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Transforming Teachers' Teaching Practices Through Deep Learning Training: Concepts and Applications at SMP Negeri 2 Amarasi Barat

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Abstract

Deep learning promotes meaningful learning by increasing student engagement, strengthening conceptual understanding and long-term retention, and developing critical thinking and problem-solving skills. However, many teachers still have limited understanding of its concepts and implementation. Therefore, this community service program aimed to improve teachers' pedagogical competence in implementing deep learning and developing subject-specific instructional modules at SMP Negeri 2 Amarasi Barat. The program employed the Community-Based Research (CBR) method, which emphasizes active community participation in identifying needs, addressing challenges, and developing contextually relevant solutions. Teachers were directly involved in needs analysis, instructional design, and practical training activities. The results indicated positive participant responses: 94.7% strongly agreed, and 5.3% agreed that the program was beneficial. No participants expressed disagreement. Furthermore, the workshop, which involved 20 teachers, successfully produced seven instructional modules adapted to different subjects. The modules emphasized the quality of learning objectives, relevance to local contexts, guiding questions, meaningful learning activities, and assessment strategies. These findings demonstrate that participatory training can strengthen teachers' understanding and practical skills in implementing deep learning. In conclusion, the program successfully enhanced teachers' understanding of deep learning principles. It enabled them to develop practical instructional modules that support meaningful, contextual, and student-centered learning in classroom activities.

Keywords deep learning; teacher training; teaching practices

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1. INTRODUCTION

Improvements in the quality of education in Indonesia today are measured not only by rote-learning-based academic achievements, but also by students' ability to develop higher-order thinking skills, particularly creativity and critical thinking (Asmara et al., 2023). National and international reports indicate that these skills remain a serious challenge in various educational institutions. The results of a study (Azmi et al., 2025) show that most students' critical thinking skills fall into the "adequate" category; this should be a point of attention for teachers so that they can enhance students' self-confidence, analytical skills, and systematic thinking, thereby improving their critical thinking abilities. The results of international assessments reported by the Program for International Student Assessment (PISA) consistently rank Indonesia at the bottom in literacy areas requiring reasoning, analysis, and problem-solving, indicating a weak internalization of critical thinking skills in the learning process (Andi Rachman et al., 2021). The PISA results, which measure the literacy skills of students in Indonesia, show that in 2018 Indonesia ranked 72nd out of 78 countries, with scores of 371 in reading literacy, 379 in mathematics, and 389 in science—all well below the average. In 2022, the PISA results showed a decline, with scores of 359 in literacy, 366 in mathematics, and 383 in science. This indicates that students' cognitive performance has not yet demonstrated stable, consistent progress (Kristanti M et al., 2026).

The national education policy, through the Merdeka Curriculum, has provided ample scope for the development of learning that is oriented toward deep, reflective, and contextual understanding. In reality, however, the implementation of this policy has not yet been fully optimized in schools across Indonesia (Faiz, 2022). Many teachers still face difficulties in translating curriculum requirements into teaching practices that enable students to think critically and creatively. Instruction still tends to be teacher-centered, focused on covering the material, and lacking in meaningful exploration and reflective dialogue (Fatmawati et al., 2024). The reason for choosing SMP Negeri 2 Amarasi Barat is that the school is just beginning to implement deep learning in its curriculum; therefore, this material can serve as a refresher and provide additional knowledge on how to apply deep learning in the classroom.

One of the key factors influencing this situation is teachers' pedagogical competence. Some teachers still have only a basic understanding and have not received adequate training in applying deep learning (Mahardika & Jaya, 2025). Another challenge teachers face in implementing deep learning is the lack of ongoing professional training and guidance on the subject. This has resulted in suboptimal

implementation of deep learning. In addition, limited ICT infrastructure, network disruptions, low teacher literacy, and a heavy administrative workload pose significant obstacles (Asitah et al., 2026b). Many teachers do not yet fully understand how to design learning experiences that not only convey content but also build students' thinking skills through reflection, problem-solving, and connections to real-life contexts (Dewi et al., 2025). Although some teachers have participated in various training programs, their conceptual understanding and practical skills in designing and implementing deep learning are still limited; however, their curiosity is very high, and they continue to strive to learn more and develop their abilities.

