

A Deep Learning Model within the Merdeka Curriculum for PAUD Teachers' Pedagogical, Social, and Emotional Skills in Tegal

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Abstract : This study aims to develop a Deep Learning Implementation Model integrated with the Merdeka Curriculum to strengthen the pedagogical, social, and emotional skills of formal and non-formal Early Childhood Education (ECE) teachers in Adiwerna, Dukuhturi, and Talang Districts, Tegal Regency. An initial survey indicates that teachers experience difficulties in designing meaningful play, conducting reflective documentation, managing emotions, and planning learning systematically. The study employs Research and Development (R&D) using the ADDIE model, comprising Analysis, Design, Development, Implementation, and Evaluation. Data are collected through questionnaires, classroom observations, interviews, and expert assessments, then analysed descriptively, qualitatively, and quantitatively. The study is expected to produce a valid, practical, and effective model that helps teachers implement reflective, meaningful, child-centred deep learning through integrated pedagogical planning, social interaction, and emotional regulation. The model is also expected to strengthen teachers' professional development and reduce existing competency gaps between formal and non-formal ECE settings.

Keywords : Deep Learning; Merdeka Curriculum; Pedagogical Skills; Social Skills; Emotional Skills; Early Childhood Teachers

Abstrak : Penelitian ini bertujuan mengembangkan Model Implementasi Pembelajaran Mendalam yang terintegrasi dengan Kurikulum Merdeka untuk memperkuat keterampilan pedagogis, sosial, dan emosional guru Pendidikan Anak Usia Dini (PAUD) formal dan nonformal di Kecamatan Adiwerna, Dukuhturi, dan Talang, Kabupaten Tegal. Survei awal menunjukkan bahwa sebagian guru masih mengalami kesulitan dalam merancang bermain bermakna, melakukan dokumentasi reflektif, mengelola emosi, dan menyusun pembelajaran secara sistematis. Penelitian menggunakan metode Research and Development (R&D) dengan model ADDIE yang meliputi Analysis, Design, Development, Implementation, dan Evaluation. Data dikumpulkan melalui kuesioner, observasi kelas, wawancara, dan penilaian ahli, kemudian dianalisis secara deskriptif dengan pendekatan kualitatif dan kuantitatif. Penelitian ini diharapkan menghasilkan model yang valid, praktis, dan efektif dalam membantu guru menerapkan pembelajaran mendalam yang reflektif, bermakna, dan berpusat pada anak melalui integrasi perencanaan pedagogis, interaksi sosial, dan regulasi emosi. Model ini juga diharapkan memperkuat pengembangan profesional

guru serta mengurangi kesenjangan kompetensi antara satuan PAUD formal dan nonformal.

Kata Kunci : *Pembelajaran Mendalam; Kurikulum Merdeka; Keterampilan Pedagogis; Keterampilan Sosial; Keterampilan Emosional; Guru PAUD.*

INTRODUCTION

Early Childhood Education (ECE) lays the groundwork for producing capable human resources, since the period from birth to six years old is a “golden age” in which roughly 90 percent of brain growth is completed and the child's character, attitudes, and long-term learning capacity take shape (Windayani et al., 2021). The quality of ECE services depends heavily on teachers, who act as facilitators, companions, and role models, particularly with respect to their pedagogical, social, and emotional competence (Fiyul & Duryat, 2025).

In response to twenty-first-century educational demands, the Indonesian government introduced the Merdeka Curriculum, granting schools the autonomy to design contextual, student-centered instruction oriented toward the Eight Graduate Profile Dimensions (Rustiyana et al., 2025). This policy aligns with the idea of deep learning, which emphasizes holistic mastery of concepts, reflection, and the application of knowledge to real life, and which at the ECE level is integrated with the principle of learning through meaningful play (Apriani et al., 2025). At the national policy level, implementation of Curriculum Merdeka in ECE settings still faces uneven opportunities and structural obstacles across regions (Garnika & Rohiyatun, 2025). The success of this approach rests largely on teachers' pedagogical skill in designing meaningful play activities and differentiated, reflective assessment (Fatimah et al., 2025), their social skill in communicating and collaborating with children, parents, and colleagues (Khoiriyah & Fakhruddin, 2025), and their emotional skill in regulating themselves and building a sense of safety for children (Fiyul & Duryat, 2025).

