IJORER: International Journal of Recent Educational Research
Homepage: https://journal.ia-education.com/index.php/ijorer
Emal: ijorer@ia-education.com

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 7, No. 5, September 2026
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# Enhancing Critical Thinking Through Deep Learning Pedagogy in Elementary IPAS: A Quasi-Experimental Study

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**DOI:** https://doi.org/10.46245/ijorer.v7i5.1554

**Sections Info**

***Article history:***
Submitted: July 01, 2016
Final Revised: August 27, 2026
Accepted: September 09, 2026
Published: September 27, 2026

***Keywords:***
Critical Thinking Skills; Deep Learning Pillars; Deep Learning; Quasi-Experiment

**ABSTRACT**

**Objective:** This study aims to evaluate the effect of implementing a Deep Learning pedagogical approach on enhancing elementary students' critical thinking skills. **Method:** This study employed a quasi-experimental design (non-equivalent control group design) involving an experimental group and a control group, both confirmed to have equivalent baseline capabilities. Data were collected using a critical thinking test instrument and analyzed using non-parametric statistical methods due to the non-normal distribution of the data. **Results:** The results revealed a significant difference in critical thinking skills between the two groups, with the experimental group demonstrating substantially greater improvement than the control group, which received inquiry-based instruction following the school's standard practice. **Novelty:** This study contributes to the still-limited empirical literature on Indonesia's newly introduced Deep Learning policy by testing, at the classroom level, the integrated operation of its three pedagogical pillars (mindful, meaningful, and joyful learning) within an elementary IPAS unit on the local creative economy — offering classroom-based evidence to complement the largely conceptual studies published on this framework to date.

## INTRODUCTION

The rapid advancement of globalization and information technology in the 21st century has compelled the education sector to fundamentally transform its longstanding educational paradigms?? (Rehman, 2025). Conventional classroom approaches that have historically prioritized rote memorization and one-directional knowledge transfer are increasingly regarded as insufficient to address the demands of contemporary society. Consequently, educational institutions are expected to cultivate students' critical thinking as a core competency for learning, problem solving, and responsible decision-making in an increasingly complex world (Somantri & Handayani, 2024; Trilling, B., & Fadel, C, 2009). As a higher-order cognitive skill, critical thinking enables learners to evaluate information objectively, identify biases, construct logical arguments, and solve complex problems through systematic reasoning.

Despite this recognized imperative, empirical conditions in many schools reveal a contrasting reality. The proliferation of instant information through social media algorithms and the uncritical use of Artificial Intelligence (AI) tools has gradually eroded students' depth of concentration, analytical rigor, and capacity for sustained reasoning in classroom contexts (Herabadi, 2025). This cognitive decline is reflected in Indonesia's persistently low performance in the Programme for International Student Assessment (PISA) (I. Pratiwi, 2019). The most recent data indicate that Indonesia's reading literacy and mathematics scores stand at 359 and 366, respectively considerably below the OECD averages of 476 and 472 (Rahma & Rossidy, 2026). These figures serve as empirical evidence of the inadequacy of conventional pedagogical models in fostering logical reasoning and critical thinking from an early age (Sherli, 2026).

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In response to this cognitive crisis, the Indonesian Ministry of Primary and Secondary Education has (Kemendikbudristek., 2022) introduced a Deep Learning approach as a strategic pedagogical reform within the national education system (Haq & Prasetiyo, 2025; Tsuraya et al., 2025). It is essential to clarify that, within the pedagogical context, the term Deep Learning does not refer to artificial neural networks or computational systems (Nadawina et al., 2025). Rather, it constitutes a pedagogical paradigm that emphasizes conceptual mastery, interdisciplinary connections, and holistic competency development (Widagdo, 2025). This approach rests upon three core pillars: mindful learning (conscious and focused engagement), meaningful learning (connecting knowledge to real-life contexts), and joyful learning (fostering intrinsically motivated, enjoyable learning experiences) (Azzahra & Jaya, 2025). This policy shift reorients educational priorities away from administrative compliance and grade attainment toward a transformative process of intellectual and critical development.