Currently, teachers are expected to develop their teaching skills to foster students' cognitive abilities through ongoing assessment and feedback; however, in practice, many teachers still rely on lectures, rote-learning exercises, and summative tests. The challenges teachers face make it difficult for them to achieve meaningful learning outcomes, underscoring the need to strengthen their pedagogical knowledge. The Deep Learning approach offers a relevant pedagogical framework to address these challenges. This approach emphasizes a deep understanding of concepts, active student engagement, the development of metacognitive awareness, and meaningful learning experiences. Deep learning encourages teachers to act as facilitators who design learning experiences based on questions, exploration, and reflection, so that students not only know "what," but also understand "why" and "how." The successful implementation of deep learning depends heavily on teachers' readiness and pedagogical competence (Dewi et al., 2025). Research conducted by [author] shows that training elementary school teachers in Surakarta in implementing deep learning approaches resulted in a 45% increase in the pedagogical skills of 20 elementary school teachers in Surakarta for designing and applying deep learning strategies focused on critical thinking, creativity, and joyful learning. (Atmojo et al., 2025). Without systematic mentoring, teachers may revert to conventional teaching methods that are safer and more familiar. Recognizing this phenomenon in practical classroom settings, a Community Service (PKM) program is needed that directly targets the development of teachers' pedagogical competencies through training, mentoring, and reflective practice in implementing deep learning. Through this holistic mentoring program within the PKM, teachers are expected not only to gain a conceptual understanding of deep learning but also to apply it in context, in accordance with the characteristics of their students and the school environment. The ultimate impact is expected to be reflected in increased creativity and critical thinking skills among students, key indicators of the quality of 21st-century learning.

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Deep learning is an approach that emphasizes in-depth conceptual understanding through the active engagement of students (Igo et al., 2026). In the context of education, deep learning implies that the learning process can lead to meaningful learning and has been shown to increase student engagement, enhance conceptual understanding and long-term retention, and improve students' critical thinking and problem-solving skills (Maelasari & Maghfirah, 2025). Deep learning in the context of AI refers to a subfield of machine learning that uses artificial neural networks to perform tasks such as image recognition, natural language processing, and speech recognition. This is distinct from deep learning in the context of education. There are three elements of deep learning: meaningful learning, mindful learning, and joyful learning (Miranda et al., 2025). Conceptually, meaningful learning, mindful learning, and joyful learning are the three main pillars of deep learning that are mutually integrated. Mindful learning emphasizes the development of metacognition and self-reflection as the foundation for deep cognitive engagement. In this context, dialogic learning encourages students to actively engage, articulate their thoughts, and consciously evaluate their learning. On the other hand, meaningful learning emphasizes the connection between learning material and students' real-world experiences so that concepts do not remain abstract; joyful learning complements these two dimensions by fostering a positive, collaborative learning environment through learning communities (Yosita Ratri et al., 2026). The implementation of deep learning aims to encourage teachers to bring about real transformation in teaching practices, beginning with a shift away from traditional, teacher-centered approaches toward a role as facilitators who empower students through projects, contextual problem-solving, and engagement with learning partners in the surrounding community (Setiani D et al., 2025). The study (Asitah et al., 2026a) shows that implementing deep learning—particularly through training programs—significantly improves teachers' pedagogical competence and professionalism, including lesson planning, pedagogical reflection, and authentic assessment. In addition, the application of deep learning can enhance students' critical thinking and problem-solving skills while also enriching technology-based teaching methods and creating more innovative learning experiences for teachers (Deviv et al., 2025). Deep learning training can improve teachers' digital literacy (Pandra & Fatahilah, 2025).

