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THE IMPACT OF DEEP LEARNING INTEGRATED WITH SPEDOMATIK MEDIA ON ENHANCING CRITICAL THINKING SKILLS IN ELEMENTARY EDUCATION

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ABSTRACT
This study examines the impact of Deep Learning integrated with Spedomatik Media on enhancing critical thinking skills among elementary school students. Using a quasi-experimental design with a one-group pretest-posttest method, the research was conducted with second-grade students at SDN 1 Sumberagung. Results demonstrated significant improvement in students' critical thinking skills, with classical learning mastery increasing from 0% in the pretest to 80% in the posttest. Statistical analysis confirmed the approach contributed substantially to critical thinking development. The integration of Deep Learning principles with interactive media fostered active participation, reflection, and collaborative learning. These findings suggest that Deep Learning with Spedomatik Media serves as an effective strategy for developing critical thinking skills, aligning with the demands of 21st-century education.

INTRODUCTIONS

The Indonesian education system is currently undergoing a significant paradigm shift in response to dynamic global developments. According to Hattie, focus of 21st-century education has moved from simply requiring students to memorize information to emphasizing deep understanding, critical analysis, and the creation of knowledge-based solutions (Hendrianty et al., 2024). This transformation necessitates that students not only master academic content but also develop essential global competencies to address complex future challenges (Soghomonyan & Karapetyan, 2023).

Fullan et al. (2018) emphasize six global competencies that students must possess to face the challenges of the 21st century: character, citizenship, collaboration, communication, creativity, and critical thinking. In line with this, Redhana (2019) highlights four key skills that should be developed through the educational process: critical thinking and problem-solving, creativity and innovation, collaboration, and communication. Among these skills, critical thinking is increasingly recognized as one of the most important competencies in modern education.

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Critical thinking is recognized as a fundamental competency that enables students to analyze information, evaluate arguments, and make rational decisions. Recent studies show that critical thinking plays a crucial role in preparing students to face both academic challenges and complex real-life situations (Changwong et al., 2023; Rahmawati et al., 2023; Sarifah & Nurita, 2023). In the Deep Learning Academic Manuscript, critical thinking is categorized as one of the eight graduate profile dimensions that need to be developed in Indonesia's curriculum.

However, the implementation of learning focused on developing critical thinking at the elementary school level still faces significant challenges. Research by Nahar et al. (2022) shows that teacher-centered learning makes students passive and less involved in the analytical process. Sarwanto et al. (2021) also found that the dominance of lecture methods limits students' engagement in thinking actively and creatively. According to Wijaya et al. (2024), conventional one-way teaching models such as this do not provide enough space for students to explore ideas, discuss, or solve problems independently.

A similar situation is observed at SDN 1 Sumberagung, particularly in the Mathematics lesson on the concept of place value. Observation results showed that most students lacked critical thinking skills when analyzing mathematical problems. Around 75% of students scored below the completion standard, and class discussions revealed that students were unable to explain the reasoning or logical steps in solving the problems. This indicates the need for the application of a more interactive teaching strategy that can encourage students to think more deeply.

One approach considered promising to address this issue is Deep Learning, a teaching model that emphasizes deep understanding, reflective processes, and concept exploration through real-life learning experiences (Suwandi et al., 2024). Deep Learning encourages students to develop higher-order thinking skills by enhancing their ability to connect ideas, construct arguments, and solve problems independently (Meilani et al., 2024). This concept is also closely related to the 6Cs competencies of the 21st century, which include Character, Citizenship, Collaboration, Communication, Creativity, and Critical Thinking (Mceachen & Kane, 2016).

The effectiveness of Deep Learning can be further optimized when supported by interactive learning media. In the context of Mathematics learning, one relevant medium is Spedomatik, which is designed to help students understand the concept of place value through concrete visualization. This medium consists of a stereofoam board with three circles representing ones, tens, and hundreds, which can be directly manipulated by students, thus facilitating their understanding of abstract concepts (Setyawan, 2020). Due to its manipulative and interactive nature, Spedomatik is considered capable of stimulating students' critical thinking processes as they analyze number patterns, check the accuracy of value representations, and relate mathematical concepts to real-life situations.

