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Teacher Readiness for Deep Learning Implementation in Indonesian Education: A Systematic Narrative Review of Dimensions, Barriers, and Enabling Factors

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Abstract

The transformation of twenty-first century education requires a shift from rote-based instruction toward deep learning that fosters critical thinking, creativity, and meaningful understanding. In Indonesia, this shift aligns with national reforms such as *Merdeka Belajar*. However, its success depends on teachers' readiness to implement deep learning practices. This study aims to analyze the dimensions, barriers, and enabling factors of teacher readiness in this context. This study employs a systematic narrative review with thematic analysis of literature published between 2019 and 2025, sourced from Google Scholar, Scopus, DOAJ, and ERIC. From 127 identified articles, 35 studies met the inclusion criteria and were analyzed. The analysis is guided by three dimensions of readiness: cognitive (pedagogical knowledge), practical skills, and institutional support. The findings indicate that Indonesian teachers generally exhibit strong cognitive readiness but face challenges in practical implementation, particularly in designing authentic assessments and reflective learning activities. Institutional support remains uneven, especially in terms of infrastructure and professional development. Key barriers include limited training, infrastructure disparities, and traditional pedagogical practices, while enabling factors include supportive policies, teacher motivation, and professional learning communities. Comparative analysis shows that Indonesia performs relatively well in pedagogical knowledge but lags in practical readiness and institutional support compared to international contexts. In conclusion, enhancing teacher readiness requires an integrated approach that strengthens practical competencies and systemic support to achieve sustainable deep learning implementation.

Keywords: deep learning, pedagogical knowledge, meaningful engagement, meaningful transformation

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1. Introduction

Twenty-first century education necessitates a paradigmatic transformation from traditional rote-based instructional models toward more transformative and learner-centered approaches (Handayani et al., 2024). In contemporary educational discourse, the emphasis has shifted from mere knowledge acquisition to the development of higher-order thinking skills, including critical thinking, problem-solving, creativity, collaboration, and digital literacy (Jati et al., 2021; Maghfiroh et al., 2025). These competencies are essential in equipping learners to navigate the complexities of an increasingly interconnected and technology-

driven world. Consequently, pedagogical approaches must evolve to foster meaningful engagement, contextual understanding, and the ability to apply knowledge in real-world situations.

One such approach that has gained significant attention is deep learning. As articulated by Baihaqi et al (2025) and Alim et al (2025), deep learning refers to a process in which learners actively construct meaning, integrate new knowledge with prior understanding, and engage in reflective and critical thinking (Hidayani et al., 2025). Unlike surface learning, which is often characterized by memorization and minimal engagement, deep learning encourages students to explore underlying concepts, identify relationships between ideas, and apply their knowledge in novel contexts. This approach not only enhances cognitive development but also promotes lifelong learning skills that are essential in the twenty-first century (Mahardhika et al., 2025; Prihantoro et al., 2025).

In the Indonesian context, the relevance of deep learning is increasingly evident in national education reforms. The implementation of the Merdeka Belajar curriculum represents a strategic effort to create a more flexible, student-centered learning environment that accommodates diverse learner needs and potentials. Complementing this initiative is the Profil Pelajar Pancasila framework, which outlines six core competencies: faith and piety, global diversity, cooperation, independence, critical reasoning, and creativity. These competencies align closely with the principles of deep learning, as they emphasize holistic student development encompassing cognitive, social, and moral dimensions.

However, the successful implementation of deep learning is contingent upon several critical factors, among which teacher readiness plays a pivotal role. Teachers are not merely facilitators of knowledge but are key agents of change who shape the learning environment and influence student engagement. The transition from traditional teaching practices to deep learning-oriented pedagogy requires teachers to adopt new instructional strategies, integrate technology effectively, and foster a classroom culture that supports inquiry, collaboration, and reflection. Therefore, understanding and enhancing teacher readiness is essential for ensuring the effectiveness and sustainability of educational reforms.

Teacher readiness for deep learning can be conceptualized as a multidimensional construct encompassing pedagogical knowledge, practical skills, and institutional support. Pedagogical knowledge refers to teachers' understanding of deep learning principles, instructional design, and assessment strategies that promote higher-order thinking. Practical skills involve the ability to implement these principles in classroom settings, including the use of innovative teaching methods, digital tools, and student-centered learning activities. Meanwhile, institutional support encompasses the availability of resources, professional development opportunities, leadership support, and policy alignment that facilitate the adoption of deep learning practices.

