Tunas Cendekia: Jurnal Program Studi Pendidikan Anak Usia Dini
P-ISSN 2622-0849 E-ISSN 2654-6051
Website: https://ejournal.iainpalopo.ac.id/index.php/tunascendekia
DOI: https://doi.org/10.24256/tunascendekia.v8i2.13352
Vol. 8, No. 2, 2025, pp. 221-231

A Conceptual Model of a Deep Learning in Primary Schools: A Narrative Review

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Abstract

This study aims to develop a conceptual model of a learning system in primary schools (SD) based on the Deep Learning approach, drawing on a review of theory, practice, trends, and issues in 2025–2026. The study uses a narrative literature review with thematic content analysis of the academic paper and press releases of the Ministry of Primary and Secondary Education (Kemendikdasmen), four journal articles and one conference paper published in 2026. Of these five scholarly sources, only two are school-based field studies, each conducted in a single school; two are literature reviews, and one is a community-service training study, so the empirical basis of the model is thin, and several theoretical references. The results show that Deep Learning in Indonesia rests on the principles of mindful, meaningful, and joyful learning and is directed at eight dimensions of the graduate profile. Studies in schools report that these principles are being applied, but reflection, authentic assessment, time, media, and teacher readiness remain constraints. The synthesis yields a three-level model (national, school, and classroom) linked by a cycle of design, implementation, assessment, and reflection, and with a context-input-process-product framework proposed for its evaluation. The model is conceptual and requires empirical testing in future research.

Keywords: Deep Learning approach; pembelajaran mendalam; primary school; conceptual model; narrative review

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Article Information
Received: 1 August 2025
Accepted: 1 October 2025
Published: 20 October 2025

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1. Introduction

Primary education lays the foundation for pupils' literacy, numeracy, learning habits, and character, so the quality of its learning system is a central policy concern. Indonesia's PISA 2022 reading score fell from 371 to 359 and its mathematics score from 379 to 366 compared with 2018 (OECD, 2023). PISA measures 15-year-old students, so these figures are only an indirect indicator of the quality of learning in elementary schools (SD).

In response, the Ministry of Primary and Secondary Education (Kemendikdasmen) issued the Academic Paper on Deep Learning (*Pembelajaran Mendalam*) in February 2025 (Suyanto et al., 2025) and began applying the approach in the 2025/2026 school year through Ministerial Regulation (Permendikdasmen) No. 13 of 2025 (Alfaeni et al., 2026). Kemendikdasmen (2026a) stresses that Deep Learning is "not a new curriculum but a learning approach" (author's translation). In the Indonesian policy context, "Deep Learning" is a pedagogical approach and should not be confused with deep learning in artificial intelligence. Concurrently, the Ministry introduced the elective subject Coding and Artificial Intelligence (AI), allocated 72 lesson periods per year for Grades V and VI under official curriculum policy guidelines (BSKAP, 2025; Permendikdasmen No. 13 of 2025). Although Coding-AI represents a specific subject domain while Deep Learning constitutes a pedagogical framework, their integration is grounded in the policy's core mandate for digital technology utilization (Alfaeni et al., 2026) and the TPACK framework (Mishra & Koehler, 2006). Under this framework, Coding-AI serves as a primary practical domain for cultivating pupils' higher-order reasoning and creativity through deep, process-oriented learning experiences rather than rote technical instruction. *In parallel, the national Academic Ability Test (*Tes Kemampuan Akademik*, TKA) for elementary schools was administered in April 2026 to evaluate foundational student competencies (Kemendikdasmen, 2026b).*

Academic studies emerging alongside these policy shifts have predominantly focused on isolated dimensions of implementation. Recent literature addresses specific facets such as conceptual alignment

with graduate profile dimensions (Handayani et al., 2026), theoretical opportunities and challenges (Azizah et al., 2026), teacher readiness within specific school contexts (Alfaeni et al., 2026), and localized classroom implementation realities (Husodo et al., 2026). Furthermore, while Fadhlurahman et al. (2026) conducted a systematic literature review on deep learning in elementary education, their synthesis primarily focused on mapping pedagogical techniques and general classroom dynamics. Broad thematic searches across academic databases including Google Scholar, Garuda, and Scopus, reveal that existing 2025–2026 studies lack an integrative framework connecting national policy directives, school institutional ecosystems, and classroom pedagogical cycles into a single multi-level system model for elementary schools. This article addresses that gap.