According to Gagne, learning media are important stimuli that can enhance students' attention, understanding, and engagement in learning (Nurani et al., 2018). Aisyah et al. (2023) further add that interactive media can make learning more coherent, engaging, and enable the independent exploration of concepts. In the context of critical thinking, media such as Spedomatik can help students develop better analytical skills through visualization, comparison, and problem-solving activities based on the manipulation of concrete objects.

According to Stobagh, critical thinking itself is a reflective skill that requires students to analyze, evaluate, and conclude information logically (Anggraeni et al., 2022). Learning designed to foster critical thinking allows students to engage in systematic problem-solving processes and consider various perspectives (Buchori & Prasetyowati, 2020). This ability shapes students' character to be more meticulous, rational, and prepared to face challenges they encounter in everyday life (Rahmawati et al, 2023).

Based on this background, this study focuses on analyzing the impact of interactive learning through the implementation of Deep Learning assisted by Spedomatik Media on improving elementary school students' critical thinking skills. This research is expected to contribute to the development of innovative learning strategies that can cultivate higher-order thinking skills, in line with the demands of 21st-century education.

METHOD

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This study adopts a quantitative approach. Arikunto (2018), explains that quantitative research is a method of collecting, analyzing, and presenting data using numbers, tables, graphs, and images to support the analysis of the obtained data. Sugiyono (2019) further explains that quantitative research is used to study specific populations or samples using instruments and statistical data analysis to test the hypotheses that have been established. This study was conducted at SDN 1 Sumberagung in August 2025. The school was chosen due to its characteristics, which align with the focus of this research: developing students' critical thinking skills through an interactive learning approach assisted by Spedomatik Media.

The design used in this study employed a quasi-experimental design utilizing a one-group pretest-posttest approach. This design involves measuring the dependent variables before and after the intervention using one group of students who are given treatment through Spedomatik Media-assisted learning. The measurement is conducted by comparing pretest and posttest scores to observe changes that occur after the intervention (Mukarrama, 2023).

The research variables consist of (1) the independent variable (X), which is the Deep Learning approach assisted by Spedomatik Media. This approach is applied to foster deep understanding through reflective activities, problem-solving, and group discussions regarding the concept of place value in mathematics. The use of Spedomatik Media is expected to help visualize concepts in a clear and engaging way, making it easier for students to understand and encouraging discussion and exploration during the learning process (Setyawan, 2020). (2) The dependent variable (Y) is students' critical thinking skills. This refers to the ability of students to develop basic skills, provide explanations, draw conclusions, and formulate strategies to solve problems (Sarifah & Nurita, 2023).

The population in this study consists of second-grade students at SDN 1 Sumberagung. The sampling technique used is Purposive Sampling, where samples are selected based on certain criteria relevant to the research objectives, namely second-grade students who will participate in mathematics learning using Spedomatik Media. A total of 25 students were selected as the sample.

The research instruments comprised: (1) observation protocols for documenting student activities and responses during instructional sessions. This instrument helps the researcher monitor student engagement, the classroom atmosphere, and student interaction in group discussions that implement Deep Learning assisted by Spedomatik Media. (2) Critical Thinking Skills Questionnaire. This questionnaire is used to measure students' critical thinking skills in learning mathematics regarding the concept of place value. The questionnaire is designed using a Likert scale and is given after the learning sessions to measure the impact of Deep Learning assisted by Spedomatik Media on students' critical thinking skills. (3) Tests (Pretest and Posttest). Tests are used to measure students' critical thinking abilities before and after the treatment. The pretest is given before the learning process to measure students' initial abilities, while the posttest is given after the treatment to assess the improvement in students' critical thinking skills related to the taught material (Hasnunidah, 2017).

