

The Effectiveness of Deep Learning-Based Read, Answer, Discuss, Explain, Create (RADEC) Workshop on the Perception of Bandung Principals

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Abstract

This study examines the effectiveness of a workshop in improving school principals' perceptions regarding deep learning implementation using the RADEC model (Read, Answer, Discuss, Explain, Create) in Bandung City, Indonesia. Using a weak experiment design with one group pretest-posttest non-control method and 14 perception indicators, Mann-Whitney U analysis revealed that the workshop significantly improved principals' understanding in 10 of 14 indicators ($p < 0.05$), particularly on RADEC syntax stages and their contribution to 21st-century skills. However, three foundational deep learning principles (joyful, meaningful, mindful learning) and the Answer stage showed strong understanding prior to the workshop ($p > 0.05$), indicating the workshop successfully closed knowledge gaps in technical RADEC aspects. Although effectiveness is limited to the perception dimension rather than direct implementation impact, these findings confirm the workshop was effective as a cognitive foundation for adopting innovative pedagogy. The study recommends: (1) continuous mentoring to transform perception into practice; (2) intensive coaching program by the Education Office through lesson study and community of practice; (3) integration of technical and philosophical dimensions in professional development initiatives. The research implies that while workshops are crucial, they are insufficient educational transformation requires a systemic support ecosystem connecting knowledge with implementation at the school level.

Keywords: Workshop; School Principals' Perceptions; RADEC Model; Deep Learning; Merdeka Curriculum.

Abstrak

Efektivitas Workshop Read, Answer, Discuss, Explain, Create (RADEC) Berbasis Deep Learning terhadap Persepsi Kepala Sekolah Bandung. Penelitian ini mengkaji efektivitas workshop dalam meningkatkan persepsi kepala sekolah terkait implementasi pembelajaran mendalam menggunakan model RADEC (Read, Answer, Discuss, Explain, Create) di Kota Bandung, Indonesia. Menggunakan desain weak experiment one group pretest-posttest non-control dengan 14 indikator persepsi, analisis Mann-Whitney U menunjukkan workshop meningkatkan pemahaman kepala sekolah pada 10 dari 14 indikator signifikan ($p < 0,05$), khususnya sintaks RADEC dan kontribusinya terhadap keterampilan abad ke-21. Sedangkan tiga prinsip dasar deep learning (joyful, meaningful, mindful) dan tahapan Answer menunjukkan pemahaman yang sudah baik sebelum workshop ($p > 0,05$), mengindikasikan workshop berhasil menutup gap knowledge pada aspek teknis RADEC. Meskipun efektivitas terbatas pada dimensi persepsi, tidak implementasi langsung, temuan ini mengkonfirmasi workshop efektif sebagai fondasi kognitif untuk adopsi pedagogi inovatif. Penelitian merekomendasikan: (1) pendampingan berkelanjutan untuk transformasi persepsi ke praktik; (2) program coaching Dinas Pendidikan melalui lesson study dan community of practice; (3) integrasi dimensi teknis dan filosofis dalam pengembangan profesional berkelanjutan. Implikasi penelitian menegaskan bahwa workshop adalah tahap krusial namun tidak cukup transformasi pendidikan memerlukan ekosistem dukungan sistemik menghubungkan pengetahuan dengan implementasi.

Kata kata kunci : Workshop; Persepsi Kepala Sekolah; Model RADEC; Pembelajaran Mendalam; Kurikulum Merdeka.

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Introduction

In the era of the industrial revolution 4.0 and rapid technological development, education around the world is required to prepare students with 21st-century skills, such as critical thinking, creativity, communication, and collaboration. (Arnyana, 2019; Kahar et al., 2021; Lase, 2019). In Indonesia, this effort is realized through the implementation of the Merdeka Curriculum, which emphasizes a deep learning approach to develop not only factual knowledge but also higher-order thinking skills and a positive attitude toward learning. (Coccia, 2020; Haq & Prasetyo, 2025; Juhari, 2025). This phenomenon reflects a shift in the learning paradigm from conventional transmissive methods to a process that is more active, reflective, and contextual for learners.

