Table 2.

Tabel 2. An Independent Sample T-test

Class	Mean	Sig. Hitung
Experimental groub	75,60	0,000
Control groub	63,00	0,000

Table 2 shows that the mean score of the experimental group was 75.60, while the mean score of the control group was 63.00. The experimental group obtained a higher mean score by 12.60 points. The significance value was 0.000, which was lower than 0.05. Therefore, H_0 was rejected and H_a was accepted. This result means that there was a significant difference in critical thinking skills between students taught using the Problem-Solving learning model assisted by Questions Box Challenge media and students taught using conventional learning.

3. Supporting Data from Critical Thinking Questionnaire

The student critical thinking questionnaire was used as supporting data. The results are presented in Table 3.

Table 3. Student Critical Thinking Questionnaire Results

Group	Average Percentage	Category
Experimental group	60.53%	Moderate
Control group	50.13%	Moderate

Table 3 shows that the experimental group obtained a higher questionnaire result than the control group. Although both groups were still in the moderate category, the experimental group was 10.40% higher. This result supports the test findings and shows that students who learned using the Problem-Solving model assisted by Questions Box Challenge media showed better critical thinking tendencies.

4. Effect of the Problem-Solving Learning Model Assisted by Questions Box Challenge Media

Simple linear regression analysis was conducted to determine the effect of the learning model on students' critical thinking skills. The ANOVA result is presented in Table 4.

Table 4. Regression ANOVA Result

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	840,500	1	840,500	64,954	0,000
Residual	621,120	48	12,940		
Total	1461,620	49			

a. Dependent Variable: Critical Thinking Skills

b. Predictors: (Constant), Problem Solving Media Questions Box Challenge

Table 4 shows that the regression significance value was 0.000, which was lower than 0.05. This result indicates that the regression model was statistically significant. Therefore, the Problem-Solving learning model assisted by Questions Box Challenge media had an effect on fifth-grade students' critical thinking skills.

Tabel 5. Tabel Regression Coefficients

Model	Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
(Constant)	28,960	1,609		18,002	0,000
Problem Solving Media Questions Box Challenge	8,200	1,017	0,758	8,059	0,000

Table 5 shows that the tcount value was 8.059. The ttable value at df = 48 and a significance level of 0.05 was 2.011. Since tcount was greater than ttable, H_0 was rejected and H_a was accepted. The significance value was 0.000, which was lower than 0.05. This means that the Problem-Solving learning model assisted by Questions Box Challenge media had a significant effect on students' critical thinking skills.

Table 6. Regression Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.758	0.575	0.566	3.597

Table 6 shows that the R Square value was 0.575. This means that the Problem-Solving learning model assisted by Questions Box Challenge media contributed 57.5% to students' critical thinking skills. The remaining 42.5% was influenced by other factors not examined in this study, such as students' initial ability, motivation, discussion habits, classroom interaction, and learning environment.

5. Student Response and Learning Implementation

The student response questionnaire was used to obtain supporting data on the learning process. The results are presented in Table 7.

Table 7. Student Response to the Learning Process

Group	Percentage	Category
Experimental group	50.13%	Moderate
Control group	42.93%	Moderate

Table 7 shows that the experimental group gave a higher response than the control group. The difference between both groups was 7.20%. This result indicates that students responded more positively to learning activities that involved problem-solving stages and Questions Box Challenge media.

Observation was conducted to assess the implementation of the learning process in the experimental group. The results are presented in Table 8.

Table 8. Observation of Learning Implementation

Meeting	Score	Percentage	Average Score	Category
Meeting 1	46	77%	3.07	Very good
Meeting 2	52	87%	3.47	Very good
Meeting 3	56	93%	3.73	Very good
Overall	154	85.56%	3.42	Very good

Table 8 shows that the implementation of the Problem-Solving learning model assisted by Questions Box Challenge media improved in each meeting. The percentage increased from 77% in the first meeting to 93% in the third meeting. Overall, the learning implementation reached 85.56%, categorized as very good. This result shows that the learning process was carried out according to the designed stages.

DISCUSSION

The findings show that Problem Solving assisted by Questions Box Challenge improved elementary students' critical thinking in science learning. The experimental group

obtained a higher mean score than the control group after participating in learning activities that required students to identify problems, discuss information, give reasons, and draw conclusions. This result suggests that critical thinking develops better when students are guided to process problems actively rather than only receive teacher explanations.