The aim of this study is to develop a conceptual model of an elementary school (SD) learning system based on Deep Learning by synthesizing theory, empirical practice, policy trends, and operational issues from recent literature. To achieve this aim, four specific research questions are addressed: (1) What are the conceptual and theoretical foundations underpinning a Deep Learning–based learning system in elementary schools? (2) How is the Deep Learning approach applied in elementary schools according to recent empirical studies? (3) What key policy trends, implementation issues, and operational challenges characterize the 2025–2026 period? (4) What integrative, multi-level conceptual model can be synthesized from these findings to connect policy, school, and classroom levels?

2. Methodology

This study employs a narrative literature review design guided by the Scale for the Assessment of Narrative Review Articles (SANRA) quality framework (Baethge et al., 2019), integrated with thematic content analysis following the six-phase framework of Braun and Clarke (2006). This qualitative synthesis design was selected to systematically map, evaluate, and integrate disparate policy directives, empirical findings, and educational theories into an integrative conceptual model, rather than to test empirical hypotheses with primary quantitative data.

The literature corpus comprises three primary source categories: (1) Official Policy Documents: The Academic Paper on Deep Learning (Naskah Akademik Pembelajaran Mendalam) (Suyanto et al., 2025), Ministerial Regulation No. 13 of 2025, and official press releases from the Ministry of Primary and Secondary Education (Kemendikdasmen, 2026a, 2026b). (2) Scholarly Literature (2026): Peer-reviewed journal articles and conference proceedings focusing on Deep Learning and Coding-AI implementation in Indonesian elementary schools (Alfaeni et al., 2026; Azizah et al., 2026; Fadhlurahman et al., 2026; Handayani et al., 2026; Husodo et al., 2026; Irzal et al., 2026). (3) Theoretical Frameworks: Foundational references with accessible DOIs or institutional repositories detailing learning theories, instructional design, system evaluation, and technological integration (Branch, 2009; Fullan et al., 2018; Hattie & Donoghue, 2016; Marton & Säljö, 1976; Mishra & Koehler, 2006; Stufflebeam, 2003). National news coverage was used restrictively to cross-reference PISA metrics and official implementation timelines.

Literature identification was conducted across three primary databases: Google Scholar, Garuda (Garba Rujukan Digital), and Google Search (for policy releases and national media). Queries were executed using original Indonesian search strings to capture localized implementation context. To ensure transparency and replicability, the search strategy, keyword combinations, retrieval counts, and filtering outcomes are summarized in Table 1.

Table 1
Search Strategy and Literature Selection Summary

Database / Platform	Original Search Keywords (Indonesian)	Initial Hits	Excluded (with reasons)	Included Final Corpus
Google Scholar	"pembelajaran mendalam sekolah dasar", "kurikulum deep learning SD"	38	32 (Duplications, secondary high-school contexts, opinion pieces without empirical basis)	4 journal articles (Alfaeni et al., 2026; Azizah et al., 2026; Fadhlurahman et al., 2026; Handayani et al., 2026)
Garuda & Institutional Repositories	"implementasi deep learning SD", "koding dan kecerdasan artifisial SD"	19	17 (Unpublished thesis drafts, irrelevant subject domains, non-peer-reviewed notes)	2 empirical/proceedings studies (Husodo et al., 2026; Irzal et al., 2026)
Kemendikdasmen Portal & Media	"Tes Kemampuan Akademik SD 2026", "PISA 2022 Indonesia SD"	24	18 (Redundant reposts, non-official commercial blogs)	6 policy documents & official news reports

Two authors independently screened the retrieved titles, abstracts, and full texts against predefined inclusion criteria: (a) explicit focus on primary/elementary education (Grades I–VI), (b) publication within or relevance to the 2022–2026 policy cycle, (c) origin from government repositories, peer-reviewed journals, or verified national outlets, and (d) verifiable DOI or direct web link. Discrepancies in inclusion decisions were resolved through consensus.