These three dimensions are inherently interconnected and collectively determine the extent to which teachers can effectively implement deep learning. For instance, strong pedagogical knowledge without adequate practical skills may result in ineffective classroom practices. Similarly, even highly skilled teachers may face challenges in the absence of sufficient institutional support. Therefore, a comprehensive analysis of teacher readiness must consider the interplay

between these dimensions to identify both enabling factors and potential barriers.

Despite the growing emphasis on deep learning in educational policy and discourse, empirical evidence suggests that its implementation in classrooms remains inconsistent. Many teachers continue to rely on traditional, teacher-centered approaches due to factors such as limited understanding of deep learning concepts, lack of training, time constraints, and insufficient institutional support. These challenges highlight the need for systematic efforts to assess and enhance teacher readiness, as well as to provide targeted interventions that address identified gaps.

Furthermore, the integration of deep learning into classroom practice requires a shift in assessment paradigms. Traditional assessment methods, which focus on factual recall and standardized testing, may not adequately capture the depth of student understanding and the development of higher-order thinking skills. Therefore, alternative assessment strategies such as project-based assessment, reflective journals, and performance tasks must be adopted to align with deep learning objectives.

In light of these considerations, this study aims to explore teacher readiness for implementing deep learning within the context of Indonesian education. By examining the dimensions of pedagogical knowledge, practical skills, and institutional support, this research seeks to provide a comprehensive understanding of the factors that influence the adoption of deep learning practices. As illustrated in Figure 1, these dimensions serve as a conceptual framework for analyzing both the barriers and supporting factors in the implementation process. The findings of this study are expected to contribute to the development of effective strategies for enhancing teacher readiness and ultimately improving the quality of education in Indonesia.

2. Method

This study employed a systematic narrative review approach combined with thematic analysis to synthesize and interpret existing literature on teachers' readiness in implementing deep learning within the Indonesian educational context. Unlike a purely systematic literature review (SLR) that focuses on strict quantitative aggregation of findings, this approach emphasizes conceptual synthesis, critical interpretation, and thematic exploration of patterns emerging from the literature. This method is particularly suitable for examining complex and evolving educational phenomena such as deep learning, which involve multidimensional constructs and contextual variations.

The literature search was conducted using several reputable academic databases, including Google Scholar, Scopus, DOAJ, and ERIC. A set of relevant keywords was used to ensure comprehensive coverage of the topic, including *"teacher readiness," "deep learning," "Merdeka Belajar," "project-based learning,"* and *"authentic assessment."* To maintain relevance to current educational reforms, the search was limited to publications published between 2019 and 2025.

To ensure the quality and relevance of the selected literature, inclusion and exclusion criteria were applied systematically. The inclusion criteria required that articles: (1) discuss teacher readiness, deep learning, or related pedagogical transformations; (2) be published in peer-reviewed academic journals; (3) be available in full-text format; and (4) be written in English or Indonesian. Exclusion criteria eliminated studies that were purely opinion-

based without empirical grounding, unrelated to formal education contexts (primary, secondary, or higher education), or limited to non-peer-reviewed conference abstracts.

The initial search process identified 127 articles. These articles were then subjected to a multi-stage screening process, including title screening, abstract review, and full-text assessment. After applying the inclusion and exclusion criteria, 35 studies were selected for further analysis, consisting of 20 national studies and 15 international studies. The overall process of identification, screening, eligibility assessment, and inclusion followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework to ensure transparency and methodological rigor.

The selection process is illustrated in Figure 1, which presents the flow of article identification and screening.