The reason for choosing SMP Negeri 2 Amarasi Barat is that the school will implement deep learning next semester, so this activity serves as a refresher for teachers on how to apply it. There are several challenges to implementing deep learning, including limited teacher training, an overly packed curriculum, and

disparities in infrastructure (Haq & Prasetiyo, 2025). Another challenge is that teachers often misinterpret the appropriate learning models and methods, which would make the learning environment more engaging and relevant for students (Nur et al., 2025). Therefore, deep learning training is needed for teachers at SMP Negeri 2 Amarasi Barat to develop their pedagogical competencies in effectively implementing deep learning to enhance students' creativity and critical thinking skills. Through this PKM activity, it is hoped that teachers' knowledge, skills, and abilities to develop deep learning-based instruction will improve.

2. METHODS

This PKM activity was conducted using the Community-Based Research (CBR) method. CBR is used because transforming teaching requires direct teacher involvement; through CBR, teachers' needs and obstacles are identified, and in-depth learning strategies are tailored to the school's specific circumstances and environment. This aligns closely with the objectives of the PKM, in which teachers are directly involved in needs analysis, design, and practice, and this training can address the challenges teachers face. CBR is described as participatory research or a community engagement approach involving 20 teachers in designing, implementing, and evaluating deep learning-based instruction. The 20 participants in the PKM are subject teachers for grades 1 through 3 in junior high school. The reason for conducting this training is that teachers face difficulties in designing deep learning-based instructional materials and in implementing and evaluating deep learning in the classroom. (Firmansyah et al., 2025). To that end, the activities that teachers will undertake in the PKM program are designed to develop their pedagogical competencies through deep-learning training (material presentations, guided practice, and simulations). In this program, teachers will gain knowledge, skills, and hands-on experience in the form of: 1) conceptual reinforcement of deep learning; and 2) guidance in designing instructional materials.

The PKM team serves as a discussion partner and facilitator, not as an evaluator. This activity is carried out in three stages. In this activity, teachers are encouraged to actively participate in identifying needs, developing instructional materials, conducting practical exercises, and reflecting on the training outcomes. The activity is outlined as follows: 1) Identifying needs: Teachers share their teaching methods, discuss the most challenging aspects of teaching, and express their understanding of deep learning; the results of this process then serve as the priority needs for conducting the training; 2) Developing instructional materials: Teachers are grouped by subject area and design instructional materials—such as learning objectives, activities, and

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assessments—for a specific topic they will actually teach. Teachers select learning resources from the students' local environment—such as dryland farming, weaving, local folklore, or clean water issues—and then link them to the learning outcomes. 3) Conducting the activity: The teacher implements the lesson plan at least once during a class session. 4) Reflect on the training outcomes: Teachers discuss what went well, what was challenging, and what has changed in themselves and in their students' responses. The preparation stage begins with determining the location and objectives of the PKM activity, compiling service-learning materials tailored to participants' needs, identifying the tools and materials required for the activity, coordinating with the principal of SMP Negeri 2 Amarasi Barat, and holding a final planning meeting. The preparatory activities included the PKM Team coordinating with the principal of SMP Negeri 2 Amarasi Barat on the objectives of the PKM activities, the activity format, and an agreed-upon schedule. The team gathered existing information: the number of teachers and the subjects they teach, their years of service, training they have completed, the condition of facilities, and the school's curriculum documents. The team prepared FGD guidelines, an initial reflection sheet, a short questionnaire, and an observation sheet. Participants' needs were identified through discussions with school principals, group discussions, and written reflections from teachers.