Data collection techniques include: (1) Observation, which is conducted to observe and record systematically the phenomena appearing in the research subjects. In this case, the observation focuses on student activities during learning, especially in their involvement in group discussions and problem-solving using Spedomatik Media. (2) Questionnaire, which is used to collect information regarding students' critical thinking skills after they have participated in learning using Deep Learning assisted by Spedomatik Media. This questionnaire helps to measure the extent of the influence of this method on the development of students' critical thinking skills. (3) Tests (Pretest and Posttest), given to measure changes in students' critical thinking skills. The pretest is conducted before the learning process to assess students' initial abilities, and the posttest is conducted after learning to measure the improvement in students' critical thinking skills after using Spedomatik Media in the learning process.

Data analysis techniques include: (1) Classical Learning Mastery Test (Proportion Test). This test is used to evaluate whether the class as a whole has achieved learning mastery, i.e., the percentage of students who successfully meet the Minimum Completion Criteria (KKM) that have been set. (2) Prerequisite Tests, which include: (a) Normality Test: This test aims to determine whether the data obtained is normally distributed. The normality test is performed using the Kolmogorov-Smirnov test, with data considered normally distributed if the p-value is greater than 0.05. (b) Linearity Test: The linearity test is used to examine whether the relationship between the independent and dependent variables is linear. This test is performed using SPSS (Mukarrama, 2024). (c) Heteroscedasticity Test: This test is used

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to assess whether there is homogeneity of variance in the regression model. If the significance value is greater than 0.05, the hypothesis of no heteroscedasticity is accepted. (4) Hypothesis Testing, using Simple Linear Regression Test. This test is used to measure the impact of the Deep Learning approach assisted by Spedomatik Media on students' critical thinking skills (Y), with the regression equation Y = a + bX + e.

RESULT AND DISCUSSION

Result

This study aimed to examine the effect of implementing Deep Learning assisted by Spedomatik Media on enhancing elementary students' critical thinking skills. The research findings were analyzed using various statistical tests to ensure that the learning approach applied had a significant impact on improving students' critical thinking skills. Data analysis was conducted through classical learning mastery tests to assess the proportion of students who successfully met the Learning Mastery Criteria (KKTP), as well as prerequisite tests to ensure data validity and reliability. Subsequently, a simple linear regression test was performed to measure the extent of the effect of Deep Learning assisted by Spedomatik Media on students' critical thinking skills.

The findings of the study demonstrated significant enhancement in students' critical thinking competencies following the implementation of the Deep Learning approach integrated with Spedomatik Media. The classical learning mastery in the pretest results, obtained before the application of the new method, indicated inadequate outcomes, with only 0% of students achieving the KKTP. However, after the implementation of Deep Learning assisted by Spedomatik Media, the classical learning mastery increased to 80%, with the majority of students achieving scores that met the established mastery standards. Additionally, the results of normality tests, linearity tests, and heteroscedasticity tests showed that the data were normally distributed and that the relationship between the independent and dependent variables was linear, which supports the validity of the regression results.

Overall, the findings of this study provide a clear picture of the effectiveness of implementing Deep Learning in enhancing elementary students' critical thinking skills. The use of Spedomatik Media has been proven not only to aid in visualizing mathematical concepts in a more understandable manner but also to encourage students to think analytically and actively develop their critical thinking skills.

Classical Learning Mastery

Classical learning mastery testing was conducted to determine the percentage of students who achieved the Learning Mastery Criteria (KKTP) in the topic of Place Value in the second-grade Mathematics subject at SDN 1 Sumberagung. The established KKTP was 70. This mastery test used the Proportion Test in SPSS 27, which measures the difference in students' critical thinking skills before and after the implementation of Deep Learning assisted by Spedomatik Media. Before presenting the results of the proportion test, it should be explained that classical learning mastery refers to the percentage of students who achieved the KKTP score, indicating the success of the learning method applied. The table below presents the pretest results conducted before the application of Deep Learning assisted by Spedomatik Media.

Table 1. Pretest Proportion Test

Category	N	Observed Proportion	Test Proportion	Exact Significance (2-tailed)
Pretest Scores	25	1,00	0,50	0,000

Source: Data Processed Using SPSS

Based on the pretest results, all students (25 students) scored below the KKTP, indicating that the classical learning mastery before the implementation of Deep Learning assisted by Spedomatik Media was 0%. This suggests that initially, students were unable to meet the established mastery standards. The table below presents the posttest results after the implementation of Deep Learning assisted by Spedomatik Media.