The subject of Ilmu Pengetahuan Alam dan Sosial (IPAS, or Integrated Natural and Social Sciences) at the elementary school level occupies a pivotal role in implementing this new pedagogical paradigm. Under the Kurikulum Merdeka (Independent Curriculum), IPAS has been deliberately designed to nurture scientific inquiry, logical reasoning, and problem-solving skills through direct observation of natural and social phenomena in students' immediate environments. At the Grade 6 level, the thematic (Somantri & Handayani, 2024) unit on "Creative Economy in the Local Community" demands that students move beyond definitional recall and instead apply critical reasoning to map local economic potentials, analyze economic barriers, and propose community-level solutions. However, classroom observations consistently reveal that instructional practices remain predominantly teacher-centered, limiting opportunities for students to engage in higher-order thinking and critical analysis of socioeconomic issues.

This persistent reliance on conventional, teacher-centered instruction aligns with findings from prior research, which consistently demonstrates that didactic, one-directional teaching models are ineffective in stimulating higher-order cognitive development among elementary school students (Riska & Dwi Puspita, 2025; Sitorus & Nazaruddin, 2021). To address this gap, elementary classrooms require innovative instructional interventions that operationalize the pillars of Deep Learning in authentic learning activities. Through mindful learning, students are guided to engage with full awareness of the knowledge they are constructing. Meaningful learning then directs students to connect the concept of creative economy with real phenomena in their surroundings (Syafi’i, 2025). These processes are embedded within a joyful learning climate that sustains positive affect, intellectual challenge, and intrinsic motivation (Ratnasari & Sukmawati, 2023).

The multidimensional advantages of Deep Learning pedagogy render it a highly promising instructional tool for sharpening students' logical-analytical thinking (Abdillah et al., 2025; Rahman et al., n.d.; Ratnasari & Sukmawati, 2023). While previous studies have examined isolated dimensions of meaningful learning, the present study occupies a strategically important position by investigating the integrated operational effectiveness of the government's newly released Deep Learning policy (2024/2025) when enacted at the micro level of elementary school classrooms.

A significant gap remains in the existing literature, given that empirical studies on the implementation of this newly introduced curriculum framework remain scarce due to its recent enactment. To date, no study has comprehensively examined how the three-

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
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pillar ecosystem of Deep Learning mindful, meaningful, and joyful learning—can be integrated within the IPAS subject to produce measurable improvements in elementary students' critical thinking abilities. The present study is designed to address this gap by empirically testing and validating the direct impact of this Deep Learning innovation on students' critical thinking performance in the context of creative economy problem-solving tasks.

Despite the growing recognition of the importance of critical thinking, limited evidence is available regarding how AI-assisted learning influences students' critical thinking skills in Indonesian higher education. Therefore, this study aims to examine the effect of AI-assisted learning on students' critical thinking skills in Indonesian universities. Specifically, this study addresses the following research questions: (RQ1) Does AI-assisted learning significantly influence students' critical thinking skills? (RQ2) Which dimensions of critical thinking are most affected by AI-assisted learning.

## RESEARCH METHOD

### Research Design and Participants

This study employed a quantitative approach using a quasi-experimental design, specifically a Non-equivalent Control Group Design. This methodological choice was appropriate given the practical constraints of the elementary school setting, where random assignment of students to different classes was not feasible without disrupting the existing learning environment. The study population comprised all Grade 6 students at SDS Rabbani Purwakarta, a private Islamic elementary school in Purwakarta, West Java, Indonesia, during the 2025/2026 academic year. Using purposive sampling based on comparable baseline academic achievement and equivalent classroom facilities, two intact classes were selected. Class 6 Badar (n = 22; 12 boys and 10 girls, aged 11–12 years) was assigned as the experimental group and received the Deep Learning-based instructional intervention. Class 6 Uhud (n = 22; 11 boys and 11 girls) served as the control group and received conventional teacher-centered IPAS instruction. Prior to the intervention, the equivalence of the two groups was confirmed by comparing students' academic achievement based on their previous semester grade reports.

### Ethical Considerations

Prior to data collection, ethical approval for this study was obtained from SDS Rabbani Purwakarta. Written informed consent was secured from the school principal and the parents or guardians of all participating students. Participants were assured of voluntary participation, the right to withdraw at any time, and the confidentiality of all data collected.

### Research Instruments

Data collection employed both test and non-test instruments to yield a comprehensive assessment of the intervention's effects. The primary instrument initially consisted of a 10-item constructed-response (essay) test grounded in the IPAS thematic unit on "Creative Economy in the Local Community." Test items were developed in accordance with Facione's (1990) critical thinking indicators, encompassing five dimensions: interpretation, analysis, evaluation, inference, and explanation. Each item was scored using an analytic rubric with a maximum score of 10 points per item.