During the implementation stage, teachers were equipped with knowledge of deep learning, followed by practical exercises in creating teaching modules to be presented to the class. This PKM activity took place over 3 days, with the first 2 days held in person and the third day held online. On days 1 and 2, there were four workshops: Workshop 1: Developing teaching modules for the Merdeka Curriculum; Workshops 2, 3, and 4: Deep Learning Activities (strategies, methods, evaluation, reflection); and on the third day, participants engaged in discussions and presentations on Deep Learning Activities (strategies, methods, evaluation, reflection). The expected outcomes are an increase in teachers' understanding of deep learning, an increase in teachers' ability to develop deep learning instructional materials relevant to the local context, and observable changes in teaching methods—such as more discussions, probing questions, or experience-based activities. The materials used in the PKM activities include: a summary of the official Ministry of Education and Culture document on deep learning; examples of teaching materials developed using the deep learning approach, including examples that incorporate local contexts; a template for developing teaching materials (objectives, activities, assessment); a peer observation form developed in collaboration with teachers; personal and group reflection forms; and a camera or cell phone for documentation. The evaluation stage involved

distributing a questionnaire on the benefits of the activities conducted, with participants selecting one of four categories: strongly agree, agree, disagree, and strongly disagree. This community service activity was held at SMP Negeri 2 Amarasi Barat in East Nusa Tenggara Province during the second week of April 2026.

3. FINDINGS AND DISCUSSION

The success of the PKM program was evident in the teachers' enthusiasm for participating in the activities. The program began with a presentation of the material, followed by guided practice and simulations. Through this program, teachers gained knowledge, skills, and hands-on experience in the following areas: 1) Conceptual reinforcement of deep learning, and 2) Guidance on the design of instructional materials. The instrument used in this activity measured participant satisfaction with the PKM activity. It consisted of 5 questions using a 4-point Likert scale—strongly agree, agree, disagree, and strongly disagree—as well as 2 open-ended questions regarding teachers' opinions on the PKM activity and their suggestions and feedback for future PKM activities. The data analysis technique for the questionnaire involved calculating percentages. The success of the PKM activities is evident in the questionnaire responses, the teachers' enthusiasm, and the resulting products—namely, the learning modules developed based on subject clusters.

Evidence of an increase in teachers' understanding of deep learning concepts after participating in the PKM activities includes changes to the teaching modules and reflective notes. The first PKM activity began with a conceptual review of deep learning: a) In this activity, teachers were provided with a deeper understanding of the concepts and principles of deep learning in the context of 21st-century education through training that emphasized dialogue, case studies, and reflection on the teachers' own teaching experiences. b) Teachers were guided to view deep learning not as an abstract concept, but as a pedagogical mindset that can be applied in real classroom situations. In general, teachers will design instructional modules that incorporate deep learning and include assessments tailored to the local context. For example, subject teachers design activities and link them to local contexts that will actually be applied.

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Figure 1. Conceptual Reinforcement of Deep Learning



Figure 2. Development of instructional modules that incorporate local context principles

The second activity in the PKM is guidance on the design of instructional materials: a) Intensive guidance in designing deep learning-based instructional materials. Teachers are guided to develop teaching modules or lesson plans that include questions designed to spark critical thinking; encourage student exploration and creativity; and integrate reflection and authentic assessment. The key characteristics of the learning modules developed by the teachers are the clarity of the learning objectives, the strength of the local context, the quality of the guiding questions, the alignment of the assessments with the objectives, and their suitability for the available resources. b) Teachers present the teaching modules they have created and discuss the challenges they faced while developing them.



Figure 3. Intensive guidance in designing deep learning-based instructional materials



Figure 4. Mentoring activities were conducted collaboratively with the teachers



Figure 5. Group photo with the teacher during the PKM activity

The PKM activities continue through online mentoring, during which teachers are given time to revise the teaching modules they have created and discuss the challenges they face and how to resolve them. The goal is to ensure that the teaching modules are improved and ready for use.