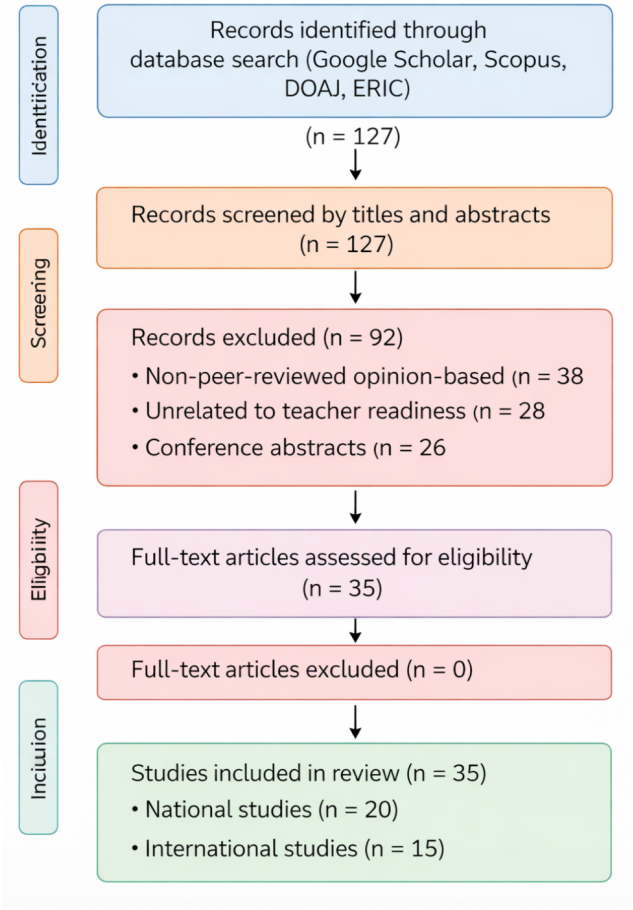

Figure 1. PRISMA Flow Diagram

Data analysis was conducted using a thematic analysis approach, allowing the researcher to identify, categorize, and interpret recurring patterns across the selected studies. The analysis focused on three primary dimensions of teacher readiness: (1) pedagogical and cognitive knowledge, (2) practical and instructional skills, and (3) institutional and systemic support. In addition, cross-cutting themes such as barriers and enabling factors, as well as comparative insights across international contexts, were identified and analyzed.

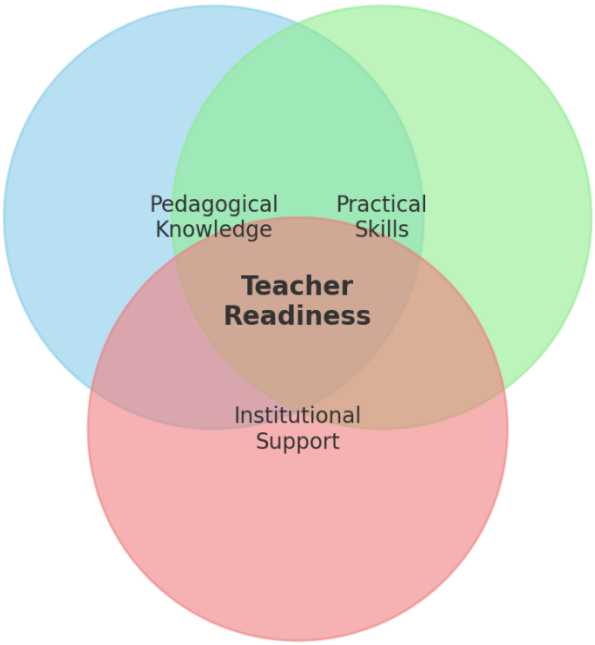

Figure 2. Conceptual Framework of Teacher Readiness for Deep Learning

Rather than quantifying findings statistically, this study emphasizes interpretative synthesis, enabling a deeper understanding of how teacher readiness is constructed and influenced by various contextual factors. This approach allows for the integration of diverse perspectives and findings, providing a more holistic and nuanced understanding of deep learning implementation.

Despite its strengths, this study has several limitations. The review is restricted to articles published in academic journals and accessible through digital databases. Consequently, relevant local studies available only in institutional reports or unpublished sources may not have been included. Additionally, as a narrative synthesis, the findings rely on interpretative analysis, which may introduce a degree of subjectivity. Nevertheless, systematic procedures in literature selection and thematic coding were employed to enhance the credibility and reliability of the analysis.

In summary, this systematic narrative review provides a structured yet flexible framework for understanding teacher readiness in deep learning, offering both conceptual clarity and practical insights relevant to educational policy and practice.

3. Result and Discussion

The findings of this study reveal that teachers' readiness to implement deep learning in Indonesia is a complex and multidimensional construct influenced by various interrelated factors. Through thematic analysis of the selected literature, several recurring patterns emerged that highlight not only the current state of readiness but also the challenges and opportunities associated with its implementation. To provide a more structured and comprehensive discussion, the results are organized into three main thematic areas: (1) the dimensions of teacher readiness, (2) the barriers and enabling factors affecting implementation, and (3) a comparative analysis within international contexts. These themes collectively offer a holistic understanding of how deep learning is being conceptualized and practiced, as well as the strategic implications

for improving educational quality in Indonesia.

a. Dimensions of Teacher Readiness in the Implementation of Deep Learning

Teacher readiness in implementing deep learning constitutes a multidimensional construct that reflects the extent to which teachers possess the knowledge, competencies, and systemic support required to transform instructional practices. Based on the synthesis of the reviewed literature, this readiness cannot be treated as a single variable; rather, it comprises three interrelated dimensions: cognitive readiness, practical readiness, and institutional readiness. These dimensions are conceptually aligned with the perspectives of Biggs & Tang (2011) and Entwistle (2009), who emphasize that deep learning can only be achieved through the integration of conceptual understanding, effective pedagogical practices, and a supportive learning environment.