Prior to field implementation, the instrument's content validity was confirmed through expert judgment, yielding a Content Validity Index (CVI) of 0.88, indicating high

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content relevance. Following a pilot study, item-total correlation analysis was conducted; non-valid items were excluded, retaining the finalized valid items for the actual test. The internal consistency reliability of the finalized instrument was established via Cronbach's Alpha, yielding a reliable coefficient of alpha = 0.724.

Complementary non-test instruments included a structured observation checklist to document the implementation fidelity of the mindful, meaningful, and joyful learning pillars, as well as a semi-structured interview guide to elicit qualitative data regarding challenges encountered by both teachers and students throughout the intervention.

**Research Procedure**

The research procedure was organized into three systematic phases. The *preparation phase* involved curriculum analysis of the Grade 6 IPAS syllabus, development of Deep Learning-aligned teaching modules (*Modul Ajar*), and pilot testing of the assessment instruments. During the *implementation phase*, both groups completed a pre-test to establish baseline critical thinking competencies. The experimental group then received three sessions of Deep Learning instruction (each lasting 70 minutes), in which students were systematically guided to engage mindfully with content, connect learning to authentic local economic contexts (*meaningful*), and problem-solve within a motivating and enjoyable learning climate (*joyful*). Upon completion of the intervention, both groups completed an equivalent post-test, followed by reflective interviews with the classroom teacher and student representatives.

**Data Analysis**

All quantitative data were analyzed using *IBM SPSS Statistics 29*. Prerequisite tests, including the Shapiro-Wilk normality test and Levene's homogeneity of variance test, were first conducted on score distributions. When the assumptions of normality and homogeneity were met, hypothesis testing was performed using an Independent Samples *t*-Test on post-test scores or normalized gain scores (*N-Gain*). The N-Gain score was calculated using Hake's (1999) formula: *g = (post-test score − pre-test score) / (maximum score − pre-test score)*, with scores ≥ 0.70 categorized as high gain, 0.30–0.69 as medium gain, and < 0.30 as low gain. If distributional assumptions were violated, the non-parametric Mann-Whitney U Test was employed as an alternative (Field, 2022). Qualitative data obtained from observation checklists and semi-structured interviews were analyzed through a process of data condensation, display, and conclusion drawing, providing a descriptive narrative of implementation fidelity and practical challenges encountered in the field.

## RESULT AND DISCUSSION

### *Results*

This section presents the findings on the effect of implementing the Deep Learning pedagogy on elementary students' critical thinking skills in the IPAS subject. Data were obtained from the pretest and posttest scores of students in the experimental and control classes. Descriptive statistics were first used to summarize students' performance, followed by the Mann–Whitney U test to examine differences between groups, as the data were not normally distributed. The analyses aimed to determine changes in students' critical thinking skills before and after the intervention and to assess whether the Deep Learning pedagogy produced significantly greater improvement than the

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inquiry-based instruction implemented in the control class. The findings are then interpreted and discussed in relation to the theoretical framework, relevant prior research, and the three core pillars of the Deep Learning pedagogy *mindful, meaningful,* and *joyful* learning to explain how these principles contributed to the observed improvements in students' critical thinking skills.

### 1. Descriptive Statistics and Baseline Equivalence (Pretest Analysis)

Prior to the intervention, a pretest was administered to evaluate the students' baseline critical thinking skills across five core dimensions: interpretation, analysis, evaluation, inference, and explanation. Table 1 summarizes the descriptive statistics for both groups.

**Table 1.** Descriptive Statistics of Pretest Critical Thinking Data

| Group | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Experimental | 22 | 3 | 7 | 5.18 | 1.140 |
| Control | 22 | 4 | 8 | 5.77 | 0.973 |

As shown in Table 1, both groups had an equal number of participants (N = 22 each). In the experimental group, students' critical thinking scores ranged from a minimum of 3 to a maximum of 7, with a mean of 5.18 and a standard deviation of 1.140. In the control group, scores ranged from 4 to 8, with a mean of 5.77 and a standard deviation of 0.973. Descriptively, the control group's initial mean score was slightly higher than that of the experimental group. In addition, the larger standard deviation in the experimental group (1.140 > 0.973) indicates that students' initial critical thinking ability in this group was more heterogeneous than in the control group, which was relatively more homogeneous. To facilitate the interpretation of the descriptive statistics presented in Table 1, Figure 1 provides a visual comparison of the mean scores and standard deviations between the experimental and control groups.

