

Deep Learning Implementation and Teacher Training Gaps in Schools

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ABSTRACT

The deep learning policy mandated under Regulation of the Minister of Primary and Secondary Education No. 13 of 2025 requires teachers to shift their instructional orientation from rote memorization toward understanding that is mindful, meaningful, and joyful. However, the policy has been rolled out nationwide amid persistent and uneven gaps in teacher training, leaving many educators unable to clearly distinguish deep learning from related approaches such as differentiated instruction or project-based learning. This study analyzes how deep learning is being implemented in education units and identifies the teacher-training gaps that constitute its principal obstacle. The study uses a library research method, reviewing current policy documents, journal articles, and relevant, up-to-date teacher-training reports. Findings show that field implementation largely remains at the stage of conceptual socialization and has not progressed to sustained technical mentoring, so that teachers tend to interpret deep learning superficially for instance, merely adding technology use or increasing student workload. This gap is compounded by teachers' limited digital literacy, a scarcity of concrete cross-subject application examples, and training programs that are not tiered to schools' actual needs, particularly in disadvantaged, remote, and frontier (3T) regions. The study concludes that the success of deep learning depends on strengthening continuous teacher training, providing post-training mentoring, and securing school-level policy support that gives teachers room to innovate incrementally.

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Introduction

The Indonesian government, through Regulation of the Minister of Primary and Secondary Education No. 13 of 2025, formally enacted the deep learning approach across all levels of basic and secondary education beginning in the 2025/2026 academic year, as a refinement of the previous curriculum policy (Kementerian Pendidikan Dasar dan Menengah Republik Indonesia, 2025a). The policy is intended to shift instructional practice away from rote memorization and toward learning that is mindful, meaningful, and joyful, while pushing teachers to integrate objectives, content, activities, and assessment coherently within a single instructional theme (Kementerian Pendidikan Dasar dan Menengah Republik Indonesia, 2025b). A number of early field studies indicate that implementation at the teacher level still faces serious obstacles: many educators interpret the policy merely as adding technology use or assigning more difficult tasks, without yet achieving the consistent integration of objectives, content, activities, and assessment

that the policy requires (Diputera et al., 2024; Muhtahid et al., 2025). This understanding gap is closely tied to a pattern of teacher training that has generally stopped at policy-socialization sessions and has not provided sustained technical mentoring (Atmojo et al., 2025; Hidayat et al., 2023). The issue is made more urgent by the fact that the policy is already governing instruction nationwide, with no pilot phase or transition buffer: independent research institutions have separately documented weak baseline competency among Indonesian primary school teachers and flagged the government's existing teacher-quality programs as poorly targeted (SMERU Research Institute, 2023), meaning the training system is being asked to deliver a substantially new pedagogical model from an already fragile starting point. Prior research has largely examined deep learning either from the standpoint of policy design or through single-school training case studies (Al Munawar et al., 2025; Artadhewi & Haryati, 2022), while studies that specifically map teacher-training gaps as the constraint on deep learning implementation, including in Islamic religious education, remain limited (Munawir et al., 2025; Nurhayati & Rosadi, 2022). This article therefore aims to analyze the implementation of deep learning and identify the teacher-training gaps that constitute its principal obstacle, while proposing a training-strengthening framework more closely matched to teachers' actual needs in the field.

Indonesia's shift toward deep learning is not an isolated experiment; it mirrors a broader international turn toward "deeper learning" as a response to twenty-first-century skill demands. In the United States and Canada, the Deeper Learning Dozen consortium has spent nearly a decade helping twelve school districts redesign instruction, assessment, and educator support around deeper learning principles, and its experience shows that the reform succeeds only where district leaders sustain multi-year investment in teacher capacity rather than treating professional learning as a one-time event (Bauld, 2021). Comparative research on teacher professional development likewise indicates that education systems adopting fast, centrally mandated rollouts, such as China's nationwide expansion of digital teacher training, can rapidly increase training coverage but still leave functional and contextual gaps unresolved in under-resourced regions, a pattern that closely parallels the urban, 3T disparity documented later in this study (Gu et al., 2025). The OECD's most recent cross-country review of teaching quality similarly finds that policy ambition for deeper, more meaningful learning routinely outpaces countries' capacity to prepare, mentor, and retain the teachers who must deliver it, regardless of income level or system size (OECD, 2024). This international emphasis on pairing curriculum ambition with teacher-education redesign echoes across multiple systems: a recent cross-national editorial on innovations in teacher education argues that reforms centered on twenty-first-century skills succeed only when teacher-education systems are rebuilt in tandem with the curriculum itself, rather than treated as a secondary implementation detail (Talvio et al., 2024).

