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Deep Learning Training: Improving Teacher Competence in Implementing "the 2024 Merdeka Curriculum"

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Abstract

The transition to a competency-based curriculum requires a paradigm shift for teachers, from mere implementers of material to innovative curriculum developers. However, teacher training is often theoretical and fails to address substantive classroom practice. This study aims to document and analyze the effectiveness of Deep Learning strategy-based training in improving the competency of high school teachers in DKI Jakarta to authentically implement the 2024 Independent Curriculum. Using the ADDIE (Analysis, Design, Development, Implementation, Evaluation) instructional design framework, this activity involved 224 teachers in the online phase and 33 selected teachers per class in the offline phase. Data were collected through needs surveys, observations of the results of the Learning Objective Flow (ATP) development, and pre- and post-tests related to pedagogical strategies. The results showed an increase in participants' knowledge outcomes from an average pretest of 68.5 to an average posttest of 83.7 with an N-gain of 0.78. The Deep Learning approach significantly improves teachers' pedagogical literacy, as evidenced by their ability to deconstruct Learning Outcomes (LO) into contextual instructional designs based on deep conceptual understanding. The transformation in mindset is evident in the shift from conventional teaching methods to reflective and inclusive learning strategies. This study concludes that training that emphasizes independent knowledge construction and collaboration is the main key in bridging the gap between macro curriculum policies and micropedagogical practices in the classroom.

Keywords: Merdeka-curriculum, ADDIE approach, deep learning, teacher competence

INTRODUCTION

The transition to a competency-based curriculum has become a dominant global trend in the past decade, serving as a strategic response to the increasingly dynamic demands of the times (Henri *et all.*, 2017). Implementation of this curriculum model has become a key agenda for educational reform in various countries, with the primary goal of equipping students with 21st-century skills, such as critical thinking, collaboration, and digital literacy (Kailo *et al*., 2025). Through this approach, the focus of education shifts from merely mastering textual material to developing practical capabilities that enable students to adapt to complex real-world challenges.

In the national context, this educational transformation is realized through the Independent Curriculum policy, which upholds the principles of flexibility and institutional autonomy. This curriculum specifically emphasizes differentiated learning methods tailored to individual needs and character building (Iyanda, 2025). The success of this transition depends heavily on teachers' pedagogical competence in integrating these values into classroom practice. The effectiveness of the teaching and learning process depends heavily on teachers' ability to integrate pedagogical competence with the use of appropriate instructional materials in the classroom (Nassor *et all.*, 2024). Therefore, mastery of these competencies is a crucial foundation for educators to create a learning environment that is not only meaningful but also inclusive for all levels of students (Florian & Linklater, 2010).

The fundamental challenges in curriculum implementation are often rooted not in the substance of the policy itself, but rather in the effectiveness of the training strategies provided to educators (Kailo *et all.*, 2025). Although current curriculum designs demand high levels of pedagogical innovation, the reality on the ground shows that the majority of in-service training remains trapped in traditional paradigms (Kennedy, 2016; Darling-Hammond *et all., 2017)*. The dominance of standard lecture and discussion methods in training sessions often results in the neglect of contextual problem-solving aspects. A theoretical approach without ongoing practical support has proven unsuccessful in providing a substantive long-term impact on teacher professional growth.

The failure to transform this training model ultimately created a wide gap between visionary curriculum design and conventional classroom instructional practices (Kailo & Njagi, 2025). This phenomenon confirms that the implementation of new curricula at the national level consistently faces similar systemic obstacles: the difficulty of translating macro policies into effective, concrete actions at the micropedagogical level (Mlenge, 2025). Without a reorientation toward a more practice-based and collaborative teacher professional development system, the curriculum's ambition to create flexible and innovative learning will be difficult to achieve equitably (DuFour & Fullan, 2013).

Much research has been conducted on improving teacher competency in the context of curriculum reform, but the majority has focused on top-down administrative technical training. Previous studies have emphasized that the main obstacle to curriculum implementation lies in

teachers' low pedagogical literacy in translating curriculum flexibility into instructional design (Iyanda, 2025; Mlenge, 2025). Although various in-service trainings have been conducted, the models used tend to be theoretical and lack a deep cognitive focus, resulting in a dichotomy between policy vision and classroom practice (Kailo & Njagi, 2025). A significant correlation exists between teachers' competency levels and their teaching performance in secondary schools (Matira and Ofrin, 2024). This reinforces the urgency of providing Deep Learning training to ensure teachers possess competency standards aligned with the demands of curriculum change. The main challenge faced by teachers in the field is how to change teaching patterns from traditional approaches to deeper learning. (Ladyawati, 2025).