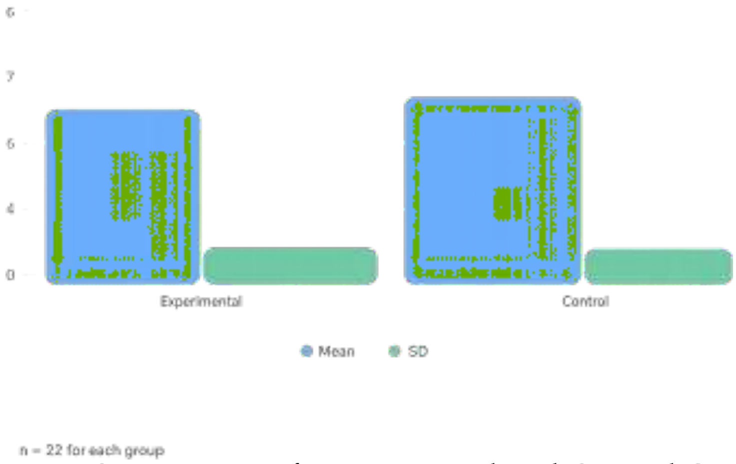


**Figure 1.** Comparison of Experimental and Control Group

Figure 1 provides a visual comparison of the descriptive statistics for the experimental and control groups. The control group demonstrated a marginally higher mean pretest score (M = 5.77) than the experimental group (M = 5.18), with a difference of only 0.59 points. This small difference suggests that the initial critical thinking abilities of the two groups were relatively comparable before the intervention. Additionally, the experimental group exhibited a higher standard deviation (SD = 1.140) than the control group (SD = 0.973), indicating a wider distribution of students' scores and greater heterogeneity in their initial abilities. Conversely, the lower standard deviation in the

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control group reflects more homogeneous pretest performance. Therefore, Figure 1 supports the descriptive findings presented in Table 1 and demonstrates that the two groups had similar baseline characteristics, although the experimental group displayed slightly greater variability in students' critical thinking scores.

Before hypothesis testing, prerequisite tests were conducted to ensure that the data met the required statistical assumptions. One such prerequisite is the normality test, which aims to determine whether the critical thinking data are normally distributed. In this study, the normality test was conducted using the Shapiro-Wilk test with the aid of IBM SPSS Statistics 29, given that the sample size in each class was fewer than 50 students (N = 22). The results of the normality test for the pretest critical thinking data in the experimental and control classes are presented in Table 2.

**Table 2.** Normality Test of Pretest Data for the Experimental and Control Classes

| Class | Statistic | df (N) | Sig. (p-value) | Conclusion |
|---|---|---|---|---|
| Experimental | 0.915 | 22 | 0.061 | Normally distributed (0.061 > 0.05) |
| Control | 0.890 | 22 | 0.029 | Not normally distributed (0.029 < 0.05) |

As shown in Table 2, the Shapiro-Wilk normality test indicated that the pretest critical thinking data for the Experimental Class had a significance value of 0.061 ($p > 0.05$), indicating a normal distribution. Meanwhile, the pretest data for the Control Class had a significance value of 0.029 ($p < 0.05$), indicating a non-normal distribution. Because one of the two groups' data was not normally distributed, the prerequisite assumptions for parametric statistics were not fully met.

Given that the pretest data for the Control Class were not normally distributed, hypothesis testing to examine the difference in baseline ability between the two classes could not use parametric statistics (Independent Samples t-Test). As an alternative, the non-parametric Mann-Whitney U test was used. This test aimed to determine whether there was a significant difference in critical thinking skills between the Experimental and Control classes prior to treatment. The results of the Mann-Whitney U test for the pretest critical thinking data, obtained using IBM SPSS Statistics 29, are presented in Table 3.

**Table 3.** Mann-Whitney U Test Results for Pretest Critical Thinking Data

| Variable | Mann-Whitney U | Z | Asymp. Sig. (2-tailed) | Conclusion |
|---|---|---|---|---|
| Critical Thinking Skills | 175.500 | -1.639 | 0.101 | No significant difference |

As shown in Table 3, the Mann-Whitney U test yielded an Asymp. Sig. (2-tailed) value of 0.101 for the pretest critical thinking data. Because this value is greater than the significance threshold of 0.05 (0.101 > 0.05), H0 is accepted and H1 is rejected. This indicates that there was no significant difference in critical thinking skills between students in the Experimental Class and students in the Control Class prior to treatment. It can therefore be concluded that the two groups had equivalent, homogeneous baseline abilities.