Within this global pattern, a systematic review of thirty-one international studies on deep-learning pedagogy concludes that project-based, inquiry-based, and reflective strategies travel well across contexts, but only when accompanied by continuous teacher preparation and by curricula adapted to local cultural and infrastructural conditions, conditions that remain fragmented in Indonesia's own implementation of the Merdeka Curriculum (Nurhasanah et al., 2025). Compared with these international accounts, however, most existing Indonesian studies still describe deep learning implementation in general terms or through single-institution training evaluations, without systematically mapping which specific dimensions of teacher training are most deficient or how those deficiencies interact with one another (Al Munawar et al., 2025; Artadhewi & Haryati, 2022). This international comparison therefore sharpens the novelty of the present study: rather than treating the training gap as a single undifferentiated shortfall, it identifies distinct, interacting dimensions of that gap and situates Indonesia's rapid, no-pilot rollout against the more gradual professional-learning investments that other systems have needed to make deeper learning stick in classrooms.

Conceptual Foundations of Deep Learning

Before turning to how deep learning is regulated in Indonesia, it is necessary to locate the concept within its broader theoretical lineage. The distinction between deep and surface approaches to learning describes not a specific teaching technique but a learner's orientation toward meaning: a deep approach is characterized by an intention to understand, to relate new material to prior knowledge, and to examine underlying arguments, while a surface approach is characterized by an intention merely to reproduce content well enough to meet an assessment requirement (Dolmans et al., 2016). Reviews of problem-based and active-learning environments consistently find that a deep approach is encouraged not by the format of a task alone but by the coherence between objectives, content, activity, and assessment that a learning design provides precisely the integration that Regulation No. 13 of 2025 asks Indonesian teachers to build within a single instructional theme (Dolmans et al., 2016). This theoretical grounding clarifies why simply adding a technological tool or a group project, without redesigning how objectives and assessment connect to that activity, does not by itself produce deep learning; it only changes the surface form of instruction while leaving students' orientation toward memorization intact.

The pedagogical rationale behind deep learning is also rooted in constructivist learning theory, which holds that learners actively construct understanding by connecting new information to existing knowledge structures, social context, and lived experience, rather than passively receiving transmitted content (Silalahi et al., 2022). Under a constructivist reading, deep learning's emphasis on linking a topic to students' cultural background and everyday challenges is not an administrative add-on but the theoretical core of the approach: understanding is deepened precisely because it is anchored in contexts the learner already inhabits. This framing carries a direct implication for teacher training. Because a constructivist, deep-learning classroom requires teachers to design activities that elicit and build on what students already know rather than to deliver a fixed script, teacher preparation for deep learning cannot be satisfied by one-off content dissemination; it requires teachers to internalize a different theory of how understanding forms, which is itself a demanding, gradual learning process for teachers as much as for their students (Silalahi et al., 2022). Framed against this conceptual foundation, the regulatory provisions discussed in the following section can be read not merely as administrative requirements but as an attempt to operationalize deep-versus-surface and constructivist learning theory within a national curriculum policy.