Overall, the findings indicate that Indonesian teachers have demonstrated increasing awareness of the importance of deep learning. This is reflected in a gradual shift from rote-based instructional approaches toward more meaningful, reflective, and student-centered learning. However, the level of readiness remains uneven and varies significantly depending on factors such as geographical location, access to professional development, and institutional support.

Table 1. Distribution of Teacher Readiness Dimensions in Deep Learning Implementation

Readiness Dimension	Key Indicators	Level of Readiness (Average)	Key Findings
Cognitive	Understanding of deep learning concepts, HOTS, reflective learning	High (75–85%)	Teachers are aware of the importance of deep learning, but distribution is uneven
Practical	Instructional design, authentic assessment, use of technology	Moderate (60–75%)	Difficulties in implementation, particularly in assessment and reflective practices
Institutional	Infrastructure, school policy, professional development support	Low–Moderate (55–70%)	Unequal support between urban and rural schools

Table 1 demonstrates that cognitive readiness tends to be higher compared to the other dimensions. This suggests that, at a conceptual level, most teachers have developed an understanding of the importance of deep learning in the context of twenty-first century education. This understanding includes awareness of higher-order thinking skills (HOTS), problem-based learning, and reflective learning as essential components of effective instruction (Pradana & Dipsatara, 2026; Iswari et al., 2025; Puspita et al., 2025). However, a high level of cognitive readiness does not necessarily translate into effective classroom implementation.

In contrast, practical readiness appears at a moderate level. Many teachers encounter challenges in translating theoretical knowledge into concrete teaching practices. The primary difficulties lie in designing authentic assessments that capture students' deep understanding and in facilitating reflective and collaborative learning activities (Khairi & Ishafit, 2026). This indicates the presence of a gap between *knowing* and *doing*, which is often attributed to limited hands-on training and insufficient opportunities for experiential learning.

The third dimension, institutional readiness, emerges as both a critical and highly variable factor. Schools with strong leadership, an innovative culture, and adequate resources tend to exhibit higher levels of readiness. Conversely, schools in remote or under-resourced areas face significant challenges, including limited digital infrastructure, insufficient access to continuous professional development, and weak policy support at the local level.

To further elaborate the relationships among these dimensions, Table 2 presents the interaction effects between different combinations of readiness.

Table 2. Interaction Among Teacher Readiness Dimensions

Dimension Combination	Impact on Deep Learning Implementation	Interpretation
High cognitive – Low practical	Implementation remains conceptual and not fully operational	Gap between theory and practice
High practical – Low institutional	Innovation occurs but is not sustainable	Dependent on individual teacher initiative
High cognitive + High practical + High institutional	Optimal and sustainable implementation	Ideal condition
Low across all dimensions	No significant instructional transformation occurs	Dominance of traditional pedagogy

Table 2 highlights that the effectiveness of deep learning implementation is largely determined by the balance and interaction among the three dimensions of readiness. A combination of high cognitive and practical readiness without adequate institutional support often leads to unsustainable innovation (Pangestu et al., 2026). In many cases, even highly competent teachers struggle to maintain deep learning practices due to constraints related to infrastructure, policy, and organizational culture.

Conversely, the ideal condition is achieved when all three dimensions are well-developed and mutually reinforcing. In such contexts, teachers not only understand the principles of deep learning but are also capable of implementing them effectively within a supportive institutional ecosystem. This finding is consistent with international literature, which underscores the importance of systemic approaches in educational reform.

Furthermore, the findings reveal that disparities among these dimensions contribute significantly to the slow pace of instructional transformation in Indonesia. Many professional development programs tend to focus primarily on enhancing theoretical knowledge, without adequately addressing practical skills and institutional capacity (Fadlullah et al., 2026). As a result, efforts to promote deep learning often fail to achieve their intended impact.