This is where the gap that this research fills lies. Unlike conventional training, which focuses solely on introducing curriculum structure, this research integrates a Deep Learning approach into teacher training (Fullan, Quinn & McEachen, 2017). This approach not only trains technical aspects but also encourages teachers to engage in critical reflection, in-depth collaboration, and independent knowledge construction to create truly meaningful and inclusive learning. The novelty of this activity lies in the implementation of Deep Learning strategies specifically aligned with the 2024 Independent Curriculum update, which demands more dynamic curricular adaptations than previous versions. Through Deep Learning Training (DLT), teachers are trained to (1) Think Critically and Creatively; (2) Interdisciplinary Connections; (3) Pedagogical Reflection (Baharuddin, 2025). Deep Learning literacy goes beyond simply using digital devices; it encompasses teachers' ability to use technology as a tool to encourage students to think critically, collaborate globally, and independently construct new knowledge. Empowering teachers with this literacy is an absolute prerequisite (Mahardhani, *et all.* 2025).

Therefore, this article aims to document how a Deep Learning-based training model can significantly improve teacher competency in authentically implementing the Independent Curriculum. The primary focus is directed at transforming teachers' mindsets from curriculum implementers to curriculum developers who are responsive to student needs.

METHOD

This activity involved high school teachers in Jakarta. The initial phase was conducted online with 224 teachers participating. Phase 2, for deep learning training, was conducted on-site, with a maximum of 33 participants per class. The training design utilized the ADDIE framework to ensure that teacher competency training was structured and impactful in classroom practice.

1. Analysis

The initial step was to identify gaps between the 2024 Independent Curriculum policy and the understanding of physics teachers in DKI Jakarta. In coordination with the DKI Jakarta Physics MGMP management, the team conducted an initial survey to determine teachers' difficulties in analyzing the latest Learning Outcomes (CP). Given that high schools in Jakarta

have diverse facilities, an analysis was conducted based on the specific needs of the schools to ensure the curriculum was contextualized.

2. Design

At this stage, the team designed a training curriculum that integrates Deep Learning concepts. The main goal is for teachers to be able to transform CP into a unique Learning Objective Flow (ATP) according to the characteristics of each school. The two-stage training flow was designed: (1) a curriculum document development workshop, and (2) training on Deep Learning strategies (such as Problem-Based Learning or Inquiry-Based Learning).

3. Development

The development phase involved creating the materials and instruments to be used in the training. The 2024 Physics CP surgical guide and a self-assessment instrument for teacher competency were developed. The training materials were validated by curriculum and pedagogical experts to ensure the relevance of the Deep Learning approach.

4. Implementation

Implementation was carried out in two crucial phases for teachers under the coordination of the DKI Jakarta Physics MGMP:

Phase I (ATP Workshop): Teachers were invited to collaboratively analyze high school Physics CP. Hasil dari fase ini adalah draf ATP yang mencerminkan dimensi profil lulusan dan kearifan lokal/kondisi dunia nyata dari setiap sekolah. Implementation Time: March 2025 with participants being Physics teachers within the scope of the DKI Jakarta Physics MGMP.

Phase II (Deep Learning Training): Teachers were trained to understand the concept of the Deep Learning approach and implement it in classroom learning. This training emphasized how teachers could foster a deep understanding of Physics concepts (conceptual understanding) and the interrelationships between phenomena, rather than simply memorizing formulas. Implementation period: July to November 2025, with teachers from several high schools in DKI Jakarta participating. The program will consist of on-site training followed by on-the-job mentoring.

5. Evaluation

Evaluations are conducted to measure the effectiveness of activities and improve teacher competency. These are conducted during training through observations of the ATP results compiled by teachers. Competency changes are measured through pre- and post-tests related to Deep Learning strategies, as well as product assessments in the form of teaching modules integrated with the principles of the 2024 Independent Curriculum.