After confirming that the two groups had equivalent baseline abilities with no significant difference, the next step was to administer the different treatments to each class: the Experimental Class received Deep Learning-based instruction, while the Control Class received inquiry-based instruction.

After the treatment phase was completed, both classes were given a posttest using the same instrument as the pretest, in order to measure students' final critical thinking achievement following treatment. Before conducting the final hypothesis test on the

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posttest data, a normality test was again performed. Given that the sample size in each class was fewer than 50 students (N = 22), the Shapiro-Wilk test was used, with the aid of IBM SPSS Statistics 29. The results of the normality test for the posttest critical thinking data are presented in Table 4.

**Table 4.** Normality Test of Posttest Data for the Experimental and Control Classes

| Class | Statistic | df (N) | Sig. (p-value) | Conclusion |
|---|---|---|---|---|
| Experimental | 0.762 | 22 | < 0.001 | Not normally distributed |
| Control | 0.977 | 22 | 0.867 | Normally distributed |

As shown in Table 4, the Shapiro-Wilk normality test indicated that the posttest critical thinking data for the Experimental Class had a significance value of < 0.001, which is smaller than the significance threshold (0.000 < 0.05); the posttest data for the Experimental Class were therefore not normally distributed. Meanwhile, the posttest data for the Control Class had a significance value of 0.867, which is greater than 0.05, indicating that the Control Class posttest data were normally distributed. Because one group's data (Experimental Class) were not normally distributed, the prerequisite assumption for parametric statistics was not met.

Because the prerequisite test showed that the Experimental Class posttest data were not normally distributed, the final hypothesis test to compare the effectiveness of the two treatments could not use parametric statistics (Independent Samples t-Test). As an alternative, hypothesis testing was conducted using the non-parametric Mann-Whitney U test.

This test aimed to determine whether there was a significant difference in critical thinking skills between the Experimental and Control classes after treatment. The results of the Mann-Whitney U test for the posttest critical thinking data, obtained using IBM SPSS Statistics 29, are presented in Table 5.

**Table 5.** Mann-Whitney U Test Results for Posttest Critical Thinking Data

| Variable | Mann-Whitney U | Z | Asymp. Sig. (2-tailed) | Conclusion |
|---|---|---|---|---|
| Critical Thinking Skills | 31.000 | -4.979 | < 0.001 | Significant difference |

As shown in Table 5, the Mann-Whitney U test on the posttest data yielded an Asymp. Sig. (2-tailed) value of < 0.001 (0.000) for students' critical thinking skills. This value is far smaller than the significance threshold of 0.05 (0.000 < 0.05). In accordance with the Mann-Whitney U decision rule, when the significance value is smaller than 0.05, H0 is rejected and H1 is accepted. This indicates that there was a significant difference in critical thinking skills between students in the Experimental Class, who received the Deep Learning approach, and students in the Control Class, who received inquiry-based instruction, after treatment. It can therefore be concluded that the implementation of the Deep Learning approach had a significant effect on students' critical thinking skills.

### *Discussion*

The empirical findings of this study provide strong evidence supporting the pedagogical efficacy of the Deep Learning framework in fostering critical thinking skills among elementary school students within the IPAS curriculum. The methodological rigor established through pretest baseline equivalence (p = 0.101) ensures that the marked performance divergence observed at posttest (p < 0.001) was directly driven by the instructional intervention rather than pre-existing cognitive disparities. The superior

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cognitive gains demonstrated by the experimental class can be directly attributed to the operational synergy of the three core pillars of Deep Learning: *mindful learning*, *meaningful learning*, and *joyful learning*.

First, mindful learning (focused, conscious engagement) addressed the cognitive fragmentation commonly induced by digital distractions and shallow information habits. In the experimental classroom, mindful learning was operationalized by guiding Grade 6 students to actively focus their attention during problem analysis without jumping to premature conclusions. When introduced to complex local economic scenarios, students were systematically prompted to observe underlying problem structures, map cause-and-effect relationships, and regulate their own thinking processes (*metacognition*). This conscious mental engagement directly enhanced their skills in *interpretation* and *analysis* (Facione, 1990), allowing them to unpack socioeconomic challenges rather than relying on surface-level definitions.