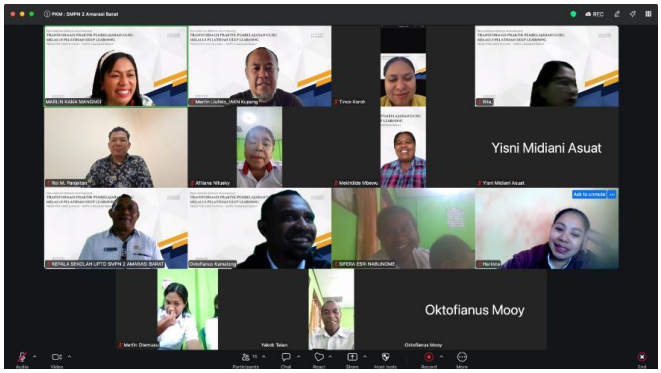
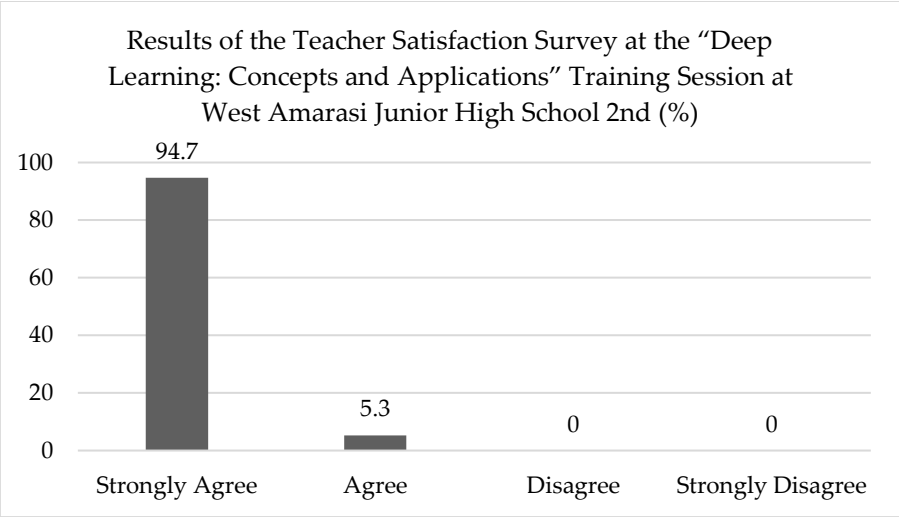


Figure 6. Online guidance on creating teaching modules

In this activity, the PKM Team assessed the effectiveness of the deep learning training program. Questionnaires were distributed to the teachers, and an analysis of the PKM activity's effectiveness revealed that 94.7% of the teachers strongly agreed

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and 5.3% agreed that it was very effective. The results of the effectiveness analysis are presented in Figure 1.1 below



Grafik 1. Pre-test results of the Teacher Satisfaction Survey at the "Deep Learning: Concepts and Applications" Training Session at SMP Negeri 2 Amarasi Barat (%)

The workshop, attended by 20 teachers, produced seven modules tailored to specific subjects, with a focus on the quality of the modules—specifically, the formulation of learning objectives, relevance to the local context, the quality of guiding questions, meaningful activities, and assessment. The deep learning modules developed can actively increase teacher engagement and enhance teachers' pedagogical competencies. The modules developed should also integrate three key components: deep learning technology, adaptive pedagogy, and continuous assessment (Virdinarti Putra & Yunitiara Rizqi, 2024) .a

4. CONCLUSION

The PKM activity titled "Transforming Teachers' Teaching Practices Through Deep Learning Training: Concepts and Applications at West Amarasi Barat Junior High School 2nd" was successfully carried out. The results of this activity showed that 94.7% of participants strongly agreed, 5.3% agreed, 0% disagreed, and 0% strongly disagreed regarding the activity's usefulness. This activity provided a deeper understanding of deep learning concepts and applications and led to the development of deep learning-based teaching modules that teachers can use in the classroom. The workshop, attended by 20 teachers, produced seven modules tailored to specific subjects, with a focus on the quality of the modules—specifically, the formulation of learning objectives, relevance to the local context, the quality of guiding questions, meaningful activities, and assessment

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