Empirically, however, the implementation of the Merdeka Curriculum together with deep learning at the ECE level continues to face real gaps, in both formal (kindergarten) and non-formal (playgroup) institutions (Gandana et al., 2024; Nuraeni et al., 2025). A preliminary survey conducted in Adiwerna, Dukuhturi, and Talang Districts, Tegal Regency, found that 70 percent of teachers struggled to implement meaningful play, only 40 percent consistently carried out reflective documentation, 65 percent felt overwhelmed in managing their emotions during instruction, and 50 percent had not arranged their lesson planning systematically (see Table 1). These findings point to a “fun-without-meaning” pattern, lessons that are enjoyable but not yet meaningful, together with teacher-development efforts that remain partial and largely limited to one-off training rather than an integrated, sustained approach spanning the pedagogical, social, and emotional dimensions.

Table 1. Preliminary Survey Findings on ECE Teachers' Pedagogical, Social, and Emotional Readiness in Adiwerna, Dukuhturi, and Talang Districts

No	Indicator	Percentage of Teachers	Dimension Affected
1	Struggled to design/implement meaningful play	70%	Pedagogical
2	Consistently carried out reflective documentation	40%	Pedagogical
3	Felt emotionally overwhelmed while teaching	65%	Emotional
4	Had not arranged lesson planning systematically	50%	Pedagogical

Source: Preliminary field survey (2025), processed by the author

Based on the problems described above, this study aims to: (1) examine the profile and development needs of formal and non-formal ECE teachers' pedagogical, social, and emotional skills in Adiwerna, Dukuhturi, and Talang Districts, Tegal Regency; (2) assess teachers' understanding of

the concept and principles of deep learning within the Merdeka Curriculum; (3) design and test the feasibility of a Deep Learning Implementation Model within the Merdeka Curriculum; (4) evaluate the model's effectiveness in improving teachers pedagogical, social, and emotional skills; and (5) identify the supporting and inhibiting factors involved in applying the model in the three districts.

RESEARCH METHOD

This study employs a Research and Development (R&D) design following the ADDIE model, Analysis, Design, Development, Implementation, and Evaluation, chosen because it provides a systematic sequence for producing an educational product that is field-tested and workable (Rindrayani *et al.*, 2025; Yuwana *et al.*, 2023). The product being developed is a Deep Learning Implementation Model within the Merdeka Curriculum intended for formal and non-formal ECE teachers. Table 2 summarizes the activity and expected output of each stage.

Table 2. Stages of the ADDIE-Based Research and Development Procedure

ADDIE Stage	Main Activity	Output
Analysis	Identify teachers' profile, conceptual understanding, skills, and development needs	Needs-analysis report
Design	Draft the model's objectives, content, implementation steps, and evaluation format	Initial model draft
Development	Validate the preliminary product with three experts (content, learning design, ECE practice)	Validated prototype
Implementation	Trial the model with 50 practicing teachers through observation, interviews, and questionnaires	Field-test data
Evaluation	Analyze all data to refine the model	Valid, practical, effective final model

Source: Adapted from Rindrayani et al. (2025) and Yuwana et al. (2023)

The study is conducted in Adiwerna, Dukuhturi, and Talang Districts, Tegal Regency, over an eight-month period (December 2025–July 2026). The population comprises roughly 600 formal and non-formal ECE teachers actively teaching in kindergartens (TK), Islamic kindergartens (RA), playgroups (KB), day-care centers (TPA), and other licensed ECE units (SPS) within the three districts. Participants are selected purposively: teachers take part in the needs-analysis stage, three experts validate the model during the development stage, and fifty teachers participate in the implementation trial. The variables examined include teachers' understanding of deep learning, their pedagogical, social, and emotional skills, and the developmental model itself.

Data are gathered through questionnaires, classroom observation, interviews, documentation, and expert validation sheets. Instrument validity is examined through content validity (expert judgment by three validators) and construct validity, the latter tested with Pearson product-moment correlation, an item being considered valid when its calculated *r* exceeds the table value at a significance level below 0.05. Reliability is assessed with Cronbach's Alpha, an instrument being considered reliable at a coefficient of at least 0.70, using IBM SPSS Statistics (Sugiyono, 2022). Data are analyzed descriptively: interview, observation, documentation, and expert-input data are examined qualitatively, through data reduction, data display, and conclusion drawing, while questionnaire and validation data are examined quantitatively in the form of scores, averages, and percentages, with both sets of findings then combined as the basis for refining the model (Kriyantono, 2020).