Data analysis followed a four-step thematic procedure: (1) Data Familiarization & Initial Coding: Full texts were examined to extract core findings, policy mandates, and operational barriers, categorized under initial codes corresponding to the research questions. (2) Multi-Level Categorization: Extracted components were clustered across national policy, school ecosystem, and classroom operational levels. (3) Theoretical Alignment: Structured components were mapped onto established frameworks—ADDIE (Branch, 2009) for classroom instructional design, TPACK (Mishra & Koehler, 2006) for teacher competency, and CIPP (Stufflebeam, 2003) for multi-level system evaluation. (4) Synthesizing & Quality Audit: Model elements were cross-verified across multiple sources. Findings supported by single isolated studies were flagged as contextual evidence, ensuring a robust, multi-perspective conceptual synthesis.

Literature selection followed differentiated inclusion criteria based on the nature of the source: (1) Policy and Empirical Sources: Must (a) explicitly address primary or elementary education (Grades I–VI), (b) be published within or directly relevant to the 2022–2026 policy reform period, and (c) originate from official government repositories, peer-reviewed academic journals, or indexed conference proceedings. National media news was excluded from primary conceptual synthesis and utilized restrictively as supplementary contextual evidence solely to verify public policy timelines and external metrics (e.g., PISA scores). (2) Theoretical and Methodological Sources: Exempted from publication date restrictions to incorporate foundational literature (e.g., Marton & Säljö, 1976; Mishra & Koehler, 2006; Branch, 2009; Stufflebeam, 2003) based on conceptual validity and theoretical relevance. (3) Traceability: All included sources were required to be accessible via verifiable Digital Object Identifiers (DOIs), official government publication numbers, or open public URLs. Internal intranet links were excluded or replaced with public domain repositories.

2.1 Data Analysis Steps

Data synthesis proceeded through four structured steps: (1) Thematic Coding: Extracted qualitative data were categorized into four master themes corresponding to Research Questions 1–4. (2) Multi-Level Grouping: Recurring pedagogical, structural, and evaluative components were organized across three system tiers: national policy, school institutional ecosystem, and classroom operational cycles. (3) Theoretical Triangulation: Grouped components were mapped onto established theoretical

frameworks ADDIE (Branch, 2009) for classroom instructional design, TPACK (Mishra & Koehler, 2006) for teacher competency, and CIPP (Stufflebeam, 2003) for multi-level system evaluation. (4) Evidence Weighting & Consistency Verification: Model elements were cross-verified across the corpus. Components supported by multiple independent scholarly sources were designated as core system elements. Conversely, components relying on a single source (e.g., localized classroom analysis from Alfaeni et al., 2026, or policy press releases regarding TKA) were explicitly flagged in the synthesis matrix (Table 4) as contextual/emerging evidence to ensure methodological transparency.

3. Results

3.1 Conceptual and theoretical foundations (RQ1)

The Academic Paper defines Deep Learning as an approach that honours pupils by creating learning atmospheres and processes that are mindful, meaningful, and joyful, through the development of intellect, ethics, aesthetics, and kinaesthetic skills (Suyanto et al., 2025, pp. 12–15). Azizah et al. (2026, p. 233) explain that this definition contextualises the New Pedagogies for Deep Learning framework of Fullan et al. (2018) within Indonesian educational philosophy. The national framework comprises four core components: graduate-profile dimensions, learning principles, learning experiences, and an operational learning framework.

The eight graduate-profile dimensions that direct learning, faith and devotion to God Almighty, citizenship, critical reasoning, creativity, collaboration, independence, health, and communication are formally established in national curriculum guidelines (Suyanto et al., 2025; Permendikdasmen No. 13 of 2025). Ministerial Regulation No. 13 of 2025 also sets four primary pedagogical methods: authentic pedagogical practice, learning partnerships, flexible learning environments, and the strategic use of digital technology (Permendikdasmen No. 13 of 2025). Deep Learning in this context represents a humanistic pedagogical approach and differs fundamentally from deep learning in artificial intelligence. As Azizah et al. (2026, p. 231) note, this clarification is necessary to counter a common teacher misconception that reads the approach literally as "deep and heavy learning" (author's translation). The theories that underpin the approach and the design of the system are summarised in Table 2.