However, in practice, there are still many obstacles that hinder the transformation of learning at the elementary school level. (Hasanah et al., 2024; Oktarin & Saputri, 2024; Sutanto, 2024). One of the main obstacles is the lack of understanding and readiness among school principals as academic leaders in adopting and effectively implementing the deep learning model. School principals hold a strategic role as decision-makers and policy direction-setters in their schools; without the support and understanding of school principals, innovative learning initiatives, including the adoption of deep learning-based instructional models, will be difficult to implement systematically and sustainably (Kosam & Zulaikha, 2025; Silalahi et al., 2025). Previous research shows that many principals still tend to retain conventional teaching patterns focused on content mastery and exam-based assessment, resulting in 21st-century skills receiving insufficient attention (Natasya et al., 2025; Sahra et al., 2025; Sesanti & Chrisyarani, 2024). This condition indicates the existence of a gap between progressive national education policies and actual practices in the field.

To bridge this gap, a solution is needed that operationalizes the philosophy of deep learning into concrete classroom pedagogy. The Read, Answer, Discuss, Explain, and Create (RADEC) model emerges as a structured and systematic solution to support the implementation of deep learning. (Andini & Fitria, 2021; Handayani, Sopandi, Syaodih, Setiawan, et al., 2019; Handayani, Sopandi, Syaodih, Suhendra, et al., 2019). The RADEC model functions as a technical syntax that translates the three fundamental principles of deep learning—joyful learning, meaningful learning, and mindful learning—into concrete learning stages that can be implemented by teachers and facilitated by principals. (Fauziyyah et al., 2024; Lestari & Suhandi, 2020; Ritonga et al., 2021). Previous studies have proven the effectiveness of RADEC in improving critical thinking skills and creativity among elementary school students. (Iwanda et al., 2022; Setiawan et al., 2020). However, the implementation of this model is still very limited due to a lack of understanding and support from principals as decision-makers and leaders of the learning process.

Based on these facts, there is an urgent need to develop the capacity of principals to understand and implement deep learning based on the RADEC model through systematic training and workshop programs. Although several studies have shown the benefits of workshops in improving teachers' competencies, research focusing on the effectiveness of workshops for principals particularly regarding their perceptions and understanding of the RADEC model is still very limited. In other words, there is a research gap that needs to be filled

to determine the extent to which workshops can change principals' perceptions and readiness to support the transformation of deep learning.

This study aims to evaluate the effectiveness of a workshop on implementing deep learning based on the RADEC model in changing the perceptions of elementary school principals in Bandung, so that it can serve as a foundation for ongoing professional development and more effective implementation strategies in the future. The results of this study are expected to provide both scientific and practical contributions to support the success of educational transformation in Indonesia in line with the vision of the Merdeka Curriculum.

Method

This research was conducted in elementary schools in Bandung City, Indonesia, with principals as subjects selected based on their willingness to participate and relevance to the issue of learning transformation. The process involved planning stages through needs identification via focus group discussions and interviews, preparation in the form of socialization and participant recruitment, implementation of multi-session workshops covering the concept of deep learning and model simulations, with data collection through pretests before and posttests after the workshops using a validated questionnaire consisting of 14 perception indicators, as well as evaluation through statistical analysis using the Mann-Whitney U test to identify significant changes between groups, followed by reporting and dissemination of results to the Bandung City Education Department and stakeholders.

This study adopts a weak experimental design using the one-group pretest-posttest non-control technique (Al Muhandis & Riyadi, 2023; Chang et al., 2023; Dai et al., 2023; Nirwana & Rezeki, 2020). This method was chosen to evaluate the effectiveness of the workshop in improving principals' perceptions of the RADEC model and deep learning. Perceptions were measured using a validated questionnaire consisting of 14 indicators covering conceptual and practical understanding. Data were collected before (pretest) and after (posttest) the workshop implementation. This study uses a community engagement research design integrated with program impact evaluation. The implementation of activities is designed through a phased approach that systematically combines preparation, implementation, and evaluation aspects to ensure the validity of results and the sustainability of program impact.

The first stage includes comprehensive planning activities, starting with problem identification based on needs analysis in the field through discussions with local education stakeholders. This stage also involves an in-depth literature review on deep learning and the RADEC model as a theoretical framework, the preparation of a structured workshop module with clear learning outcomes, as well as the development of measurement instruments in the form of validated questionnaires with 14 indicators to assess principals' perceptions. In parallel, strategic coordination is conducted with the Bandung City Education Office and representatives of the target group of school principals to ensure alignment between the program design and contextual needs, as well as institutional support.

The operational preparation stage includes the formal socialization of the program to prospective participants and stakeholders to build ownership and commitment, recruitment of workshop participants based on predetermined inclusion criteria (elementary and junior high

school principals in Bandung City), as well as arranging technical details such as the venue, instructional equipment, and teaching materials to ensure quality implementation.