In conclusion, teacher readiness for implementing deep learning is a complex and layered phenomenon that requires simultaneous development across cognitive, practical, and institutional dimensions. A holistic approach to teacher development one that integrates conceptual understanding, practical competence, and systemic support is essential to achieve sustainable and meaningful transformation in educational practice.

b. Barriers and Enabling Factors in the Implementation of Deep Learning

The implementation of deep learning in educational contexts, particularly in

Indonesia, is influenced by a complex interplay between inhibiting and enabling factors. While previous sections have highlighted the multidimensional nature of teacher readiness, this section focuses on identifying the key barriers and supporting factors that shape the extent to which deep learning can be effectively adopted in classroom practice. Understanding this duality is essential for designing targeted interventions and policy strategies that can accelerate educational transformation.

The literature consistently indicates that, despite growing awareness and policy support, the implementation of deep learning remains constrained by several structural, pedagogical, and systemic challenges (Adhantoro et al., 2026; Ismiyanto et al., 2026; Sutopo et al., 2021). At the same time, emerging enabling factors particularly those driven by policy reforms and teacher agency offer promising pathways for improvement.

Table 3. Major Barriers to Deep Learning Implementation

Barrier Category	Specific Issues	Impact on Implementation
Professional Training	Limited access to hands-on training, lack of continuous development programs	Weak practical readiness
Infrastructure	Unequal access to digital tools, internet limitations, lack of learning resources	Restricted innovation
Pedagogical Culture	Dominance of lecture-based teaching, resistance to change	Surface-level learning persists
Assessment Practices	Overreliance on standardized testing, lack of authentic assessment	Misalignment with deep learning goals

Table 3 illustrates that barriers to deep learning implementation are not isolated but rather interconnected across multiple dimensions. One of the most prominent challenges is the limitation in professional training. Many teachers report that available training programs are often theoretical in nature and do not provide sufficient opportunities for practical application (Alim et al., 2025). As a result, teachers struggle to translate conceptual knowledge into classroom practices, particularly in designing authentic assessments and facilitating reflective learning activities.

Infrastructure disparities also represent a critical barrier, especially in geographically diverse contexts such as Indonesia. Schools in urban areas tend to have better access to digital tools and internet connectivity, enabling them to experiment with innovative pedagogies. In contrast, schools in rural or remote areas face significant constraints, limiting their ability to adopt technology-enhanced deep learning approaches. This digital divide exacerbates inequalities in educational quality and teacher readiness.

Furthermore, entrenched pedagogical cultures present a significant challenge. The persistence of teacher-centered, lecture-based instruction reflects not only habit but also systemic pressures, such as curriculum coverage demands and standardized testing requirements (Andriyani et al., 2025). These conditions discourage experimentation with student-centered approaches and hinder the development of higher-order thinking skills. Additionally, assessment practices that prioritize factual recall over conceptual understanding further misalign with the principles of deep learning, as highlighted.

While these barriers are substantial, the literature also identifies several enabling

factors that support the implementation of deep learning.

Table 4. Key Enabling Factors in Deep Learning Implementation

Enabling Factor	Description	Contribution to Implementation
Educational Policy	Merdeka Belajar framework promoting flexibility and student-centered learning	Encourages pedagogical innovation
Teacher Motivation	High enthusiasm and willingness to adapt	Drives individual-level change
Professional Communities	Teacher collaboration, knowledge sharing	Enhances collective capacity
Leadership Support	Visionary school leadership and supportive management	Facilitates institutional change

Table 4 highlights that enabling factors operate across multiple levels, from individual teacher motivation to systemic policy support. One of the most significant drivers is the *Merdeka Belajar* policy, which provides a flexible framework that encourages innovation in teaching and learning. This policy reduces rigid curriculum constraints and allows teachers to design more contextual and meaningful learning experiences aligned with deep learning principles.

Teacher motivation also emerges as a critical enabling factor. Despite various challenges, many teachers demonstrate a strong willingness to innovate and improve their teaching practices. This intrinsic motivation often compensates for structural limitations, enabling teachers to experiment with new pedagogical approaches even in less supportive environments (Taqiyya et al., 2025). However, reliance on individual motivation alone is not sufficient for sustainable transformation.

Professional learning communities further enhance teacher readiness by fostering collaboration and shared learning. Through peer interaction, teachers can exchange best practices, reflect on their experiences, and collectively solve instructional challenges. This collaborative approach aligns with the principles of continuous professional development and has been widely recognized in international studies as a key factor in successful educational reform.