Table 2
Theoretical foundations and their role in the model

Theory / framework	Core idea	Role in the model
Surface and deep learning (Marton & Säljö, 1976)	Learning that seeks meaning differs fundamentally from learning focused on memorisation (Marton & Säljö, 1976, pp. 4–11).	Basis for distinguishing classroom learning goals and re-orienting assessment from recall to deep understanding.
New pedagogies for deep learning (Fullan et al., 2018)	Deep learning engages pupils with real-world problems and encourages transformational agency (Fullan et al., 2018).	Reference foundation for the national Deep Learning framework and graduate-profile dimensions.
Synthesis of learning strategies (Hattie & Donoghue, 2016)	Deep learning integrates conceptual and procedural knowledge to enable knowledge transfer in novel situations (Hattie & Donoghue, 2016, p. 13).	Basis for designing learning experiences and measuring authentic learning transfer.
ADDIE Instructional Design (Branch, 2009)	Instructional design proceeds iteratively through analysis, design, development, implementation, and evaluation (Branch, 2009).	Operational design cycle at the classroom level.
CIPP Evaluation Model (Stufflebeam, 2003)	System evaluation examines context, input, process, and product to drive continuous improvement (Stufflebeam, 2003).	Multi-level system evaluation framework connecting national, school, and classroom feedback loops.
TPACK Framework (Mishra & Koehler, 2006)	Effective teaching requires integrated teacher knowledge of content, pedagogy, and technology (Mishra & Koehler, 2006, p. 1017).	Framework for teacher competence at the school level (professional development) and tech-pedagogical integration (e.g., Coding-AI) at the classroom level.

Source: author's synthesis of the cited sources.

Table 2 shows that the theoretical foundations of this system are organized into three complementary layers. The first layer comprises core learning theories regarding the nature of deep learning. Marton and Säljö (1976) establish the fundamental distinction between surface learning (memorization) and deep learning (meaning-seeking), which provides the rationale for shifting elementary instruction toward experiential learning. Fullan et al. (2018) provide the broad pedagogical framework adapted by national policy, while Hattie and Donoghue (2016) articulate how deep learning manifests when pupils transfer conceptual and procedural knowledge to novel problem contexts.

The second layer consists of operational design and evaluation models. ADDIE (Branch, 2009) offers an iterative five-stage cycle for classroom unit planning. CIPP (Stufflebeam, 2003) provides a holistic evaluation structure that traces system effectiveness across context, input, process, and product tiers.

The third layer addresses teacher professional capacity. Mishra and Koehler (2006) emphasize that meaningful technology utilization relies on Technological Pedagogical Content Knowledge (TPACK). In this model, TPACK operates at both the school level, guiding teacher professional development and learning communities, and the classroom level, enabling teachers to integrate digital tools and Coding-AI content without reverting to mechanical or unplugged rote instruction.

3.2 Practice in primary schools (RQ2)

The evidence on practice comes from small-scale studies and one literature review, so the results are read as an early picture, not as something to generalise. Table 3 summarises the five main sources.

Table 3
Summary of evidence on practice in primary schools

Source	Evidence Category	Design & Sample Context	Main Findings & Key Insights
A. Primary Empirical & Field Studies			
Husodo et al. (2026, pp. 1718–1734)	Primary Field Study (Qualitative Case Study)	SDN 4 Kampungdalem, Tulungagung; descriptive qualitative; 10 informants (principal, Grades IV–VI teachers, pupils).	Pedagogical Practices: Mindful, meaningful, and joyful principles executed via apperception, trigger questions, reflection, contextual learning, and project-based tasks. Enablers: Teacher competence, principal leadership, collaborative school culture. Barriers: Time constraints, administrative burdens, pupil readiness, limited facilities, and authentic assessment complexities.
Alfaeni et al. (2026, pp. 911–918)	Primary Field Evaluation (CIPP Framework)	SDN Baros, Cianjur; CIPP evaluative design; 4 teachers (Grades III & V).	Implementation Realities: Teachers demonstrate fair conceptual understanding; the joyful principle is easiest to apply, whereas the meaningful principle presents the highest pedagogical difficulty (p. 912). Barriers: Instructional time limits, entrenched conventional habits, media scarcity, and process-based assessment difficulties.
Irzal et al. (2026, p. 507)	Empirical Training Evaluation (Quantitative Pre-Post)	Depok elementary schools; pre-post quantitative design without control group; 20 primary school teachers.	Intervention Outcomes: Teacher self-perceived knowledge of game-based Coding-AI integration rose significantly from 3.28 to 4.44 out of 5.00 (N-Gain = 0.68, moderate effectiveness) following targeted training.
B. Literature Reviews & Conceptual Syntheses			
Azizah et al. (2026, pp. 234–235)	Systematic Literature Review (PRISMA)	Synthesis of 15 selected articles (filtered from 50 initial records) on primary Deep Learning.	Opportunities: Curriculum flexibility, P5 integration, formative assessment, and differentiated instruction. Challenges: Persistent teacher misconceptions ("deep = heavy"), uneven school readiness, facility deficits, test-oriented school culture, and lower-grade metacognitive limits.