Figure 1. Coordination with the Head of the Bandung City School Principal Working Group (K₃S)

The workshop implementation phase is designed as an intensive program held through several sessions with optimal duration and frequency for effective learning. The workshop materials cover three main components: (1) the fundamental concepts and principles of deep learning, which include three main pillars joyful learning, meaningful learning, and mindful learning; (2) an in-depth understanding of the RADEC model a comprehensive analysis of each stage (Read, Answer, Discuss, Explain, Create), its syntax, and its contribution to the development of 21st-century skills; and (3) simulations and hands-on practice in applying the RADEC model through case studies and role-playing to enhance practical understanding. Data collection is carried out at two critical moments: pretest measurement before the workshop begins to capture the principals' baseline perceptions, and posttest measurement after the entire series of workshops is completed to identify changes in perception resulting from the intervention.



Figure 2. Documentation of workshop implementation

The evaluation stage involves statistical analysis of pretest and posttest data using the Mann–Whitney U test to examine the significance of differences in mean perceptions for each indicator. This test was chosen because data derived from Likert scale instruments with a limited sample size may not meet the assumption of normality, making a non-parametric test more appropriate. The analysis focuses on identifying which indicators show significant changes ($p < 0.05$) and which ones demonstrate solid understanding from the baseline, in order to provide a comprehensive overview of the workshop's effectiveness.

The final stage involves the preparation of a comprehensive final community service report containing key findings, practical implications, and evidence-based recommendations. The research results are then disseminated to the target community, the Bandung City Education Office, participating school principals, and other relevant stakeholders through outreach forums and academic publications to ensure that the research findings are accessible and can be utilized in local education policy decision-making and the development of community service programs.

Result and Discussion

This study involved elementary school principals in Bandung City who participated in the Workshop on the Implementation of Deep Learning Based on the RADEC Model. The respondents had diverse characteristics, including their level of education, years of service, school status (public/private), and the number of teachers they managed. This diversity provides a representative picture of principals' perceptions of educational innovation.

The data from the questionnaire completed before and after the workshop were analyzed using the Mann–Whitney U test to examine differences in perceptions between the groups. A summary of the analysis results is presented in Table 1.

Tabel 1. Ringkasan Hasil Uji Mann–Whitney U pada Setiap Indikator Persepsi

Code	Perception Indicator	Z	Sig. (2-tailed)	Result
X1	Deep learning as joyful learning	-1.763	0.078	Not significant
X2	Deep learning as meaningful learning	-1.763	0.078	Not significant
X3	Deep learning as mindful learning	-1.763	0.078	Not significant
X4	Understanding Read stages (RADEC)	-3.040	0.002	significant
X5	Understanding Answer stages (RADEC)	0.000	1.000	Not significant
X6	Understanding Discuss stages (RADEC)	-3.470	<0.001	significant
X7	Understanding Explain stages (RADEC)	-3.884	<0.001	significant
X8	Understanding Create stages (RADEC)	-3.884	<0.001	significant
X9	RADEC develops students' skills (1)	-3.671	<0.001	significant
X10	RADEC develops students' skills (2)	-4.222	<0.001	significant
X11	RADEC support deep learning implementation	-4.415	<0.001	significant
X12	The purpose of RADEC implementation	-2.588	0.010	significant
X13	Difference between RADEC vs conventional learning	-2.434	0.015	significant
X14	Differences in the roles of teachers and students (deep learning vs conventional)	-5.036	<0.001	significant

The analysis results show that out of the 14 indicators tested, 10 indicators exhibited a significant increase from the pretest to the posttest ($p < 0.05$), namely understanding of the Read stage (X₄), Discuss (X₆), Explain (X₇), Create (X₈), the benefits of RADEC for 21st-century skills (X₉, X₁₀, X₁₁), the objectives of implementing RADEC (X₁₂), the differences between deep learning and conventional learning (X₁₃), as well as the differences in teacher-student roles in the context of deep learning versus conventional learning (X₁₄). This indicates that the workshop had a tangible impact on improving principals' perceptions in the dimensions of understanding RADEC syntax and its benefits for 21st-century skills..

On the other hand, four indicators showed no significant change, namely the three core principles of deep learning—joyful learning (X₁), meaningful learning (X₂), and mindful learning (X₃)—as well as understanding of the Answer stage in the RADEC model (X₅) ($p > 0.05$). This finding is particularly interesting because it reveals that non-significant results do not mean the workshop had no impact, but rather indicate that principals already had a good understanding of these dimensions before attending the workshop. This suggests the presence of a ceiling effect on indicators X₁–X₃ and X₅, where the principals' baseline understanding was already high (as shown by high pretest scores), leaving little room for substantial improvement in the posttest.