Training outcomes were evaluated using pretest and posttest analysis using N-Gain. Thirty questions were provided for both the pretest and posttest. These questions covered pedagogical knowledge, deep learning knowledge, and implementation.

RESULTS AND DISCUSSION

A training program for high school teachers in Jakarta yielded significant results in bridging the gap between macro curriculum policies and micro-pedagogical practices in the classroom. Using the ADDIE framework, the following details the results and their discussion:

1. Transforming Curriculum Understanding Through CP and ATP Analysis

The results of Phase I training demonstrated improved teacher skills in translating the 2024 Learning Outcomes (CP) into contextual Learning Objectives (ATP). Unlike previous practices that tended to copy government examples, teachers were able to:

- Deconstructing the CP in accordance with the diverse characteristics of school facilities in DKI Jakarta.
- Integrating Local Wisdom, where the resulting ATP draft reflects a graduate profile relevant to the socio-cultural conditions of students.

2. Implementation of Deep Learning Approach

Evaluation data shows a paradigm shift in teaching from surface learning (memorizing formulas) to deep learning. A comparison of teacher competencies before and after training is outlined in the following table:

Table 1. Comparison of Teacher Pedagogical Competence

No	Aspect	Before Training	After Training
1	Material Focus	Textual and formula mastery	Conceptual understanding
2	Methods	Standard lectures and discussions	Deep learning by implementing problem-based learning or other relevant models
3	Teacher Role	Curriculum implementation	Curriculum Development (Responsive)
4	Products	Administrative teaching tools	Technology-based deep learning tools with deep learning principles

3. Analysis of Pre-Test and Post-Test Results

Based on the evaluation results, there was a significant increase in average scores between the pre-test and post-test. This improvement included understanding of:

- Strategies for sparking student curiosity through real-world physics phenomena.
- Critical reflection techniques in the learning process.
- Development of inclusive and differentiated teaching modules..

The findings of this activity confirm Kailo et al.'s (2025) argument that the main obstacle to curriculum development lies not in its content, but rather in the teacher training strategy. This training successfully broke through the traditional paradigm that relies solely on lectures. By engaging teachers in independent knowledge construction, this training demonstrated that the Deep Learning approach can narrow the gap between visionary curriculum design and conventional practice.

The novelty of this training lies in the transformation of the teacher's role. In line with the vision of the 2024 Independent Curriculum, teachers are no longer positioned as "teachers" but rather as autonomous curriculum developers. Through critical reflection methods in the on-site training phase, teachers are able to align curriculum flexibility with individual student needs, which is the essence of differentiated learning (Iyanda, 2025).

Specifically, in Physics, the Deep Learning approach helps teachers shift from simply teaching mathematical problem solving to exploring the relationships between phenomena. This is crucial because high pedagogical literacy directly correlates with teaching performance and student learning outcomes (Matira & Ofrin, 2024). The use of the ADDIE model ensures that each stage of the training, from needs analysis to product evaluation (teaching modules), is structured and has a long-term impact on teacher professionalism.

4. Analysis of Training Participant Satisfaction

Overall, this training had a significant impact on participants. The training material was highly relevant to the needs of teachers in schools (61.3%), and the remainder stated that it was relevant (38.7%). Teachers stated that the examples provided were very practical and relevant (48.4%), and 45.2% stated that they were both practical and relevant.

The six-day training should be followed by mentoring during the learning process at school. Collaboration between teachers needs to be developed to produce a learning process that aligns with the concept of Deep Learning.

CONCLUSION

The implementation of Deep Learning-based training for high school teachers in Jakarta has been proven to significantly improve pedagogical competence in adopting the 2024 Independent Curriculum. This research demonstrates that shifting the training model from merely technical-administrative to one that emphasizes critical reflection and collaboration can transform teachers' roles from mere curriculum implementers to responsive and autonomous curriculum developers.

Overall, this activity confirms that the success of the national curriculum transition depends heavily on the reorientation of the teacher professional development system. The Deep Learning approach to in-service training is a strategic solution to bridge the gap between the government's policy vision and the reality of classroom practice. The results of this study recommend the need for ongoing mentoring so that the pedagogical innovations that have been formed can be internalized into a consistent academic culture in schools.

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