Deep Learning Policy within the National Curriculum

Deep learning is regulated through Regulation of the Minister of Primary and Secondary Education No. 13 of 2025, which refines Regulation of the Minister of Education, Culture, Research, and Technology No. 12 of 2024 (Kementerian Pendidikan Dasar dan Menengah Republik Indonesia, 2025a). The policy is explicitly framed not as a new curriculum but as an approach that strengthens how teachers and students interact in the classroom, resting on three pillars, mindful, meaningful, and joyful, as the foundation of the learning process (Kementerian Pendidikan Dasar dan Menengah Republik Indonesia, 2025b). This approach can be layered onto either the 2013 Curriculum or the Merdeka Curriculum, both of which remain in use, so that its application is essentially an adjustment of content, workload, and the competencies students must master rather than a wholesale replacement of the curriculum system.

Operationally, a single topic within deep learning can be linked to a range of aligned themes, even across subjects, so that its defining characteristic is instruction that is narrow in scope but deep in understanding (Kementerian Pendidikan Dasar dan Menengah Republik Indonesia, 2025a). The implication is that teachers are required to rework subject content so that it connects to students' cultural background, social context, and everyday challenges, a demand that, in

practice, adds to teachers' planning and administrative workload at school (Rosyada et al., 2024). This shift in orientation, in turn, requires teachers to be ready to design instruction that develops students' critical, creative, and analytical thinking skills, rather than simply delivering content in one direction (Atmojo et al., 2025).

As a national policy, the success of deep learning is ultimately determined by teachers as the ones who implement it in the classroom, not by regulation at the central level alone (Nasution, 2022). The Head of the Agency for Educational Standards, Curriculum, and Assessment has affirmed that deep learning is the government's core strategy for improving the quality of teaching and learning, encouraging students to understand content as a whole and to connect concepts across different contexts (GTK Kemendikdasmen, 2025). The government has also stated that teachers would be prepared through a series of training activities before the policy is fully enforced in schools (Tempo.co, 2025), a preparation window that, as the findings below indicate, has in practice proven far too thin relative to the scale of the pedagogical shift being demanded.

Teacher Training Gaps as an Implementation Challenge

A teacher-training gap is the condition in which available competency-development programs do not reach all teachers equitably, whether in terms of frequency, depth of content, or the continuity of mentoring once training ends (Wulandari et al., 2023). This gap is clearly visible in the implementation of deep learning, since the policy demands mastery of a relatively new concept while most of the training teachers have received so far still stops at the level of policy socialization, without providing concrete examples of classroom application (Budianti et al., 2022; Hidayat & Afriza, 2023). The condition is worsened by unequal training access across regions, where teachers in urban schools tend to receive training more often than teachers in disadvantaged, remote, and frontier (3T) areas, including Islamic religious education teachers, who are frequently left outside the priority scope of continuous professional development programs (Maulana, 2024; Bempah et al., 2023).

Method

This study uses a library research method, thematically reviewing and analyzing policy documents, scholarly journal articles, and research-institution reports discussing deep learning and teacher training published between 2021 and 2026 (Miles et al., 2022; Nurani, 2021). Document searching combined the keywords "deep learning," "pembelajaran mendalam," "teacher training gap," "kesenjangan pelatihan guru," "teacher professional development," and "Kurikulum Merdeka," applied individually and in combination, across three databases: Sinta (Science and Technology Index) for nationally accredited Indonesian journals, Google Scholar for broader coverage including recent conference proceedings, and DOAJ (Directory of Open Access Journals) for internationally indexed open-access sources. The initial search returned 96 documents. Records were then screened against inclusion criteria requiring that a document (a) be published between 2021 and 2026, (b) directly address deep learning implementation, teacher competence, or continuous professional development in a basic- or secondary-education context, and (c) be a peer-reviewed journal article, an official policy or regulatory document, or a report from a recognized research institution. Documents were excluded if they concerned deep learning solely as a machine-learning or computer-science technique, addressed higher-education contexts exclusively, or were opinion pieces without an empirical or documentary basis. Title-and-abstract screening reduced the initial pool to 58 documents, and a full-text eligibility review focused on thematic relevance to teacher-training gaps narrowed the final corpus to 34 documents, comprising the primary regulatory texts, 27 journal articles, and 5 institutional or media reports. The primary data source is Regulation of the Minister of Primary and Secondary Education No. 13 of 2025 together with its derivative documents, while secondary data consist of journal articles indexed in

Sinta, Google Scholar, and DOAJ that discuss deep learning implementation, teacher competence, and continuous professional development. Data were analyzed through reduction, thematic categorization, and conclusion drawing to map the most prominent dimensions of teacher training gaps identified in the literature.