The improvement can be explained through the structure of Problem Solving. This model requires students to observe a problem, predict possible answers, collect information, analyze data, and formulate conclusions (Martir et al., 2024). These stages are relevant to critical thinking because students are trained to understand the problem before giving an answer. Problem Solving encourages students to process information through structured stages (Susanto & Airlanda, 2023).

Questions Box Challenge strengthened the learning process by providing question cards as concrete learning stimuli. Students did not only receive questions from the teacher but also took challenge cards and discussed the answers with peers. This activity encouraged students to read problems, select relevant information, explain reasons, and communicate conclusions (Kurnianto et al., 2024). Critical thinking is related to reflective and reasonable thinking when deciding what to believe or do (Dewi et al., 2024). The indicators used in this study also support the measurement of students' ability to identify problems, provide reasons, and determine strategies (Rahmawati et al., 2023).

The findings are consistent with previous studies on Problem Solving and media-assisted learning. Janah and Suryani (2022) found that Problem Solving assisted by mind mapping affected students' conceptual understanding. Mekarsariningtyas and Rizqi (2024) also reported that Problem Solving assisted by Canva influenced elementary students' problem-solving ability. Muryani & Purwanti (2021) found that inquiry learning assisted by Kahoot affected elementary students' critical thinking skills. Putra et al. (2021) showed that problem-based learning improved students' mathematical problem-solving ability. These findings indicate that active learning supported by suitable media can strengthen students' reasoning processes.

The regression result also shows that Problem Solving assisted by Questions Box Challenge contributed 57.5% to students' critical thinking skills. This contribution is meaningful because critical thinking is influenced by many factors. Learning motivation, classroom interaction, prior knowledge, reading ability, and learning environment may also influence students' performance. Elementary students' critical thinking skills are influenced by internal and external learning factors (Diatmika & Sudirman, 2024).

This study has practical implications for elementary science learning. Questions Box Challenge is simple, concrete, and easy to use in classroom settings. The media can support teachers in creating active learning without requiring advanced technology. The same format can also be adapted to other science topics, such as the water cycle, environmental pollution, force and motion, or living things.

Several limitations should be acknowledged. The study involved only two fifth-grade classes from one elementary school, so the findings cannot be generalized widely. The topic was limited to the human respiratory system. The intervention was conducted in three meetings, so the long-term retention of students' critical thinking skills was not examined. Future studies can involve broader samples, apply the model to different science topics, and add deeper qualitative data to explain students' thinking processes.

CONCLUSION

The study concludes that there is a significant difference in critical thinking skills between students taught using the Problem-Solving learning model assisted by Questions Box Challenge media and students taught using conventional learning. The experimental group obtained a higher mean score than the control group, namely 75.60 compared to 63.00. The independent sample t-test showed a significance value of $0.000 < 0.05$, meaning that the difference between the two groups was statistically significant.

The Problem-Solving learning model assisted by Questions Box Challenge media also had a significant effect on fifth-grade students' critical thinking skills. The regression test showed that tcount = 8.059 was greater than ttable = 2.011, with a significance value of 0.000. The R Square value of 0.575 indicates that the model contributed 57.5% to students' critical thinking skills. These findings show that structured problem-solving stages combined with question-based media can help students identify problems, select information, explain reasons, and draw conclusions in elementary science learning.

This study contributes to elementary science education by offering an instructional strategy that combines a thinking-oriented learning model with simple and interactive media. Teachers can use Questions Box Challenge media as an alternative tool to make science learning more active, especially when the learning objective is related to critical thinking. Future studies are recommended to apply this model to different science topics, involve broader samples, and examine the long-term impact of the learning model on students' critical thinking, communication, and problem-solving skills.

REFERENCES

Adella, B., Fadhilaturrahmi, & Marta, R. (2022). Peningkatan Kemampuan Berpikir Kritis Siswa Menggunakan Model Creative Problem Solving (CPS) di Sekolah Dasar. *MODELING: Jurnal Program Studi PGMI, 9*(4), 149–158.