Second, meaningful learning served as the contextual bridge that transformed abstract scientific and social concepts into relevant cognitive schema. Rather than memorizing theoretical definitions of "creative economy," students in the experimental group investigated authentic, real-world economic potential and barriers within their local community. By linking curriculum content directly to observable social phenomena in Purwakarta, students constructed deep conceptual networks rather than isolated facts. This authentic engagement catalyzed higher-order cognitive processing, specifically strengthening their capacities for *evaluation* and *inference* as they formulated actionable, community-level solutions for local micro-enterprises.

Third, joyful learning cultivated an emotionally supportive and intrinsically motivating classroom climate that sustained the intellectual effort required for critical reasoning. Higher-order thinking inherently demands cognitive persistence and risk-taking—processes that are easily hindered by anxiety or traditional, rigid teacher-centered environments. By embedding collaborative discussions, scientific debates, and interactive problem-solving tasks within a positive, low-anxiety environment, students felt empowered to voice diverse perspectives, defend arguments, and constructively critique peers' reasoning. This positive affective state directly supported the *explanation* dimension of critical thinking, turning problem-solving into an enjoyable, rewarding endeavor.

In contrast, while the control group's inquiry-based instruction provided structured activities, it lacked the integrated focus on conscious mindfulness and authentic contextual grounding inherent to the three-pillar ecosystem. Consequently, students in the control class predominantly operated within lower cognitive tiers, struggling to apply evaluative reasoning to novel socioeconomic dilemmas.

From a theoretical standpoint, these findings reinforce constructivist learning paradigms, confirming that critical thinking is most effectively cultivated when learners actively construct meaning through authentic, emotionally engaging experiences (Ennis, 2018; Jonassen, 2011). Empirically, the study validates the Indonesian Ministry's national pedagogical strategy, demonstrating that when *mindful*, *meaningful*, and *joyful* learning are systematically enacted at the micro level of elementary classrooms, they serve as a powerful catalyst for cognitive transformation.

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## CONCLUSION

Based on the results of the data analysis and discussion, it can be concluded that the Deep Learning approach had a significant positive effect on improving elementary students' critical thinking skills in the IPAS subject. Prior to the intervention, the experimental and control groups demonstrated equivalent baseline academic abilities. Following the intervention, however, students who experienced the Deep Learning approach achieved significantly higher critical thinking scores than those who received inquiry-based instruction. These findings indicate that integrating the three core pillars of Deep Learning—mindful, meaningful, and joyful learning—effectively promotes higher-order thinking and supports students in becoming active, critical, logical, and systematic problem solvers.

The findings have important practical implications for teachers. To enhance students' critical thinking skills, teachers should design learning experiences that encourage reflective thinking (mindful), connect concepts with authentic real-life contexts (meaningful), and foster an engaging, collaborative, and enjoyable learning environment (joyful). Teachers are also encouraged to facilitate inquiry, discussion, problem-solving, and continuous reflection as integral components of classroom instruction. Implementing these principles in IPAS learning can help shift classroom practice from teacher-centered instruction toward more student-centered learning that actively develops higher-order thinking skills.

These findings provide empirical evidence supporting the effectiveness of the Deep Learning approach as an instructional framework for improving critical thinking among elementary school students and offer practical guidance for teachers seeking to implement meaningful learning innovations in the IPAS classroom.

## ACKNOWLEDGEMENTS

The authors would like to express their sincere gratitude to the principal, teachers, and students of SDS Rabbani Purwakarta for their support, assistance, and cooperation during the data collection process. The authors also gratefully acknowledge the financial support provided by Universitas Pendidikan Indonesia for the preparation of this article as an output of the LPPM Universitas Pendidikan Indonesia Beginner Lecturer Grant Program, under Decree No. 215/UN40.F7/PT.01.01/2026.

## REFERENCES

Abdillah, A. N., Anggraeni, P., & Rahayu, A. H. (2025). *Pengaruh Model Pembelajaran Read, Answer, Discuss, Explain, Create (Radec) Berbantuan Media Komik Digital Terhadap Kemampuan Berpikir Tingkat Tinggi (Hots)*.

Alim, S. F., Prayitno, H. J., Mu'ti, A., Sutopo, A., & Hastuti, W. (2025). *Fundamental Concepts of Deep Learning: Principles in Advancing Holistic Education Practices*. *1*(2).

Arianty, R., Sofiasyari, I., Yuliana, R., Amanaturrakhmah, I., & Nurjanah, N. (2026). Transformasi pendidikan abad 21: Implementasi deep learning dalam sistem pembelajaran digital di Sekolah Dasar. *COLLASE (Creative of Learning Students Elementary Education)*, *9*(1), 106–113.