Table 2. Posttest Proportion Test

Category	N	Observed Proportion	Test Proportion	Exact Significance (2-tailed)
Posttest Scores	25	0,80	0,50	0,004
<= 70	5	0,20	0,50	

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Source: Data Processed Using SPSS

Based on the posttest results, 20 students (80%) achieved the KKTP, while 5 students (20%) did not meet the KKTP. This indicates an 80% improvement in classical learning mastery, which demonstrates the effectiveness of the implementation of Deep Learning assisted by Spedomatik Media in enhancing student achievement. Before performing hypothesis testing, several prerequisite tests were conducted, including normality, linearity, and heteroscedasticity tests. These tests aim to ensure the adequacy of the data before further analysis.

Normality Test

The normality test aims to check if the data obtained are normally distributed. The results of the normality test using Shapiro-Wilk showed that the significance values for all variables were greater than 0.05, indicating that the data are normally distributed.

Table 3. Normality Test Results

Variable	Shapiro-Wilk Sig	Description
Deep Learning Assisted by Spedomatik (Y)	0,253	Normal
Critical Thinking Skills (X)	0,092	Normal

Source: Data Processed Using SPSS

Based on the Shapiro-Wilk results, the significance values for all three variables were greater than 0.05, indicating that the data are normally distributed and can proceed to further analysis.

Linearity Test

The linearity test was conducted to examine whether the relationship between the independent and dependent variables is linear. Based on the linearity test results, the relationship between Deep Learning assisted by Spedomatik Media and Critical Thinking Skills (Y) shows a linear relationship.

Table 4. Linearity Test Result

Variable	Significance	Description
Deep Learning Assisted by Spedomatik (X) on Critical Thinking Skills (Y)	0,648	Linear

Source: Data Processed Using SPSS

The significance value for Deep Learning assisted by Spedomatik Media on Critical Thinking Skills was 0.648, which
is greater than 0.05, indicating a linear relationship between the two variables.

Heteroscedasticity Test

The heteroscedasticity test was used to ensure that there were no signs of unequal variances in the regression model. The results indicated that no heteroscedasticity was found, meaning the data met the assumption of homoscedasticity.

Table 5. Heteroscedasticity Test Result

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
(Constant)	5,162	5,481		0,942	0,356
Deep Learning Spedomatik Media	0,102	0,072	0,284	1,418	0,169

Source: Data Processed Using SPSS

The significance value of 0.169 is greater than 0.05, indicating no heteroscedasticity, and the regression model used is acceptable.

Hypothesis Testing

To test the research hypothesis, simple linear regression was performed. The results of the simple linear regression test showed that Deep Learning assisted by Spedomatik Media had a significant impact on students' Critical Thinking Skills.

Table 4.9: Simple Linear Regression for Deep Learning Assisted by Spedomatik Media on Critical Thinking Skills

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Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
(Constant)	22,684	9,175		2,473	0,021
Deep Learning Spedomatik Media	0,715	0,121	0,777	5,924	0,000

Source: Data Processed Using SPSS

The regression equation for Critical Thinking Skills is Y = 22.684 + 0.715X. This indicates that for every unit increase in Deep Learning assisted by Spedomatik Media, students' critical thinking skills improve by 0.715. Based on the findings, the implementation of Deep Learning assisted by Spedomatik Media significantly influenced the improvement of elementary students' critical thinking skills. The classical learning mastery test, normality test, linearity test, and simple linear regression results showed significant changes in students' skills after the implementation of this approach.

Discussion

Deep Learning Design Assisted by Spedomatik Media to Enhance Students' Critical Thinking Skills

This study aimed to examine the effect of implementing the Deep Learning approach assisted by Spedomatik Media in enhancing elementary students' critical thinking skills in the topic of Place Value in Grade 2 Mathematics. The results of the study indicate that the application of this learning design can significantly improve students' critical thinking skills. The learning was conducted over four meetings, each lasting 2 x 35 minutes. The teaching module used included learning materials and collaborative Student Worksheets (LKPD) to support group discussions. The applied Deep Learning principles focus on three key aspects: awareness, enjoyment, and meaningfulness.