Afifah, N. A. Y., Soegeng, Y., & Mudzanatun. (2020). Keefektifan Model Pembelajaran Talking Stick Berbantu Media Question Box terhadap Hasil Belajar Tematik Siswa Kelas III SD. *Jurnal Pedagogi dan Pembelajaran, 3*(3), 449–458. https://doi.org/10.23887/jp2.v3i3.28375

Azura, A. R., Suryanti, & Hariyono, E. (2023). Science teaching materials based on field trips with local wisdom to improve elementary school students' critical thinking. *International Journal of Current Educational Research, 2*(2), 115–127. https://doi.org/10.53621/ijocer.v2i2.240

Betu, J., Patandean, A. J., & Burhan. (2024). Pengaruh Model Pembelajaran Berbasis Proyek Berbantuan Media Puzzle terhadap Kemampuan Berpikir Kritis Siswa Sekolah Dasar. *Bosowa Journal of Education, 5*(1), 116–120. https://doi.org/10.35965/bje.v5i1.5277

Dewi, P. A. G., Wiarta, I. W., & Kristiantari, M. G. R. (2024). Model Pembelajaran Problem Solving Berbantuan Permainan Mino Card terhadap Berpikir Kritis pada Pembelajaran Matematika. *Jurnal Ilmiah Pendidikan Profesi Guru, 7*(1), 160–171. https://doi.org/10.23887/jippg.v7i1.75141

Diatmika, I. P., & Sudirman, I. N. (2024). Analisis Kemampuan Berpikir Kritis Siswa dalam Pembelajaran IPAS di Sekolah Dasar Kelas V SDN 2 Batur. *Pentagon: Jurnal Matematika dan Ilmu Pengetahuan Alam, 2*(4), 108–117. https://doi.org/10.62383/pentagon.v2i4.295

Ennis, R. H. (2011). *The nature of critical thinking: An outline of critical thinking dispositions and abilities*. University of Illinois. https://education.illinois.edu/docs/default-source/faculty-documents/robert-ennis/thenatureofcriticalthinking_51711_000.pdf

Gustia, T., Tanjung, I. F., & Safitri, I. (2022). Pengaruh Model Pembelajaran Problem Solving terhadap Kemampuan Berpikir Kritis Siswa. *Jurnal Pendidikan dan Konseling, 4*(6), 10065–10072.

Hidayati, N., Suryanti, & Cahaya, N. (2023). The potential for the development of critical thinking tests: An overview of educators' perceptions. *Jurnal Kependidikan: Jurnal Hasil Penelitian dan Kajian Kepustakaan di Bidang Pendidikan, Pengajaran, dan Pembelajaran, 9*(1), 56–65. https://doi.org/10.33394/jk.v9i1.6794

Janah, S., & Suryani, E. (2022). Pengaruh Model Pembelajaran Problem Solving Berbantuan Mind Mapping terhadap Pemahaman Konsep Siswa Kelas IV. *JISPE: Journal of Islamic Primary Education, 3*(1), 31–36.

Julianti, R. Y., Anggoro, B. S., & Pratiwi, D. D. (2025). Pengaruh Model LOK-R Berbantuan Question Box terhadap Berpikir Kritis dan Self-Awareness Siswa SMP. *Pendas: Jurnal Ilmiah Pendidikan Dasar, 10*(3), 208–220. https://doi.org/10.23969/jp.v10i3.29209

Karmila, M., & Samosir, H. T. G. (2023). Penerapan Model Pembelajaran Problem Solving dalam Pembelajaran IPA untuk Meningkatkan Kemampuan Siswa pada Materi Siklus Makhluk Hidup di Kelas IV SD Negeri 1 Cidahu. *Jurnal Review Pendidikan dan Pengajaran, 6*(4), 4359–4366. https://doi.org/10.31004/jrpp.v6i4.21646

Kurnianto, I., Ismaya, E. A., & Pratiwi, I. A. (2024). Pengaruh Model Problem Based Learning Berbantuan Media Rimba terhadap Kemampuan Berpikir Kritis Siswa Sekolah Dasar. *Jurnal Basicedu, 8*(4), 2647–2659. https://doi.org/10.31004/basicedu.v8i4.8178