Leadership support at the institutional level also plays a crucial role. Schools with visionary leaders who prioritize innovation and provide necessary resources tend to create environments conducive to deep learning (Baihaqi et al., 2025). Leadership not only influences policy implementation but also shapes school culture, which in turn affects teacher behavior and student outcomes.

The comparative relationship between barriers and enabling factors is further illustrated in Figure 3. The figure reveals that barriers remain dominant in critical areas such as professional training and infrastructure, where their relative weight exceeds that of enabling factors. This indicates that systemic challenges continue to limit the effectiveness of deep learning implementation despite ongoing reform efforts.

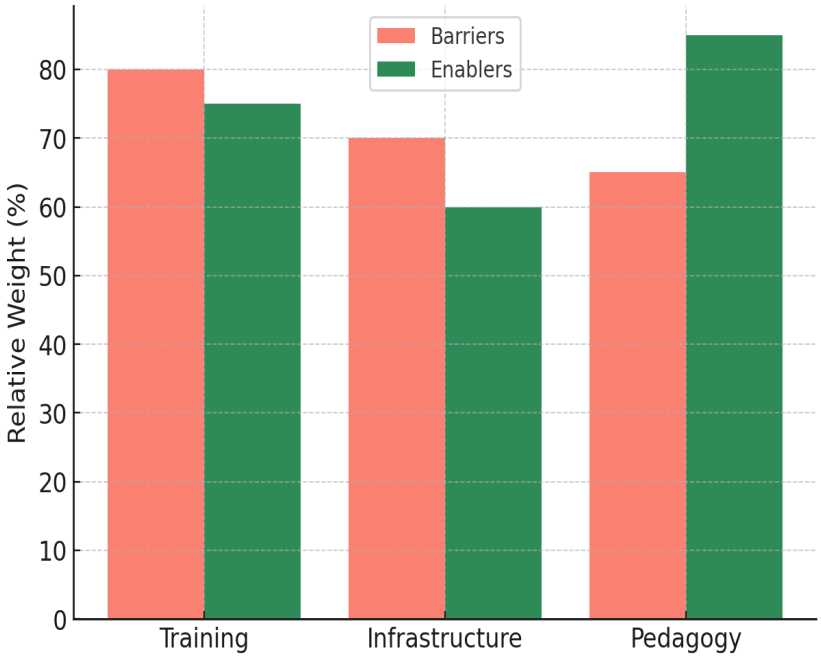

Figure 3. Barriers vs Supporting Factors inTeacher Readiness

Interestingly, the figure also shows that in the domain of pedagogy, enabling factors slightly outweigh barriers. This suggests that, at the classroom level, teachers are increasingly willing to adopt innovative teaching practices, supported by policy frameworks and professional communities. However, this pedagogical readiness is often constrained by external factors such as limited resources and inadequate institutional support.

From an analytical perspective, Figure 2 underscores the importance of addressing structural barriers while simultaneously strengthening enabling conditions. The imbalance between barriers and enablers highlights that policy interventions must go beyond rhetorical support and focus on tangible improvements, such as expanding access to quality training, investing in digital infrastructure, and reforming assessment systems.

Moreover, the dynamic interplay between barriers and enabling factors suggests that teacher readiness is not static but evolves over time. As enabling factors become more prominent particularly through sustained policy implementation and professional development there is potential for a gradual reduction in the impact of barriers. However, without coordinated efforts at multiple levels, the persistence of these barriers may continue to hinder the full realization of deep learning in educational practice.

In conclusion, the implementation of deep learning is shaped by a delicate balance between inhibiting and enabling factors. While significant progress has been made in terms of policy support and teacher motivation, substantial challenges remain, particularly in relation to training, infrastructure, and pedagogical transformation. Addressing these challenges requires a comprehensive and systemic approach that integrates policy, practice, and institutional support to ensure sustainable and equitable educational innovation.

c. Comparative Analysis of Teacher Readiness in Global Contexts

A comparative analysis of teacher readiness in implementing deep learning provides critical insights into how different educational systems respond to similar pedagogical transformations. By situating Indonesia within a broader international context, this study identifies both convergent patterns and context-specific divergences that shape the adoption of deep learning practices. Such analysis is essential for understanding not only the relative position of Indonesian education but also for deriving transferable lessons that can inform policy and practice.