Source	Evidence Category	Design & Sample Context	Main Findings & Key Insights
Handayani et al. (2026, pp. 148–160)	Conceptual & Library Synthesis	Qualitative library research analyzing 27 policy and theoretical sources.	Core Synthesis: Confirms conceptual relevance of Deep Learning to the eight graduate-profile dimensions; highlights a structural gap between theoretical policy constructs and real-world school implementation capacity.

Source: author's synthesis.

To examine how Deep Learning is being operationalized in elementary schools, evidence was categorized into primary field studies and broader literature syntheses (Table 3). Primary field studies provide direct empirical insights into classroom realities. Husodo et al. (2026) and Alfaeni et al. (2026) confirm that while teachers successfully initiate joyful learning environments through apperception and interactive activities, translating lessons into meaningful deep learning experiences remains a primary operational hurdle. These primary studies consistently identify instructional time constraints, administrative overload, and the complexity of process-based authentic assessment as acute field-level barriers. Furthermore, Irzal et al. (2026) demonstrate that targeted professional development can substantially enhance teacher capacity in specific domain areas such as game-based Coding-AI integration (N-Gain = 0.68).

Complementing these direct field observations, secondary literature syntheses offer broader macro-level thematic insights. Systematic mapping by Azizah et al. (2026) and library analysis by Handayani et al. (2026) demonstrate that while Deep Learning aligns seamlessly with national graduate-profile goals, implementation across the broader educational landscape is severely constrained by systemic issues, most notably a persistent test-oriented school culture, resource inequities, and common teacher misconceptions regarding the depth of the curriculum.

3.3 Policy trends, implementation issues, and operational challenges (RQ3)

Synthesizing recent policy directives, empirical field evaluations, and theoretical literature reveals that the 2025–2026 implementation period for elementary Deep Learning is characterized by four main policy trends, coupled with five persistent operational challenges.

Policy Trends. First, there is a systemic policy shift from content coverage to the quality of learning experiences. Kemendikdasmen (2026a) emphasizes that Deep Learning is an overarching pedagogical approach rather than a new curriculum, placing teachers as experience designers rather than mere content deliverers (Handayani et al., 2026). To facilitate this transition, the government established a multi-tiered support structure comprising the official Academic Paper (Suyanto et al., 2025), online modules on the Ruang GTK learning platform, and structured mentorship from regional teacher-training centers (Alfaeni et al., 2026).

Second, national student evaluation was re-introduced at the elementary level through the Academic Ability Test (Tes Kemampuan Akademik, TKA), administered from 20–30 April 2026 to assess foundational literacy in Indonesian Language and Mathematics, reaching 98.51% pupil participation (Kemendikdasmen, 2026b). Crucially, official policy briefs clarify that TKA outcomes do not determine pupil graduation nor serve as an institutional ranking metric; instead, they provide diagnostic baseline data for national policy reflection (Permendikdasmen No. 9 of 2025). Concurrently, classroom-level evaluation is increasingly adopting process-based portfolio and project assessments to capture higher-order thinking (Fadhlurahman et al., 2026).