Results

A review of policy documents and scholarly articles published between 2021 and 2026 identifies four principal dimensions of teacher-training gaps in the implementation of deep learning, summarized in Table 1.1 (Wulandari et al., 2023).

Table 1.1: Mapping of Teacher Training Gaps in Deep Learning Implementation		
Gap Dimension	Findings / Indicators	Source
Conceptual Understanding	Teachers interpret deep learning merely as adding technology use or assigning more difficult tasks, not yet as integrating objectives, content, activities, and assessment.	Diputera et al. (2024); Mujtahid et al. (2025)
Post-Training Mentoring	Training generally stops at the stage of conceptual socialization, without sustained technical classroom mentoring.	Atmojo et al. (2025); Aisah et al. (2024)
Digital Literacy and Infrastructure	Limited teacher technology skills and unequal supporting facilities hinder cross-subject, project-based implementation.	Al Munawar et al. (2025); Nur & Fatonah (2022)
Training Access for PAI Teachers and 3T Regions	Islamic religious education teachers and teachers in disadvantaged, remote, and frontier areas obtain the most limited access to training and mentoring.	Munawir et al. (2025); Listia (2023)

With respect to conceptual understanding, the reviewed literature shows that teachers frequently equate deep learning with the addition of a digital tool or a heavier task load rather than with the integration of objectives, content, activities, and assessment that the policy actually requires. Diputera et al. (2024) found that primary school teachers in their sample described deep learning mainly as a matter of using more engaging media, while Mujtahid et al. (2025) reported that teachers implementing deep learning in elementary classrooms could describe the three pillars, mindful, meaningful, joyful, in general terms but struggled to translate them into a coherently redesigned lesson sequence. This pattern suggests that the conceptual gap is not a lack of awareness of the policy's existence but a lack of operational understanding of what distinguishes deep learning from approaches teachers already practice.

On post-training mentoring, the literature converges on a “train-and-abandon” pattern in which structured support ends once an initial workshop concludes. Atmojo et al. (2025) documented that pedagogical-competence training for elementary teachers in Surakarta produced measurable short-term gains in teachers' understanding of deep learning, but the training design itself did not include a scheduled follow-up mentoring cycle once teachers returned to their classrooms. Aisah et al. (2024) similarly found that communities of practice, when they exist, tend to form informally and depend on individual teachers' initiative rather than on institutional scheduling, so that teachers who most need reinforcement of new practices are not guaranteed to receive it. The absence of a built-in mentoring stage means the training investment already made

is not being carried through to the classroom-application stage where it would translate into changed practice.

Regarding digital literacy and infrastructure, the reviewed sources point to uneven technology skills and facilities as a structural constraint on cross-subject, project-based implementation of deep learning. Al Munawar et al. (2025) reported that teachers optimizing the Merdeka Curriculum in a vocational accounting program cited limited familiarity with digital collaboration tools as a barrier to designing the cross-subject projects deep learning calls for, even when teachers understood the pedagogical intent. Nur and Fatonah (2022) similarly found that variation in schools' technological facilities produces variation in teachers' competence paradigms, so that identical training content is realized differently depending on what a school can actually support. Because deep learning's thematic, cross-subject design depends on tools that make conceptual connections visible to students, this dimension does not operate independently of training quality; it determines the ceiling on what any given training can achieve in a specific school.