The literature reveals that teacher readiness for deep learning is influenced by a combination of structural, cultural, and policy-related factors that vary significantly across regions. In developing countries, including Indonesia and several Asian nations, the primary challenges tend to revolve around infrastructure limitations, uneven access to professional development, and deeply rooted traditional pedagogical practices. In contrast, developed countries particularly in Western contexts generally exhibit stronger institutional support and infrastructure but face different challenges, such as aligning assessment systems with deep learning objectives and ensuring coherence between teacher education programs and classroom practices.

Table 5. Comparative Dimensions of Teacher Readiness: Indonesia vs International Contexts

Dimension	Indonesia Context	International Context	Key Difference
Pedagogical Knowledge	Relatively strong conceptual understanding	Strong and supported by structured training	Similar strength, but more formalized abroad
Practical Skills	Moderate, limited by lack of hands-on training	High, supported by continuous professional development	Gap in implementation capacity
Institutional Support	Uneven, dependent on region and school resources	Strong, with systemic policy and infrastructure support	Significant disparity

Table 5 highlights that while Indonesian teachers demonstrate relatively strong pedagogical knowledge, comparable to their international counterparts, significant gaps remain in terms of practical skills and institutional support. This finding suggests that conceptual awareness alone is insufficient to ensure effective implementation of deep learning. In many international contexts, particularly in countries with advanced education systems, teacher training programs are more structured and emphasize the integration of theory and practice. Continuous professional development is systematically embedded within the education system, enabling teachers to refine their instructional practices over time.

In contrast, the Indonesian context is characterized by fragmentation in professional development opportunities. Training programs are often sporadic and lack continuity, resulting in limited opportunities for teachers to develop practical competencies. Furthermore, institutional support varies widely depending on geographic and socio-economic conditions, creating disparities in teacher readiness across regions. This uneven distribution of resources and support mechanisms contributes to the gap in implementation capacity observed in this study.

To further examine these differences, Table 6 presents a comparison of key challenges faced in different global contexts.

Table 6. Comparative Challenges in Deep Learning Implementation Across Contexts

Context	Major Challenges	Implications
Indonesia & Asia	Infrastructure gaps, limited training, traditional pedagogy	Slower adoption and uneven implementation
Western Countries	Assessment alignment, feedback systems, curriculum coherence	Challenges in optimizing deep learning outcomes
Global Common Issues	Need for continuous professional development, institutional support	Universal requirement for sustainability

Table 6 demonstrates that although the nature of challenges differs across contexts, there are also shared global concerns. In Indonesia and similar contexts, the emphasis is on overcoming foundational barriers such as infrastructure and teacher training. These challenges directly affect the feasibility of implementing deep learning at scale. Without adequate resources and support, even well-designed pedagogical approaches cannot be effectively executed.

On the other hand, Western countries, which generally have more established educational infrastructures, face more nuanced challenges related to system optimization. Issues such as aligning assessment practices with deep learning objectives and ensuring coherence between curriculum design and teacher preparation programs highlight the complexity of sustaining high-quality educational systems. These challenges suggest that even in well-resourced contexts, achieving deep learning is not merely a matter of resource availability but also of systemic alignment and pedagogical coherence.

Importantly, Table 6 also identifies several universal challenges that transcend geographical boundaries. Continuous professional development, institutional investment, and systemic support emerge as critical factors in all contexts. This reinforces the notion that teacher readiness for deep learning is not solely dependent on local conditions but also on broader educational paradigms and global trends.

The comparative dynamics of teacher readiness are further illustrated in Figure 3, which presents a radar chart comparing Indonesia and international contexts across three key dimensions: pedagogical knowledge, practical skills, and institutional support. The figure reveals that Indonesia demonstrates relatively strong performance in pedagogical knowledge, approaching international levels. This indicates that teachers in Indonesia are conceptually prepared to engage with deep learning principles.

However, the chart also clearly shows that Indonesia lags behind in practical skills and institutional support. The gap in practical readiness suggests that teachers face difficulties in translating theoretical understanding into effective classroom practices. This aligns with earlier findings indicating limitations in hands-on training and experiential learning opportunities. Meanwhile, the disparity in institutional support reflects systemic issues such as uneven infrastructure, limited access to resources, and varying levels of leadership support.

From an analytical standpoint, Figure 4 underscores the importance of adopting a holistic approach to improving teacher readiness. Enhancing pedagogical knowledge alone is insufficient; equal attention must be given to strengthening practical competencies and institutional frameworks. The imbalance among these dimensions highlights the need

for integrated policy interventions that address both individual and systemic factors.