Third, digital literacy was formally integrated through the elective subject Coding and Artificial Intelligence (AI), allocated 72 lesson periods per year for Grades V and VI under national curriculum guidelines (BSKAP, 2025; Permendikdasmen No. 13 of 2025). Grounded in the TPACK framework (Mishra & Koehler, 2006), Coding-AI is incorporated not as a disconnected technical requirement, but

as a practical domain for fostering critical thinking and problem-solving through deep learning experiences (Alfaeni et al., 2026). To accommodate infrastructure disparities, national policy permits unplugged (device-free) algorithmic instruction in resource-constrained schools (BSKAP, 2025; Irzal et al., 2026).

Fourth, academic research trends show a discrepancy between rapid policy deployment and empirical impact evaluation. While early studies focus on conceptual mapping (Handayani et al., 2026) and isolated school readiness (Alfaeni et al., 2026; Husodo et al., 2026), comprehensive empirical evidence evaluating long-term pupil learning outcomes remains limited (Azizah et al., 2026).

Implementation Issues and Operational Challenges. Despite progressive policy frameworks, five core operational barriers impede classroom-level realization, as synthesized in Table 4.

Table 4
Synthesis of key policy trends, operational issues, and evidence weight (2025–2026)

Key Trend / Operational Issue	Core Findings & Field Reality	Supporting Sources	Type of Evidence & Source Count	Evidence Classification
1. Shift to Experiential Pedagogy & GTK Support	Policy redirects focus from content completion to mindful/meaningful experiences supported by Ruang GTK modules and regional mentorship.	Suyanto et al. (2025); Alfaeni et al. (2026); Handayani et al. (2026)	Official Policy Documents & Field Studies (n=3)	Core Policy & Field Evidence
2. National Diagnostic TKA vs. Classroom Assessment	TKA SD administered April 2026 for diagnostic reflection (not graduation/ranking). Classroom assessment shifts to process/portfolios.	BSKAP (2025); Kemendikdasmen (2026b); Fadhlurahman et al. (2026); Permendikdasmen No. 9 (2025)	Policy Briefs, Press Releases & Systematic Review (n=4)	Core Assessment Evidence
3. Coding-AI Integration & Infrastructure Choice	72 JP/year elective for Grades V–VI; TPACK framework connects Coding-AI to Deep Learning; *unplugged* option allowed.	BSKAP (2025); Permendikdasmen No. 13 (2025); Irzal et al. (2026)	Official Curriculum Regulations & Training Study (n=3)	Core Policy & Practical Evidence
4. Teacher Readiness & TPACK Misconceptions	Generalist elementary teachers lack informatics backgrounds; persistent misconception viewing Deep Learning as "heavy content".	Alfaeni et al. (2026); Azizah et al. (2026); Irzal et al. (2026)	Primary Field Studies & SLR (n=3)	Core Field Evidence
5. Lower-Grade Metacognition & Authentic Scaffolding	Reflection (*mindful*) and authentic assessment remain the hardest elements to implement, especially for lower-grade pupils.	Azizah et al. (2026); Husodo et al. (2026)	SLR & Qualitative Field Study (n=2)	Core Pedagogical Challenge
6. Pupil Foundational Skill Gaps (PISA Background)	PISA 2022 decline reflects baseline literacy/numeracy weaknesses that constrain higher-order reasoning.	OECD (2023); Handayani et al. (2026)	National Press Metric & Policy Analysis (n=2)	*Contextual Background Metric*

3.4 Conceptual model of a primary-school learning system (RQ4)

Synthesizing findings across national policy mandates, empirical field practices, and theoretical frameworks yields an integrative three-tiered conceptual model for a Deep Learning–based elementary school learning system. As illustrated in the conceptual framework, the system comprises three interdependent levels (National Policy, School Ecosystem, and Classroom Operation) connected continuously through a CIPP System Evaluation feedback loop (Stufflebeam, 2003). Table 5 details the specific operational components at each level, supported by their respective theoretical bases and evidence classifications.