RESULTS AND DISCUSSION

Conceptual Results of the Model Development

Identification of the Implementation Gap

At the current stage of the research, the results represent the conceptual outcomes underlying the development of the Deep Learning Implementation Model rather than empirical evidence of its effectiveness. The model is structured around four interconnected components: the expected condition of early childhood education (ECE), the existing implementation gap, the proposed developmental intervention, and the intended outcomes. These components form the conceptual pathway illustrated in Figure 1.

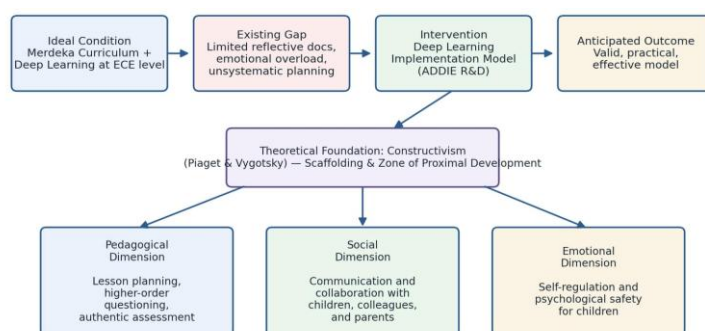


Figure 1. Conceptual Framework of the Deep Learning Implementation Model

Source: Author's synthesis based on Piaget's and Vygotsky's constructivist theory and the pedagogical-social-emotional competency framework of Fiyul and Duryat (2025).

From a regulatory and pedagogical perspective, the implementation of the Merdeka Curriculum at the ECE level requires meaningful, child-centred learning that encourages active exploration, reflection, and interaction. This orientation is consistent with the principles underlying Permendikbudristek No. 5 of 2022 and Permendikdasmen No. 13 of 2025. Consequently, teachers are expected not only to demonstrate pedagogical competence but also to possess adequate social and emotional competencies to create safe, collaborative, and developmentally appropriate learning environments.

However, the preliminary analysis in Adiwerna, Dukuhturi, and Talang Districts indicates a gap between these expectations and existing educational practices. Learning activities tend to emphasise enjoyment without consistently ensuring meaningful learning experiences. Other identified issues include limited reflective documentation, uneven teacher emotional regulation, and disparities in access to professional development between formal and non-formal ECE teachers. These conditions are consistent with the opportunities and implementation barriers to the Merdeka Curriculum identified by Garnika and Rohiyatun (2025). The findings provide the empirical-contextual basis for developing a model that integrates pedagogical, social, and emotional teacher competencies.

Structure of the Proposed Deep Learning Implementation Model

The proposed model is grounded in Piaget's and Vygotsky's constructivist perspectives, particularly the principles of active knowledge construction, social interaction, *scaffolding*, and the *Zone of Proximal Development*. Within this perspective, children develop understanding through direct experience and interaction with their social environment, while teachers provide appropriate support according to children's developmental needs (Lutfi & Nurmatin, 2023).

Based on this foundation, the model integrates three interrelated dimensions of teacher competence. The pedagogical dimension encompasses learning design, higher-order questioning, differentiated instruction, and authentic assessment (Fatimah et al., 2025). The social dimension concerns teachers' capacity to communicate and collaborate effectively with children, colleagues, and parents. The emotional dimension focuses on teachers' self-regulation, emotional awareness, and capacity to establish psychological safety in the learning environment (Fiyul & Duryat, 2025). Rather than treating these competencies separately, the proposed model positions them as mutually reinforcing components of deep-learning implementation.

Table 3. Conceptual Components of the Proposed Deep Learning Implementation Model

Component	Identified Condition	Model Response	Intended Outcome
Pedagogical competence	Learning activities are not consistently meaningful and reflective	Learning planning, higher-order questioning, differentiated instruction, and authentic assessment	More meaningful and developmentally appropriate learning
Social competence	Variation in communication and collaboration among teachers, children, and parents	Strengthening communication and collaborative practices	Stronger learning partnerships and child engagement
Emotional competence	Uneven teacher emotional regulation and psychological classroom support	Self-regulation and psychological safety strategies	A safer and more supportive learning environment
Professional development	Unequal training access between formal and non-formal ECE teachers	Inclusive and structured competency-development model	More equitable teacher capacity
Deep-learning implementation	Learning may be enjoyable but does not always promote deeper meaning-making	Integration of pedagogical, social, and emotional competencies	Meaningful, reflective, and child-centred learning

Source: Author's synthesis based on Lutfi and Nurmatin (2023), Fatimah et al. (2025), Fiyul and Duryat (2025), Garnika and Rohiyatun (2025), and the preliminary analysis.