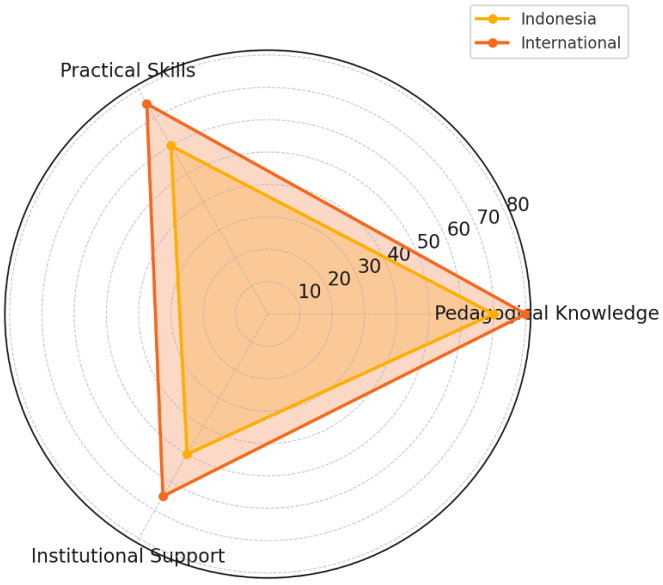

Figure 4. Comparative Teacher Readiness

Furthermore, the figure suggests that Indonesia has a strong foundation upon which further improvements can be built. The relatively high level of pedagogical knowledge indicates readiness at the conceptual level, which can serve as a catalyst for broader transformation if supported by appropriate training and institutional investment. In this regard, lessons from international contexts particularly in designing structured professional development programs and strengthening institutional support systems can provide valuable guidance.

In conclusion, the comparative analysis reveals that while Indonesia shares common challenges with other countries, it also faces unique contextual constraints that influence teacher readiness for deep learning. Bridging the gap between conceptual understanding and practical implementation, as well as addressing disparities in institutional support, are critical priorities for advancing educational reform. At the same time, the identification of universal principles highlights the importance of sustained investment in teacher development and systemic support to achieve meaningful and lasting improvements in educational quality.

4. Conclusion

This study provides a comprehensive synthesis of teachers' readiness to implement deep learning within the Indonesian educational context through a systematic narrative review with thematic analysis. The findings reveal that teacher readiness is a multidimensional construct shaped by the interaction of three core dimensions: cognitive (pedagogical) understanding, practical implementation skills, and institutional support. While Indonesian teachers generally demonstrate a relatively strong conceptual awareness of deep learning principles aligned with the demands of twenty-first century education and national reforms such as *Merdeka Belajar* this readiness is not yet fully translated into effective classroom practices.

The analysis highlights a critical gap between theoretical understanding and practical application. Many teachers face challenges in designing authentic assessments, facilitating reflective learning, and implementing student-centered pedagogies. These limitations are further compounded by uneven institutional support, particularly in terms of infrastructure, access to continuous professional development, and leadership capacity. As a result, the implementation of deep learning remains inconsistent across regions and educational settings.

Furthermore, the study identifies a dynamic interplay between barriers and enabling factors. Key barriers include limited professional training, disparities in infrastructure, and the persistence of traditional lecture-based pedagogical cultures. On the other hand, enabling factors such as supportive educational policies, particularly the *Merdeka Belajar* initiative, strong teacher motivation, and the emergence of professional learning communities provide a promising foundation for advancing deep learning practices. However, the dominance of structural barriers indicates that policy intentions must be accompanied by concrete and sustained implementation strategies.

The comparative analysis with international contexts further reinforces these findings. While Indonesia demonstrates comparable strength in pedagogical knowledge, it lags behind in practical readiness and institutional support when compared to more developed educational systems. This suggests that improving teacher readiness requires not only enhancing individual competencies but also strengthening systemic and organizational capacities. At the same time, the study identifies universal principles across contexts, including the importance of continuous professional development, institutional investment, and systemic alignment in achieving sustainable deep learning implementation.

In conclusion, advancing deep learning in Indonesia requires a holistic and integrated approach that simultaneously addresses cognitive, practical, and institutional dimensions of teacher readiness. Policy reforms must be complemented by targeted professional development programs, equitable infrastructure investment, and supportive school leadership to ensure sustainable transformation. This study contributes to the existing body of knowledge by offering a conceptual and thematic understanding of teacher readiness, while also providing strategic insights for policymakers, educators, and researchers. Future research is recommended to incorporate empirical investigations and longitudinal studies to further validate and extend these findings in diverse educational contexts.

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