According to Rahmawati et al (2023), awareness-based learning begins by connecting the lesson material to real-life experiences and contexts relevant to students' lives. This principle was applied in the teaching of the Place Value concept to engage students' attention and focus. In this study, providing an initial introduction at the start of the learning process was one effort to enhance students' awareness of the value of the material being taught, which made students more active in the learning process. Previous research supports this by showing that learning connected to real-life contexts can increase students' engagement in learning (Siregar & Lestari, 2020).

The principle of enjoyment in learning was applied through the use of Spedomatik Media, aimed at creating a more engaging and motivating learning atmosphere. This media helps visualize abstract concepts in a more concrete and easily understandable way for students (Setyawan, 2020). A study by Hendi et al. (2020) also revealed that the use of visual media in learning is highly effective in improving students' motivation and reducing boredom during lessons.

Furthermore, the principle of meaningful learning was applied through group discussion methods, supplemented with collaborative LKPD, providing students an opportunity to interact and develop their critical thinking skills by collaboratively processing information. In line with this, Dewi & Rimpiati (2016) explained that group-based learning can improve students' analytical skills as they are given the opportunity to explore and discuss the material in depth.

The implementation of Deep Learning principles, which include understanding, applying, and reflecting, provided students with opportunities not only to understand the material deeply but also to apply it in meaningful activities and reflect on the learning process. Through these stages, students were expected to actively engage in learning, both in group discussions and in deep reflection on the concepts learned. As Fullan et al. (2018) stated, Deep Learning principles are highly effective in improving students' critical thinking skills because they allow them to make connections between new information and existing knowledge.

The Impact of Deep Learning Assisted by Spedomatik Media on Students' Critical Thinking Skills

The results of this study show that the implementation of Deep Learning assisted by Spedomatik Media has a positive and significant impact on students' critical thinking skills. This is evidenced by a t-value greater than the t-table value (5.924 > 1.665) with a significance value of 0.000 < 0.05. Thus, it can be concluded that the application of Deep Learning assisted by Spedomatik Media is effective in enhancing students' critical thinking skills. This finding is consistent with the results reported by Putra & Kurniasari (2022), who stated that Deep Learning-based learning,

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focusing on in-depth understanding and critical reflection, is effective in improving students' analytical and problem-solving abilities.

The combination of Deep Learning principles with the use of Spedomatik Media created a more interactive learning environment and provided students with opportunities to think analytically. Spedomatik Media, which functions as a visual and interactive tool, helped students actively participate in group discussions. In this study, students demonstrated an ability to analyze problems more deeply, construct arguments, and develop solutions based on the information they had learned. This aligns with the findings of Siregar & Lestari (2020), which showed that interactive learning can help students develop critical thinking skills through group discussions and practical applications.

Based on the calculation of the coefficient of determination (R^2), the effect of implementing Deep Learning assisted by Spedomatik Media on students' critical thinking skills was 60.4%, while the remaining percentage was influenced by other factors not studied in this research. This suggests that additional variables, such as prior knowledge or individual student characteristics, may have contributed to the improvement of critical thinking skills, but were not accounted for in this study. This indicates that Deep Learning assisted by Spedomatik Media significantly contributes to developing students' critical thinking skills, both in solving mathematical problems and analyzing more complex concepts. A study by Putri et al. (2024) also emphasized that the use of technology-based learning media can enhance students' critical thinking abilities in various academic contexts.

These results are in line with the research conducted by Pratama & Yuliani (2021), who concluded that the Deep Learning approach fosters in-depth understanding of learning materials through critical, reflective, creative, and applied thinking processes. In Deep Learning, students are not only required to memorize facts but also to integrate new knowledge with existing knowledge and apply it in broader, real-world contexts. This approach also encourages active student engagement through social interaction, which enhances skills such as problem-solving, innovation, and collaboration. A study by Aisyah et al. (2023) also demonstrated that learning media that emphasizes interaction and critical reflection can improve student learning outcomes in overcoming real-world challenges.