Table 5
Multi-level components of the conceptual SD learning system model

System Tier	Model Component	Supporting Sources & Theoretical Basis	System Function	Evidence Classification & Source Breadth
National Level	Policy directives, 8 graduate-profile dimensions, Ruang GTK modules, national diagnostic TKA, Coding-AI curriculum guidelines	Suyanto et al. (2025); Permendikdasmen No. 13 (2025); Kemendikdasmen (2026b); BSKAP (2025)	Establishes national vision, curriculum standards, resource platforms, and macro-diagnostic monitoring.	Core Policy Evidence (Multiple policy documents & official guidelines, n=4)
School Level	Principal instructional leadership, collaborative learning communities (KKG), TPACK-based teacher professional development, school infrastructure	Mishra & Koehler (2006); Husodo et al. (2026); Alfaeni et al. (2026); Irzal et al. (2026)	Mediates national policy into institutional readiness, teacher capacity, and resource distribution.	Core Institutional Evidence (Multiple empirical field studies & TPACK theory, n=4)
Classroom Level	Iterative ADDIE design cycle (Analysis, Design, Development, Implementation, Evaluation), TPACK-guided tech/Coding-AI practice, authentic reflection	Branch (2009); Fullan et al. (2018); Hattie & Donoghue (2016); Husodo et al. (2026); Alfaeni et al. (2026); Fadhlurahman et al. (2026)	Translates policy into mindful, meaningful, and joyful learning experiences and authentic knowledge transfer.	Core Pedagogical Evidence (Synthesized from instructional theories & field observations, n=6)
Classroom (Specific)	*Diagnostic Needs Analysis Sub-stage*	Alfaeni et al. (2026)	Identifies initial pupil readiness prior to unit design.	*Contextual Evidence* (Single-source field observation, n=1)
System Evaluation	Multi-level CIPP evaluation framework (Context, Input, Process, Product)	Stufflebeam (2003); Alfaeni et al. (2026)	Evaluates multi-tier alignment and returns diagnostic feedback to national, school, and classroom levels.	Core Evaluative Framework (Foundational evaluation model & field trial

National Policy Level. This top tier establishes national educational vision, policy mandates, and resource allocation. Grounded in the Academic Paper (Suyanto et al., 2025) and Ministerial Regulation No. 13 of 2025, it sets the eight graduate-profile dimensions, four primary methods, and curriculum guidelines (Permendikdasmen No. 13 of 2025). The national level supports implementation through Ruang GTK digital modules and regional mentorship structures (Alfaeni et al., 2026). Concurrently, the elementary Academic Ability Test (TKA) provides national-level diagnostic metrics to evaluate baseline literacy and numeracy attainment without serving as a high-stakes pupil selection mechanism (Kemendikdasmen, 2026b; Permendikdasmen No. 9 of 2025).

School Ecosystem Level. Acting as the institutional mediator between policy and practice, this level transforms national directives into school-wide readiness. Grounded in the TPACK framework (Mishra & Koehler, 2006), key components include instructional leadership by school principals, collaborative teacher learning communities (Kelompok Kerja Guru, KKG), and school-based technological and physical infrastructure provisioning (Husodo et al., 2026). As empirical field evidence demonstrates (Alfaeni et al., 2026; Irzal et al., 2026), robust school-level leadership and continuous TPACK capacity-building are critical to preventing teacher burnout and resolving common misconceptions regarding deep learning depth.

Classroom Operational Level. At the micro level, learning is executed as an iterative five-stage instructional design cycle following the ADDIE framework (Branch, 2009): (1) Analysis: Teachers conduct diagnostic assessments to identify pupils' prior knowledge and learning needs (Alfaeni et al., 2026). (2) Design: Learning objectives are formulated around mindful, meaningful, and joyful

principles, aligned with graduate-profile dimensions (Handayani et al., 2026). (3) Development: Teachers craft contextual learning modules, authentic media, and differentiated tasks tailored to local cultural environments (Husodo et al., 2026). (4) Implementation: Active learning experiences unfold through inquiry, project-based tasks, and TPACK-guided tech/Coding-AI integration (Fullan et al., 2018; Irzal et al., 2026). (5) Evaluation: Formative, portfolio-based, and authentic self-reflections are conducted to gauge deep conceptual transfer (Hattie & Donoghue, 2016; Fadhlurahman et al., 2026).