Asriani, A., Tahir, M., & Syazali, M. (2025). Pengaruh Model Project Based Learning (PjBL) terhadap Kreativitas Peserta Didik pada Mata Pelajaran IPAS Kelas IV SDN 28 Cakranegara. *Jurnal Ilmiah Profesi Pendidikan*, *10*(1), 23–30. https://doi.org/10.29303/jipp.v10i1.3113

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 7, No. 5, September 2026
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Azzahra, Y., & Jaya, C. A. (2025). Pendekatan Deep Learning: Transformasi Mindful, Meaningful, dan Joyful dalam Pembelajaran Holistik. *EduInovasi: Journal of Basic Educational Studies*, *5*(3). https://doi.org/10.47467/edu.v5i3.9245

Eem Merani Destiana, Dimas Sartika, Nur Puspitasari, & Asiyah Asiyah. (2025). Management Pendidikan Abad 21, Globalisasi, Teknologi. *Harmoni Pendidikan : Jurnal Ilmu Pendidikan*, *2*(4), 130–147. https://doi.org/10.62383/hardik.v2i4.2399

Ersel Kaymakamoglu, S. (2017). Teachers' Beliefs, Perceived Practice and Actual Classroom Practice in Relation to Traditional (Teacher-Centered) and Constructivist (Learner-Centered) Teaching (Note 1). *Journal of Education and Learning*, *7*(1), 29. https://doi.org/10.5539/jel.v7n1p29

Field, A. (2022). Mining the ambient commons: Building interdisciplinary connections between environmental knowledge, AI and creative practice research. *Interdisciplinary Science Reviews*, *47*(2), 185–198. Scopus. https://doi.org/10.1080/03080188.2022.2036408

Halim, A. (2022). Signifikansi Dan Implementasi Berpikir Kritis Dalam Proyeksi Dunia Pendidikan Abad 21 Pada Tingkat Sekolah Dasar. *Jurnal Indonesia Sosial Teknologi*, *3*(3).

Hanifah, A., Lisnawati, N., & Tasya, D. (2025). *Efektivitas Model Problem Based Learning Berbantuan Board Game Terhadap Kemampuan Literasi Dasar Siswa Pada Pelajaran Ipas*.

Haq, M. D., & Prasetiyo, N. T. (2025). Deep learning sebagai pendekatan transformasional dalam pendidikan: Sebuah tinjauan literatur. *Jurnal Studi Guru Dan Pembelajaran*, *8*(3), 1826–1842.

Herabadi, A. G. (2025). Media Sosial dan AI (Artificial Intelligence): Kawan Atau Lawan? Pemberdayaan Manusia di Era Teknologi Digital. *Perkembangan Informasi Dan Teknologi Digital Bagi Kehidupan Manusia Kini & Akan Datang*, 159.

I.K. Supriana, I.W. Suastra, & I.W. Lasmawan. (2023). Pengaruh Model Pembelajaran Problem Based Learning Terhadap Kemampuan Berpikir Kritis Dan Hasil Belajar Ipa. *Pendasi: Jurnal Pendidikan Dasar Indonesia*, *7*(1), 130–142. https://doi.org/10.23887/jurnal_pendas.v7i1.1967

Kemendikbudristek. (2022). *Keputusan Menteri Pendidikan, Kebudayaan, Riset, dan Teknologi No. 56 Tahun 2022 tentang Pedoman Penerapan Kurikulum dalam rangka Pemulihan Pembelajaran*. Kemendikbudristek RI.

MOZA, R. (2022). *Hubunganantaraberpiki Rkreatif Matematis, Penalaran Matematis Dan Kemampuan Numerik Dalam Menyelesaikan Soal Matematika Model Programme For International Student Assessment (Pisa) Pada Ko Ntenbilangan*.

Nadawina, N., Jaya, A., Ramadhanti, D., Imronudin, I., Fatchiatuzahro, F., Halim, A., & Jati, G.

P. R. S. (2025). *Penerapan pembelajaran deep learning dalam pendidikan di Indonesia*. Star Digital Publishing.

Nafi'ah, J., & Faruq, D. J. (2025). Conceptualizing deep learning approach in primary education: Integrating mindful, meaningful, and joyful. *Journal of Educational Research and Practice*, *3*(2), 225–237.