Reflections on Limitations and Future Research Directions

While the study has shown significant improvements in students' critical thinking skills, it is important to note that the 39.6% unexplained variance suggests that other factors beyond the intervention influenced the development of students' critical thinking. These may include prior knowledge, individual learning differences, or external environmental factors that were not controlled for in the study. Future research should incorporate control groups and longitudinal designs to better isolate the specific effects of the Deep Learning approach and Spedomatik Media, and to explore the sustainability of the observed outcomes

CONCLUSION

This study demonstrates that integrating Deep Learning with Spedomatik Media significantly enhances elementary students' critical thinking skills in mathematics. The effectiveness of this approach lies in its emphasis on concrete visualization, collaborative learning, and reflective practice, which creates an environment conducive to the development of higher-order thinking skills.

The theoretical implications suggest that multimodal learning approaches, which combine pedagogical frameworks with appropriate instructional media, can effectively bridge the gap between abstract conceptual understanding and real-world application. By engaging students in hands-on, interactive experiences, such as those facilitated by Spedomatik Media, they are able to connect theoretical knowledge with practical problem-solving scenarios. This approach aligns with the demands of 21st-century education, emphasizing critical thinking, creativity, and collaboration.

Practical recommendations include the need for systematic teacher training in implementing Deep Learning strategies, as well as the development of similar interactive media for teaching other mathematical concepts. Ensuring that educators are equipped with the necessary tools and knowledge to apply these approaches is essential for sustaining their effectiveness.

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Study limitations include the single-group design and short intervention period. Future research should employ randomized controlled trials to isolate the impact of the intervention, examine long-term retention effects, and explore applications across different subject areas and grade levels.

This research contributes to the growing evidence supporting integrated pedagogical approaches for developing 21st-century skills, providing educators with practical strategies to foster critical thinking in elementary mathematics education. By offering concrete recommendations for practice and future research, it paves the way for further improvements in teaching methods and student outcomes in critical thinking

REFERECES

Aisyah, L., Prasetyo, D., & Ginting, A. (2023). Interactive learning media in improving students' analytical skills through visualization and problem-solving. *Educational Technology Journal*, 18(1), 34-42.

Anggraeni, N., Rustini, T., & Wahyuningsih, Y. (2022). Keterampilan berpikir kritis siswa sekolah dasar pada mata pelajaran IPS di kelas tinggi. *Jurnal Review Pendidikan Dasar: Jurnal Kajian Pendidikan dan Hasil Penelitian*, 8(1), 84-90.

Arikunto, S. (2018). *Prosedur penelitian: Suatu pendekatan praktik*. Rineka Cipta.

Buchori, A., & Prasetyowati, D. (2020). The effect of discovery learning model assisted by Prezi and cognitive style towards the critical thinking ability of Islamic senior high school (MAN) students. *Elementary Education Online*.

Changwong, S., Tan, J., & Yuniarti, R. (2023). The role of critical thinking in addressing complex academic challenges: A study on elementary education. *Journal of Educational Research and Practices*, 14(2), 65-77.

Dewi, L., & Rimpiati, E. (2016). Pengaruh diskusi kelompok dalam pembelajaran matematika terhadap keterampilan berpikir kritis siswa. *Jurnal Pendidikan Matematika*, 14(2), 89-99.

Fullan, M., Quinn, J., & McEachen, J. (2018). *Engage the world, change the world. Engage the World.*

Gagne, R. M. (2005). *The conditions of learning and theory of instruction*. Wadsworth Publishing.

Hendi, C., Caswita, R., & Haenilah, S. (2020). The use of visual media in learning: Improving students' motivation and reducing boredom during lessons. *Journal of Educational Media*, 15(3), 67-78.

Hendrianty, B. J., Ibrahim, A., Iskandar, S., & Mulyasari, E. (2024). Membangun pola pikir deep learning guru sekolah dasar. *Kalam Cendekia: Jurnal Ilmiah Kependidikan*, 12(3).