On the other hand, three indicators related to understanding the basic principles of deep learning (X₁–X₃) and one indicator regarding understanding the Answer stage in the RADEC syntax (X₅) did not show significant differences ($p > 0.05$). This indicates that although the workshop was effective in most aspects, there are still certain areas that require further exploration through follow-up activities, particularly concerning the conceptual principles of deep learning and the implementation of the Answer stage in RADEC. Overall, these results confirm that the workshop on implementing deep learning based on the RADEC model was effective in shifting the perceptions of school principals in Bandung City, especially in terms of the technical aspects of RADEC application and its implications for 21st-century learning.

The research results show that the workshop on the implementation of deep learning based on the RADEC model significantly changed principals' perceptions on most of the measured indicators. The most notable changes were seen in the indicators related to understanding the RADEC syntax (X₄–X₈) and the understanding of the benefits of RADEC for 21st-century skills and deep learning (X₉–X₁₁). These findings are in line with Vygotsky's social constructivism, which posits that interaction, discussion, and collaboration in the learning process play a vital role in building conceptual understanding. Thus, direct experience in the workshop provided principals with the opportunity not only to understand RADEC theoretically, but also to see its relevance in educational practice.

The success of the workshop in improving perceptions regarding the syntax aspect of RADEC reinforces the findings of Handayani et al. (2019) and Lestari & Suhandi (2020), which show that the RADEC stages—Read, Answer, Discuss, Explain, Create—are able to enhance students' engagement and critical thinking skills. Principals who understand these stages are expected to provide better policy support and supervision to teachers in implementing them in the classroom. This is in line with the principal's role as an academic leader responsible for ensuring that learning proceeds in accordance with the requirements of the Merdeka Curriculum.

Moreover, significant changes in the indicators related to the objectives of RADEC implementation and the differences compared to conventional learning (X₁₂-X₁₄) affirm that the workshop successfully broadened principals' perspectives on the urgency of deep learning. These results are consistent with the study by Pratama et al. (2020), which found that RADEC not only enhances students' higher-order thinking skills but also requires a shift in the teacher's role from merely delivering information to becoming a learning facilitator. This change in principals' perceptions is important because they act as policymakers who determine the direction of learning strategies in schools.

However, this study also found that three initial indicators related to the basic principles of deep learning (joyful, meaningful, mindful learning) and one indicator in the Answer stage of RADEC (X₅) did not experience significant changes. This can be explained by the possibility that the concept of deep learning, in general, may have already been understood by some principals prior to the workshop, so the workshop did not have a substantial impact on that particular dimension. In addition, the Answer stage in RADEC is relatively simple and often considered part of routine evaluations, so perceptions toward this stage have not changed significantly without direct classroom practice. These findings indicate that while the workshop was effective in most aspects, follow-up in the form of mentoring and the practical implementation of RADEC in schools is necessary to deepen principals' understanding of conceptual and technical aspects that are not yet optimal.

Overall, the results of this study reinforce the importance of professional development programs for school principals in addressing the challenges of 21st-century education. With increased awareness among principals regarding RADEC and deep learning, it is expected that they can play a greater role as agents of change in motivating teachers to implement innovative learning. This is relevant to the demands of the Merdeka Curriculum, which encourages exploration-based learning, differentiation, and the development of 21st-century skills.

Conclusion

This community service activity demonstrates that a workshop on the implementation of deep learning based on RADEC can be an effective strategy for increasing principals' awareness and understanding of pedagogical innovation. However, the most important lesson learned from this activity is that a change in perception is an essential first step, but it alone is not sufficient to achieve genuine educational transformation. Research findings indicate that although most principals experienced significant changes in their perceptions of RADEC and deep learning, this transformation will only be meaningful if it is followed by consistent and continuous implementation at the school level. Therefore, the success of educational transformation in the context of the Merdeka Curriculum requires long-term commitment encompassing three crucial pillars: first, ongoing support and practical coaching for principals and teachers to implement RADEC effectively in the classroom; second, conceptual deepening of the fundamental principles of deep learning through mechanisms such as communities of practice and lesson study involving inter-school collaboration; third, policy support and the allocation of resources from the Education Office to create an ecosystem conducive to learning innovation. Community service activities like this should be seen not as isolated interventions that end when the workshop concludes, but rather as entry points in the journey of educational

transformation, which requires sustained commitment, synergy, and acceleration from all education stakeholders at the school, district, and system-wide levels.

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