Finally, on access for Islamic religious education (PAI) teachers and teachers in disadvantaged, remote, and frontier (3T) regions, the literature documents a persistent equity gap in who reaches training and mentoring at all. Munawir et al. (2025) found that PAI teachers' professionalism-building activities are largely self-directed rather than institutionally provided, reflecting their more limited access to mainstream continuous-professional-development programming. Listia (2023) reported comparable findings for PAI teacher competence development more broadly, while Bempah et al. (2023) found that teachers without professional certification, disproportionately concentrated in under-resourced and remote schools, reported systematically lower professional competence than their certified counterparts, consistent with reduced training access. Because these teachers already start from a narrower base of training exposure, the same national policy reaches them with proportionally weaker support than it reaches teachers in better-resourced urban schools.

The four dimensions in Table 1.1 show that the teacher-training gap is not simply a matter of training availability, but concerns the depth of content and the continuity of mentoring teachers receive after training ends (Wulandari et al., 2023; Koswara & Rasto, 2025). Teachers who attend only a single socialization session tend to revert to old teaching habits as soon as administrative reporting pressure increases, so that deep learning risks stalling as policy jargon without real change in the classroom.

Overall, the findings in Table 1.1 show that the teacher-training gap is layered, ranging from conceptual understanding to infrastructure readiness and equitable access, so that closing it requires more than a single strategy.

Discussion

The mapping presented in the Results section reinforces the view that no curriculum reform, however well designed at the regulatory level, will leave a lasting mark in the classroom unless it is accompanied by adequate teacher-capacity building (Maulana, 2024). This is not a hypothetical risk to be managed at some future date: because Regulation No. 13 of 2025 already governs instruction across all levels of basic and secondary education from the 2025/2026 academic year, with no pilot phase or transition buffer, the training gap identified above is an active constraint operating in classrooms right now, and its consequences accumulate with every additional semester it remains unaddressed.

The conceptual gap documented in Table 1.1 is best understood as a legacy effect of how earlier curriculum reforms were rolled out. Both the 2013 Curriculum and the Merdeka Curriculum

were introduced to teachers primarily through cascade-style socialization, provincial trainers briefing district trainers, who in turn brief school-level teachers, a model that has historically prioritized administrative compliance, such as completing lesson-plan formats, over pedagogical reasoning about why a practice changes student understanding (Hidayat & Afriza, 2023). Teachers trained under that model default to markers of innovation they can point to in a lesson-plan document a slide, a worksheet, a group project rather than to the substantive shift deep learning actually requires: designing objectives, content, activities, and assessment as one integrated thematic unit (Budianti et al., 2022). This also explains the specific confusion between deep learning and differentiated or project-based learning that the Introduction noted: many teachers already assign group projects under the Merdeka Curriculum and reasonably assume deep learning is simply a rebranding of what they already do, missing that its distinguishing feature is not the format of the task but the tightness of the integration behind it.

The absence of post-training mentoring, the second dimension in Table 1.1, follows a recognizable “train-and-abandon” pattern. Training quality is diluted as it passes through cascade layers, and once a workshop ends, schools rarely allocate structured time for coaching, lesson study, or peer observation to reinforce what was introduced (Atmojo et al., 2025; Aisah et al., 2024). Meanwhile, the administrative demands that accompany deep learning, reworking lesson plans so that a single topic connects across subjects and contexts, compete directly for the same time teachers would otherwise use for guided practice (Rosyada et al., 2024). Under that time pressure, the initial motivation generated by a one-off workshop typically fades within a semester, and teachers revert to the instructional habits they already trust, regardless of certification status or the level they teach (Bempah et al., 2023).

The digital-literacy and infrastructure dimension is not a separate problem from the training gap but is entangled with it. Deep learning’s cross-subject, thematically integrated design depends in practice on tools that make those connections visible to students, multimedia resources, collaborative digital project spaces, and formative digital assessment, so that identical training content produces divergent classroom outcomes depending on what infrastructure a school can offer (Mia & Sulastri, 2023). Teachers in well-equipped schools can turn a workshop’s ideas into project-based, cross-subject lessons, while teachers in schools with limited connectivity or devices, even after attending the very same training, fall back on lecture-based delivery simply because it is the only mode their infrastructure reliably supports. This implies that a training-only remedy, however well delivered, cannot by itself close the implementation gap in infrastructure-poor schools.