Kemendikdasmen. (2024). *Pedagogical competencies in the Indonesian curriculum: Graduate profile dimensions for critical thinking and other key competencies*. Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia.

Meilani, D., Yusuf, A., & Aziz, S. (2024). The impact of Deep Learning on critical thinking skills in primary education: A case study. *Journal of Educational Technology and Innovation*, 18(2), 113-125.

Mceachen, J., & Kane, M. (2016). NPDL global report for deep learning: A global partnership. *NPDL Global Report*.

Mukarrama, R. (2023). Studi pengaruh pembelajaran berpraktikum terhadap minat belajar dan hasil belajar IPA terpadu kelas VIII di SMP Negeri 1 Kendari. *Other Thesis, IAIN Kendari*.

Nahar, F., Rahmawati, D., Sarifah, F., & Nurita, T. (2022). Pengaruh model pembelajaran berbasis masalah terhadap keterampilan kolaborasi dan berpikir kritis siswa. *Pensa: E-Jurnal Pendidikan Sains*, 11(1), 22–31.

Nurani, L., Suryani, M., & Setyawan, F. (2018). The role of learning media in enhancing students' attention, understanding, and engagement in learning. *Journal of Educational Media and Technology*, 15(2), 134-142.

Putri, N., Jannah, F., & Rakhmat, M. (2024). Efektivitas media pembelajaran berbasis teknologi terhadap keterampilan berpikir kritis siswa di SD. *Jurnal Teknologi Pembelajaran*, 21(4), 145-153.

Putra, R. A., & Kurniasari, D. (2022). Deep learning-oriented instructional strategies to improve students' analytical and problem-solving skills. *Jurnal Inovasi Pembelajaran*, 8(1), 33–45.

Pratama, M. R., & Yuliani, S. (2021). Deep cognitive processing strategies to enhance students' critical, reflective, and creative thinking. *Jurnal Pendidikan dan Pengembangan Pembelajaran*, 9(2), 87–99.

Rahmawati, A., Suryani, T., & Hidayat, A. (2023). Developing critical thinking in students through problem-solving approaches: Implications for primary education. *International Journal of Educational Psychology*, 12(1), 43-58.

Sosioedukasi
JURNAL ILMIAH ILMU PENDIDIKAN DAN SOSIAL
ISSN: 2086-6135 E-ISSN: 2541-612x
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Redhana, I. (2019). Keterampilan abad ke-21 untuk menghadapi tantangan global: Kolaborasi, komunikasi, dan berpikir kritis. Yogyakarta: Penerbit Sumber Ilmu.

Sarifah, F., & Nurita, T. (2023). Implementasi model pembelajaran inkuiri terbimbing untuk meningkatkan keterampilan berpikir kritis dan kolaborasi siswa. *Pensa: E-Jurnal Pendidikan Sains*, 11(1), 22–31.

Sarwanto, A., Sutrisno, D., & Purnamasari, I. (2021). Challenges in implementing active learning and critical thinking in elementary schools: A case study. *Journal of Education and Practice*, 18(4), 110-121.

Setyawan, D. D. (2020). Pengembangan media Spedomatik pada pemahaman konsep nilai tempat di sekolah dasar. *Jurnal Didaktika Pendidikan Dasar*, 4(1), 1-18.

Soghomonyan, F., & Karapetyan, H. (2023). The importance of developing critical thinking and problem-solving skills in the 21st century. *Educational Research and Development Journal*, 9(2), 22-35.

Sugiyono. (2019). *Metode penelitian kuantitatif, kualitatif, dan R&D*. Alfabeta.

Suwandi, R., Putri, S., & Sulastri, S. (2024). Inovasi pendidikan dengan menggunakan model deep learning di Indonesia. *Jurnal Pendidikan Kewarganegaraan dan Politik*, 2(2), 69-77.

Wijaya, A. A., Haryati, T., & Wuryandini, E. (2024). Implementasi pendekatan deep learning dalam peningkatan kualitas pembelajaran di SDN 1 Wulung, Randublatung, Blora. *Indonesian Research Journal on Education*, 5(1), 451-460.