Martir, L., Sayangan, Y. V., & Beku, V. Y. (2024). Penerapan Model Pembelajaran Discovery Learning dalam Meningkatkan Kemampuan Berpikir Kritis Siswa Sekolah Dasar pada Pembelajaran IPAS. *Jurnal Pendidikan MIPA, 14*(3), 757–766. https://doi.org/10.37630/jpm.v14i3.1829

Maulida, U., Suryawan, A., & Mardiana, T. (2023). Pengaruh Model Pembelajaran Problem Solving Berbantuan Media Miniatur Siklus Air terhadap Kemampuan Berpikir Kritis Siswa Kelas V di SD Negeri Blondo. *Borobudur Educational Review, 3*(2), 42–51. https://doi.org/10.31603/bedr.11051

Mekarsariningtyas, D. P., & Rizqi, H. Y. (2024). Pengaruh Model Pembelajaran Problem Solving Berbantuan Canva terhadap Kemampuan Pemecahan Masalah Siswa SD Negeri Ungaran 01. *Media Penelitian Pendidikan: Jurnal Penelitian dalam Bidang Pendidikan dan Pengajaran, 18*(1), 15–20. https://doi.org/10.26877/mpp.v18i1.18124

Muryani, A., & Purwanti, K. Y. (2021). Pengaruh Model Inkuiri Berbantuan Media Kahoot terhadap Kemampuan Berpikir Kritis Siswa Kelas IV. *JANACITTA: Journal of Primary and Children's Education, 4*(1), 1–12.

Pane, N. Z. (2024). *Penerapan Media Torso untuk Meningkatkan Hasil Belajar Siswa pada Pokok Bahasan Sistem Pernapasan Manusia di Kelas V UPTD SD Negeri 19 Langgapayung Kabupaten Labuhan Batu Selatan* [Undergraduate thesis, UIN Syekh Ali Hasan Ahmad Addary Padangsidimpuan]. https://etd.uinsyahada.ac.id/11970

Pratiwi, E. T., & Setyaningtyas, E. W. (2020). Kemampuan Berpikir Kritis Siswa melalui Model Pembelajaran Problem Based Learning dan Model Pembelajaran Project Based Learning. *Jurnal Basicedu, 4*(2), 379–388. https://doi.org/10.31004/basicedu.v4i2.362

Putra, L. V., Suryani, E., Kinasih, O. S., & Utami, W. T. (2021). Improving students' mathematical problem-solving abilities by using a problem-based learning approach. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika, 10*(1), 457–466. https://doi.org/10.24127/ajpm.v10i1.3315

Rahmawati, H., Pujiastuti, P., & Cahyaningtyas, A. P. (2023). Kategorisasi Kemampuan Berpikir Kritis Siswa Kelas Empat Sekolah Dasar di SD se-Gugus II Kapanewon Playen, Gunung Kidul. *Jurnal Pendidikan dan Kebudayaan, 8*(1), 88–104. https://doi.org/10.24832/jpnk.v8i1.3338

Setyawan, J. (2022). Pengembangan Instrumen Tes Kemampuan Berpikir Kritis Berbasis Indikator Ennis. *Jurnal Ilmiah Pendidikan Sains, 3*(2), 166–180.

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

Sugiyono. (2021). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D* (3rd ed.). Alfabeta.

Suryani, E., & Rini, Z. R. (2023). Pengembangan E-LKPD Berbasis SETS untuk Meningkatkan Aktivitas Belajar Siswa Sekolah Dasar. *Scholaria: Jurnal Pendidikan dan Kebudayaan, 13*(2), 158–167. https://doi.org/10.24246/j.js.2023.v13.i2.p158-167

Susanto, F. S., & Airlanda, G. S. (2023). Efektivitas Model Problem Based Learning dan Problem Solving untuk Meningkatkan Kemampuan Berpikir Kritis Siswa dalam

Pembelajaran IPAS. *Jurnal Basicedu, 7*(6), 3646–3653. https://doi.org/10.31004/basicedu.v7i6.6353

Zulherman, Iba, K., Paramita, A. A., Supriansyah, & Aji, G. B. (2021). The influence of the Question Box media-assisted Teams Games Tournament model on science learning outcomes at elementary school. *Sekolah Dasar: Kajian Teori dan Praktik Pendidikan, 30*(1), 88–96. https://doi.org/10.17977/um009v30i12021p088