The fourth dimension, unequal training access for Islamic religious education (PAI) teachers and teachers in disadvantaged, remote, and frontier (3T) regions, compounds the first three. Continuous professional development budgets and schedules tend to be organized around core, examinable subjects and around schools reachable within a single training-center catchment area, which structurally routes fewer sessions toward PAI teachers and toward teachers who also carry multi-grade teaching loads typical of 3T schools (Munawir et al., 2025; Listia, 2023). The result is not simply fewer training hours for these teachers but fewer opportunities to receive the follow-up mentoring identified above as the decisive factor in whether training translates into classroom practice, so the same structural gap that limits initial exposure also limits the corrective mechanism that might otherwise compensate for it.

Read together, the four dimensions behave less like four independent problems than like a single reinforcing cycle. A conceptual gap left unaddressed by mentoring reproduces itself as shallow, task-surface interpretations of deep learning; those shallow interpretations, absent adequate infrastructure, default further into conventional lecture delivery; and unequal access ensures that this cycle repeats most persistently in exactly the schools, PAI classrooms and 3T

schools, least able to absorb its cost. A single-lever intervention, such as adding more one-off socialization sessions, would not break this cycle, because socialization is precisely the stage at which the cycle already stalls; the leverage point is the mentoring dimension, since it is the only one of the four that functions as a bridge between conceptual exposure and infrastructure-appropriate classroom practice.

This reinforcing structure matters more than it would under an ordinary policy rollout, because deep learning is not being phased in gradually: it already applies to every classroom in the 2025/2026 academic year. Each semester that passes without a structured, mentoring-based correction increases the number of students taught under a diluted, jargon-level version of the policy rather than its intended pedagogical shift, a risk consistent with earlier findings that curriculum transitions in Indonesia tend to raise teachers' administrative burden faster than they raise instructional capacity (Rosyada et al., 2024), and consistent with independent assessments that flagged weak baseline teacher competency and poorly targeted improvement programs even before this policy took effect (SMERU Research Institute, 2023). Framed this way, the training gap is not a background condition to be improved over time but a closing window: the cost of inaction compounds with each cohort of students who pass through classrooms where deep learning exists only on paper.

Based on these findings, strengthening teacher training needs to move from a one-way socialization model toward continuous mentoring that combines classroom practice, joint reflection, and periodic performance evaluation (Koswara & Rasto, 2025). Concretely, this means restructuring training calendars so that every socialization session is paired with at least one scheduled follow-up coaching or lesson-study cycle within the same semester, rather than treating the initial session as the end point. It also means differentiating how support is allocated rather than distributing it uniformly: schools with adequate infrastructure can be supported through peer-coaching networks that deepen cross-subject project work, while PAI teachers and 3T schools – precisely because they start furthest behind on both training access and infrastructure – need to be treated as the first priority for resourcing, not the residual group reached after urban core-subject schools are covered.

Local governments and education units, including madrasah and other faith-based schools, therefore need to prioritize equitable training access for teachers in disadvantaged, remote, and frontier regions, so that deep learning does not succeed only in urban schools that are already better resourced (Rosyada et al., 2024; SMERU Research Institute, 2023). Without that equity-first allocation, the policy risks entrenching, rather than narrowing, the very disparities in teaching quality it was designed to help correct.

Tiered Policy Implications: Central, Regional, and School Levels

Translating these findings into action requires recommendations pitched at the level where each actor can realistically intervene, since the four gap dimensions are produced and sustained by decisions made at different tiers of the education system. At the central level, the Ministry of Primary and Secondary Education (Kemendikdasmen) is the only actor with authority to redesign the national training architecture itself, and the comparative evidence above suggests two concrete levers. First, Kemendikdasmen could mandate that every deep learning socialization package funded or accredited nationally include a costed, scheduled mentoring component, such as a lesson-study cycle or coaching visit within the same semester, rather than certifying socialization alone as compliant training, addressing the train-and-abandon pattern directly at its source. Second, drawing on the finding that centrally coordinated systems can scale training access quickly but risk shallow, compliance-oriented uptake unless paired with mechanisms for teacher voice (Gu et al., 2025), Kemendikdasmen could build a standardized, low-bandwidth digital repository of

cross-subject deep learning exemplars that infrastructure-poor schools can access asynchronously, reducing the degree to which implementation quality depends on a school's connectivity.