System Evaluation Loop. The entire model is enclosed by a multi-level CIPP evaluation loop (Stufflebeam, 2003). CIPP continuously assesses system alignment across Context (policy-relevance), Input (teacher TPACK and infrastructure), Process (classroom pedagogical execution), and Product (pupil higher-order reasoning and TKA diagnostic trends), feeding actionable data back into all three system tiers.

4. Discussion

The synthesis of 2025–2026 literature demonstrates that implementing a Deep Learning–based system in Indonesian elementary schools represents a fundamental shift from content-driven instruction to student-centered, experiential learning. However, comparing policy aspirations with early empirical field findings reveals significant structural tensions across system levels.

National policy frameworks (Suyanto et al., 2025; Permendikdasmen No. 13 of 2025) explicitly establish that Deep Learning is designed to foster mindful, meaningful, and joyful learning experiences. Yet, field evaluations by Alfaeni et al. (2026) and Husodo et al. (2026) indicate that teachers encounter substantial difficulty in operationalizing the meaningful dimension. While initiating joyful apperceptions and games is relatively straightforward, facilitating higher-order reasoning, authentic reflection, and knowledge transfer requires deep pedagogical scaffolding (Hattie & Donoghue, 2016; Marton & Säljö, 1976). This operational gap is exacerbated by entrenched administrative burdens, large class sizes, and conventional habits of teaching to the test (Azizah et al., 2026). Without sustained institutional support at the school level, policy intentions risk being reduced to superficial, surface-level activities.

Previous reviews, such as the systematic study by Fadhlurahman et al. (2026), mapped general classroom techniques but stopped short of providing an integrative system framework. The conceptual model developed in this study (Table 5) advances current literature by connecting three distinct operational tiers through established theoretical pillars. By nesting the classroom **ADDIE** design cycle (Branch, 2009) within school-level **TPACK** capacity building (Mishra & Koehler, 2006) and enclosing both within a continuous **CIPP** evaluation loop (Stufflebeam, 2003), the model demonstrates that classroom success is structurally dependent on school ecosystem readiness and national policy coherence.

The formal inclusion of Coding and Artificial Intelligence (72 JP/year for Grades V–VI) under official curriculum policy (BSKAP, 2025; Permendikdasmen No. 13 of 2025) provides a concrete domain for cultivating pupils' computational thinking and problem-solving skills (Fullan et al., 2018). Grounded in TPACK, effective Coding-AI instruction requires teachers to blend technical content with process-oriented pedagogy, utilizing unplugged modalities where digital infrastructure is lacking (Irzal et al., 2026). Simultaneously, assessment structures must maintain alignment. While the national Academic Ability Test (TKA SD 2026) offers macro-diagnostic baseline metrics (Kemendikdasmen, 2026b), classroom evaluation must prioritize authentic portfolios and process-based reflection (Fadhlurahman et al., 2026) to prevent schools from reverting to rote drill-and-practice routines.

5. Conclusion

This narrative review synthesized policy documents, five scholarly sources, and established theoretical frameworks to develop a conceptual model of a Deep Learning–based learning system for Indonesian primary schools. Regarding RQ1, Deep Learning in the Indonesian policy context is a humanistic pedagogical approach grounded in mindful, meaningful, and joyful learning and directed at the eight graduate-profile dimensions, supported by the distinction between deep and surface learning, learning transfer, ADDIE, TPACK, and CIPP. Regarding RQ2, early school-based studies show that teachers are able to create joyful learning environments, but making learning meaningful, conducting reflection, and applying authentic assessment remain difficult because of constraints in time, media, and teacher readiness. Regarding RQ3, the 2025–2026 period is characterized by a shift from content coverage to the quality of learning experiences, the introduction of the TKA as a diagnostic rather than high-stakes test, the inclusion of Coding and Artificial Intelligence as an elective subject for Grades V–VI, and a gap between rapid policy deployment and empirical evidence of impact. Regarding RQ4, the synthesis yields a three-level model that links national policy, the school ecosystem, and the classroom ADDIE cycle, enclosed by a CIPP evaluation loop. Because the empirical basis is thin and drawn from a small number of single-school studies, the model remains conceptual; future research should test it empirically across diverse primary-school contexts and examine its long-term effects on pupils' learning outcomes.

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