Table 3 demonstrates that the proposed model does not position deep learning merely as a teaching technique. Instead, it conceptualises deep-learning implementation as the outcome of the interaction between pedagogical quality, social relationships, teacher emotional competence, and access to professional development. The model will subsequently be developed and evaluated through the ADDIE-based Research and Development procedure to determine its validity, practicality, and effectiveness.

Discussion

Comparison with Previous Studies

The proposed model extends previous research on the Merdeka Curriculum, deep learning, and teacher competence in several respects. Nuraeni et al. (2025) primarily examined teachers' perceptions and readiness in implementing the Merdeka Curriculum, whereas Garnika and Rohiyatun (2025) identified broader opportunities and barriers associated with curriculum implementation. These studies provide important evidence regarding implementation readiness and systemic constraints, but they have not fully explained how pedagogical, social, and emotional competencies can be operationally integrated within a single developmental model. Similarly, studies addressing teacher competence have frequently examined specific dimensions independently. Fatimah et al. (2025), for example, emphasised pedagogical aspects such as learning planning, questioning strategies, and assessment, while Fiyul and Duryat (2025) highlighted the importance of social-emotional competence in supporting effective educational interactions. The present model differs by positioning these dimensions as an integrated competency system rather than as isolated teacher attributes.

This integration constitutes an important development because deep learning in ECE cannot be reduced to the use of innovative instructional strategies alone. The ability of children to engage meaningfully in learning also depends on the quality of teacher-child interactions, emotional security, opportunities for exploration, and the extent to which teachers can provide appropriate instructional support. Therefore, the proposed model broadens the existing understanding of deep-

learning implementation by connecting instructional competence with the social and emotional conditions in which learning occurs.

Constructivist Foundation of Deep Learning in ECE

The conceptual structure of the model is consistent with constructivist assumptions that children actively construct knowledge through interaction with objects, experiences, adults, and peers. From a Vygotskian perspective, learning develops through socially mediated interaction, particularly when adults provide *scaffolding* within the child's *Zone of Proximal Development* (Lutfi & Nurmatin, 2023). Accordingly, effective deep learning in ECE requires teachers to move beyond transferring information and instead organise environments in which children can explore, ask questions, make connections, and gradually develop understanding.

This theoretical perspective also explains why pedagogical competence alone may be insufficient. A teacher may possess appropriate instructional knowledge but still experience difficulty facilitating meaningful learning when communication, emotional regulation, or classroom psychological safety is inadequate. The social and emotional dimensions proposed by Fiyul and Duryat (2025) therefore complement the pedagogical dimension by creating relational conditions that allow instructional strategies to function effectively.

The pedagogical dimension further supports the transition from activity-oriented teaching towards meaning-oriented learning. Learning experiences that incorporate appropriate questioning, differentiated learning opportunities, and authentic assessment enable teachers to identify not only whether children participate in activities but also how they understand, interpret, and apply their experiences. This orientation corresponds with the pedagogical competencies described by Fatimah et al. (2025) and strengthens the conceptual relationship between teacher competence and deep-learning practice.

Integration of Pedagogical, Social, and Emotional Competencies

One of the central conceptual findings of this study is that pedagogical, social, and emotional competencies should not be treated as separate components of teacher professionalism. Instead, they operate reciprocally during the learning process. Pedagogical competence determines how learning experiences are designed, social competence shapes how interactions and collaboration occur, while emotional competence influences teachers' capacity to respond constructively to children's behavioural and emotional needs. Such integration is particularly relevant in ECE because learning is strongly embedded in social and emotional interaction. Young children require not only cognitively stimulating experiences but also consistent emotional support and secure relationships. Consequently, meaningful learning is more likely to emerge when instructional planning, teacher-child communication, emotional responsiveness, and classroom climate function cohesively.

This integrated perspective also distinguishes the proposed model from approaches that interpret deep learning mainly as a set of classroom techniques. The model conceptualises deep learning as an ecosystem of teaching practices and teacher competencies. Thus, achieving deeper learning requires simultaneous attention to what teachers teach, how they facilitate learning, how they interact with children, and how they manage their own emotional responses during the educational process.