Nurlaeli, N., Noornia, A., & Wiraningsih, E. D. (2018). Pengaruh Model Pembelajaran Problem Based Learning Terhadap Kemampuan Berpikir Kritis Matematis Siswa Ditinjau Dari Adversity Quotient. *Fibonacci: Jurnal Pendidikan Matematika Dan Matematika*, *4*(2), 145. https://doi.org/10.24853/fbc.4.2.145-154

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 7, No. 5, September 2026
Page 1171-1182


Pratiwi, I. (2019). Efek program PISA terhadap kurikulum di Indonesia. *Jurnal Pendidikan Dan Kebudayaan*, *4*(1), 51–71.

Pratiwi, R., & Helsa, Y. (2025). *Model Pembelajaran Read, Answer, Discuss, Explain, and Create (Radec) dalam Meningkatkan Keterampilan Berpikir Kritis Siswa di Sekolah Dasar*.

Rahma, P. U., & Rossidy, I. (2026). Rasionalitas Al-Kindi Dalam Transmisi Ilmu Dan Implikasinya Bagi Penguatan Berpikir Kritis Pada Pendidikan Islam Abad 21: Al-Kindi's Rationality in the Transmission of Knowledge as a Foundation for Strengthening Critical Thinking in 21st Century Islamic Education. *TA'LIMUNA: Jurnal Pendidikan Islam*, *15*(1), 153–169.

Rahman, M., Mashfiya, W., Adawiyah, S. R., Kurniasari, N., & Nihlah, S. S. (n.d.). *Praktik Pembelajaran Deep Learning di Sekolah Dasar*. Cipta Media Nusantara.

Ratnasari, N., & Sukmawati, W. (2023). Pengaruh Model Pembelajaran RADEC terhadap Perubahan Penguasaan Konsep Siswa Sekolah Dasar Materi Siklus Air. *Ideas: Jurnal Pendidikan, Sosial, Dan Budaya*, *9*(3), 1017. https://doi.org/10.32884/ideas.v9i3.1462

Rehman, T. U. (2025). The transformative impact and evolving landscape: A comprehensive exploration of the globalization of higher education in the 21st century. *Journal of Further and Higher Education*, *49*(3), 346–361.

Riska, R., & Dwi Puspita, R. (2025). Pembelajaran Berbasis Masalah Dalam Mengembangkan Berpikir Kritis Dan Kreatif Siswa Untuk Mewujudkan Profil Pelajar Pancasila. *Jurnal Perseda : Jurnal Pendidikan Guru Sekolah Dasar*, *8*(1), 77–86. https://doi.org/10.37150/perseda.v8i1.3091

SHERLI, M. (2026). *Pengaruh Model Think Pair Share (Tps) Berbantuan Wordwall Terhadap Kemampuan Berpikir Kritis Pada Mata Pelajaran Pendidikan Pancasila Peserta Didik Kelas V Sd*.

Sitorus, R. M., & Nazaruddin, I. (2021). Perbedaan Kemampuan Berpikir Kreatif Dan Berpikir Kritis Siswa yang Diajar Menggunakan Pembelajaran Konvensional Dengan Kontekstual. *FARABI: Jurnal Matematika Dan Pendidikan Matematika*, *4*(1), 1–17. https://doi.org/10.47662/farabi.v4i1.78

Somantri, M., & Handayani, H. (2024). *PENGEMBANGAN BAHAN AJAR Pembelajaran IPS SD Untuk Meningkatkan Literasi ICT* . Damera Press.

Syafi'i, A. (2025). Pendekatan pembelajaran berbasis deep learning: Mindful learning, meaningful learning, dan joyful learning. *Al-Mumtaz: Jurnal Manajemen Pendidikan Islam*, *2*(1), 45–57.

Trilling, B., & Fadel, C. (2009). *21st Century Skills: Learning for Life in Our Times.* Jossey-Bass.

Tsuraya, F. G., Rachman, J. Z., Fadli, M. A., Zidani, R. F., & Khoiriyah, U. (2025). Peran Deep Learning dalam Meningkatkan Efektivitas Sistem Pendidikan pada Sekolah Dasar dan Menengah: Kajian untuk Rekomendasi Kebijakan Nasional. *Al-Munawwarah: Jurnal Pendidikan Islam*, *17*(2), 30–52.

Widagdo, T. B. (2025). Pandangan Konseptual Pembelajaran Mendalam Menuju "Transformasi Pendidikan." *Jurnal Cerdik: Jurnal Pendidikan Dan Pengajaran*, *4*(2), 51–75.

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
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