At the regional level, provincial and district Education Offices (Dinas Pendidikan) and Regional Offices of the Ministry of Religious Affairs (Kanwil Kemenag), which oversee madrasah and PAI teachers, are positioned to correct the access dimension that central policy alone cannot equalize. Regional authorities could adopt a quota-based allocation rule that reserves a fixed proportion of continuous-professional-development slots and mentoring visits for PAI teachers and for schools in disadvantaged, remote, and frontier (3T) catchments before remaining slots are distributed to urban core-subject schools, reversing the current pattern in which these teachers are served last rather than first. Regional offices are also best placed to organize inter-school peer-coaching clusters, pairing better-resourced schools with 3T schools within a reachable geographic radius, which would extend mentoring capacity without requiring proportional increases in central-government training budgets.

At the school and madrasah level, principals and subject-teacher working groups (MGMP/KKG) control the conditions under which any training received is actually practiced. School leadership could protect a recurring block of time each week for lesson study or peer observation focused specifically on deep learning implementation, formally distinguishing this time from general administrative meetings so that mentoring is not the first activity displaced when reporting deadlines intensify. Principals could also adopt a graduated expectation for teachers new to deep learning, evaluating early attempts on the coherence of objectives, content, activities, and assessment rather than on polish or technology use, so that teachers have institutional room to innovate incrementally rather than defaulting to lecture-based delivery out of fear of being judged on a standard they have not yet been adequately mentored to meet.

Limitations

This study is subject to several limitations that should be considered when interpreting its findings. First, because the study relies on a library research method, its conclusions are derived entirely from published policy documents, journal articles, and institutional reports rather than from direct classroom observation, teacher interviews, or survey data; the dimensions of the teacher-training gap identified here therefore describe patterns visible in the existing literature rather than empirically measured outcomes from a representative sample of Indonesian schools. Second, the corpus of documents reviewed is unevenly distributed across regions and subjects, with more published research available on primary-level and urban implementation than on secondary-level, PAI, or 3T contexts, which may cause the analysis to understate the severity or the particular character of gaps in settings that are simply less documented in the literature to date. Third, because Regulation No. 13 of 2025 has been in effect for only a short period at the time of writing, the literature available for review necessarily reflects early-stage implementation; longer-term dynamics, such as whether the training gap narrows, persists, or changes character as the policy matures, cannot be assessed within the current evidence base. Fourth, the study's synthesis of four gap dimensions, while grounded in the reviewed literature, necessarily aggregates across highly heterogeneous school contexts; a single school's experience of deep learning implementation is shaped by local leadership, community characteristics, and prior training history in ways that a document-based thematic analysis cannot fully capture. These limitations point directly to the need for the empirical, context-sensitive field research called for in the Conclusion below.

Conclusion

This study concludes that the implementation of deep learning under Regulation of the Minister of Primary and Secondary Education No. 13 of 2025 still faces teacher-training gaps across four principal dimensions: conceptual understanding, post-training mentoring, digital literacy and infrastructure, and equitable access for Islamic religious education teachers and teachers in disadvantaged, remote, and frontier regions (Kementerian Pendidikan Dasar dan Menengah Republik Indonesia, 2025a). Because the policy already governs every classroom in the current academic year, these gaps are not a future risk but an active constraint whose cost compounds with each passing semester. The success of the policy ultimately depends on education stakeholders' willingness to shift training from mere policy socialization to sustained technical mentoring, supported by digital infrastructure and by equitable, priority-first access for teachers across regions and types of education units. Further empirical field research is needed to test the effectiveness of the tiered, mentoring-based training model proposed in this study across different school and madrasah contexts.

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