Addressing the Formal and Non-Formal ECE Context

Another important contribution concerns the inclusion of both formal and non-formal ECE teachers. The preliminary conditions identified in Adiwerna, Dukuhturi, and Talang indicate disparities in access to training and professional development. These findings are consistent with the broader implementation challenges discussed by Garnika and Rohiyatun (2025). If professional development opportunities remain uneven, curriculum reform may produce different levels of implementation quality across educational settings. Therefore, the proposed model is designed not only as an instructional framework but also as a professional-development mechanism applicable across different ECE contexts. By incorporating teachers from formal and non-formal institutions within the same developmental framework, the model seeks to promote more equitable competency development and reduce differences in teachers' opportunities to understand and implement deep-learning principles.

Research Gap and Contribution of the Proposed Model

Previous studies have provided important evidence regarding teacher readiness, curriculum implementation, pedagogical competence, and social-emotional competence. However, these areas have predominantly been investigated independently. Nuraeni *et al.* (2025) focused on teacher perceptions and readiness, while Garnika and Rohiyatun (2025) examined curriculum-level opportunities and barriers. Other studies have highlighted either pedagogical competencies (Fatimah *et al.*, 2025) or social-emotional competencies (Fiyul & Duryat, 2025). The research gap therefore lies in the limited availability of an empirically developable model that simultaneously integrates these competency dimensions specifically for deep-learning implementation in formal and non-formal ECE contexts. The novelty of the present study is the development of a unified Deep Learning Implementation Model in which pedagogical, social, and emotional competencies constitute interconnected mechanisms supporting meaningful, reflective, and child-centred learning.

Furthermore, the model is designed within an ADDIE-based Research and Development framework. This distinguishes the study from descriptive investigations because the intended contribution is not limited to explaining implementation conditions. The study seeks to produce a developmental product that will undergo systematic analysis, design, development, implementation, and evaluation before conclusions regarding its validity, practicality, and effectiveness are established. The study has several theoretical and practical implications. Theoretically, the proposed framework expands discussions of deep learning in ECE by positioning teacher competence as a multidimensional construct involving pedagogical, social, and emotional processes. It also provides a conceptual bridge between constructivist learning theory and contemporary competency-based approaches to teacher professional development.

Practically, the model may provide ECE institutions with a structured framework for designing teacher-development programmes that move beyond technical instructional training. Professional development should simultaneously strengthen lesson design, reflective practice, communication, collaboration, emotional self-regulation, and the ability to create psychologically safe learning environments. Such an approach may be particularly valuable for reducing professional-development disparities between formal and non-formal ECE teachers. At the policy and institutional levels, the model may also contribute to the implementation of the Merdeka Curriculum and the emerging deep-learning orientation promoted through Permendikbudristek No. 5 of 2022 and Permendikdasmen No. 13 of 2025. Rather than interpreting curriculum implementation primarily as administrative compliance, the model emphasises the development of teacher competencies required to translate curriculum principles into meaningful classroom practices.

The present findings should be interpreted in accordance with the developmental stage of the research. At this stage, the proposed relationships among pedagogical, social, emotional, and deep-learning dimensions represent a theoretically and contextually derived framework rather than conclusions regarding intervention effectiveness. Consequently, claims concerning the model's validity, practicality, and effectiveness will require evidence from the subsequent Development, Implementation, and Evaluation stages. This developmental status does not reduce the conceptual contribution of the study but defines the appropriate scope of interpretation. Subsequent validation involving expert review, practitioner evaluation, field implementation, and empirical assessment will provide opportunities to refine the model and examine its applicability across different ECE settings. Future testing involving diverse formal and non-formal institutions may further strengthen the model's transferability and provide evidence regarding the conditions under which the model produces optimal educational outcomes.

CONCLUSION AND SUGGESTIONS

The gap between the demands of the Merdeka Curriculum and the readiness of formal and non-formal ECE teachers in Adiwerna, Dukuhuri, and Talang Districts, Tegal Regency, to implement deep learning points to the need for an integrated developmental model. The Deep Learning Implementation Model designed through this ADDIE-based R&D approach is expected to

bridge that gap by strengthening teachers' pedagogical, social, and emotional skills within a systematic, contextual, and child-centered framework. Further research is recommended to complete the Development, Implementation, and Evaluation stages so as to generate empirical evidence of the model's feasibility and effectiveness. Education authorities and ECE institutions are encouraged to support equal access to training for both formal and non-formal teachers, while future researchers are encouraged to examine the model's applicability in other geographic settings to strengthen the generalizability of these findings

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