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Enhancing Deep Learning through a Website-Based Digital Interactive Board: 'Rumah Pendidikan' in Elementary Schools

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Enhancing Deep Learning through a Website-Based Digital Interactive Board: 'Rumah Pendidikan' in Elementary Schools

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Articles Information	Abstract
Received : 08-08-2026 Revised : 03-09-2026 Accepted : 04-09-2026 Published : 30-09-2026	The utilization of digital technology in primary school instruction has not yet reached its full potential, despite schools possessing Digital Interactive Boards (DIBs) and access to the Rumah Pendidikan learning resource platform. This community service initiative aimed to strengthen teachers' capacity to implement "Deep Learning" by utilizing DIBs integrated with Rumah Pendidikan resources. The program involved 65 teachers and 7 school principals from the Kenanga Cluster in Jatibarang District, Indramayu Regency. Activities included awareness-raising sessions, training, demonstrations, hands-on practice, discussions, mentoring, and evaluation. Results indicated that all participants deepened their understanding of Deep Learning concepts; proficiency in using DIBs and Augmented Reality media reached 90%, while the ability to design technology-based instruction reached 80%. The program demonstrated that practice-based training and mentoring can enhance teachers' readiness to integrate digital technology into their teaching. Continued mentoring is essential to ensure optimal classroom implementation. Keywords: Deep Learning; Digital Interactive Board; Rumah Pendidikan; Primary School.
	Abstrak Pemanfaatan teknologi digital dalam pembelajaran di sekolah dasar belum mencapai potensi maksimalnya, meskipun sekolah telah memiliki <i>Digital Interactive Board</i> (DIB) dan akses ke platform sumber belajar Rumah Pendidikan. Inisiatif pengabdian kepada masyarakat ini bertujuan untuk memperkuat kapasitas guru dalam menerapkan <i>Deep Learning</i> dengan memanfaatkan DIB yang diintegrasikan dengan sumber daya Rumah Pendidikan. Program ini melibatkan 65 guru dan 7 kepala sekolah dari Gugus Kenanga di Kecamatan Jatibarang, Kabupaten Indramayu. Rangkaian kegiatannya meliputi sesi peningkatan kesadaran, pelatihan, demonstrasi, praktik langsung, diskusi, pendampingan, dan evaluasi. Hasil kegiatan menunjukkan bahwa seluruh peserta memperdalam pemahaman mereka mengenai konsep <i>Deep Learning</i>, tingkat kemahiran dalam menggunakan DIB dan media <i>Augmented Reality</i> mencapai 90%, sementara kemampuan merancang pembelajaran berbasis teknologi mencapai 80%. Program ini membuktikan bahwa pelatihan berbasis praktik dan pendampingan dapat meningkatkan kesiapan guru untuk mengintegrasikan teknologi digital ke dalam pembelajaran mereka. Pendampingan berkelanjutan sangat penting untuk memastikan penerapan yang optimal di dalam kelas. Kata kunci: <i>Deep Learning</i>; <i>Digital Interactive Board</i>; Rumah Pendidikan; Sekolah Dasar.

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1. INTRODUCTION

The transformation of education in the digital era requires schools to develop learning processes that are not merely oriented toward knowledge mastery but also capable of fostering critical thinking, creativity, collaboration, and communication skills, as well as shaping students' character (Amir, Sekaringtyas, & Yunus, 2026). Indonesia's educational transformation policy positions "Deep Learning" as a strategic approach that encourages students to engage in meaningful, conscious, and enjoyable learning experiences (Usman et al., 2025). Through this approach, students are expected to go beyond rote memorization of concepts; instead, they should be able to understand, connect, apply, and reflect on knowledge within real-life contexts, thereby developing comprehensive competencies (Yumna, N., Zakiah, L., & Yunus, M., 2026).

Implementing in-depth learning requires support from rich learning resources and interactive media, as well as teacher competence in integrating digital technology into the instructional process (Kusumawati, Zakiah, & Yunus, 2026). One form of digital transformation undertaken by the government involves providing Digital Interactive Boards (DIBs) to various elementary schools and developing the web-based platform Rumah Pendidikan; this platform offers a wide range of digital learning resources, interactive media, instructional videos, assessments, and teaching materials that can be utilized by both teachers and students (Yulianti et al., 2025). The availability of DIBs and Rumah Pendidikan creates opportunities for teachers to foster learning experiences that are more contextual, collaborative, interactive, and student-centered. Various studies indicate that the use of digital technology integrated with instructional strategies can enhance learning motivation, student engagement, higher-order thinking skills, and the quality of learning outcomes (Al Kahfi, Utami, & Yunus, 2026).

Nevertheless, various studies indicate that the success of digital transformation in schools is not determined solely by the availability of technological devices but is heavily influenced by teachers' competence in utilizing them (Zakiah et al., 2025; Suntari et al., 2025). Teachers' digital pedagogical competence is a key factor in the successful integration of technology into instruction (Annisa, Usman, & Yunus, 2025). Training that includes hands-on practical guidance is more effective at enhancing teachers' skills than training that focuses merely on content delivery (Sundari et al., 2026; Yunus, & Dulyapit, 2026). These findings suggest that the provision of digital resources must be balanced with capacity building for teachers to ensure that technology genuinely impacts the improvement of learning quality (Syaipul et al., 2025).

Field observations, interviews, and a needs analysis conducted by the State University of Jakarta's community service team at elementary schools within the Kenanga Cluster (Jatibarang District, Indramayu Regency) revealed that most schools had received Digital Interactive Boards (PID) from the government. However, their utilization in learning activities remains suboptimal. The PIDs are primarily used as simple presentation tools rather than being fully leveraged to support interactive and in-depth learning experiences. Furthermore, most teachers lack a comprehensive understanding of the "Deep Learning" concept and are not yet accustomed to utilizing the various features and learning resources available on the Rumah

Pendidikan website.

A needs analysis also identified several priority issues facing the partners. First, teachers' understanding of the concepts, characteristics, and implementation of Deep Learning remains limited, resulting in instruction that tends to focus on content delivery. Second, teachers' proficiency in operating Digital Interactive Whiteboards varies, particularly regarding the integration of digital media into learning activities. Third, teachers lack sufficient experience in utilizing the "Rumah Pendidikan" web-based learning resource for lesson planning and implementation. Fourth, there is a lack of systematic mentoring programs to assist teachers in developing technology-based instructional materials that align with Deep Learning principles.

This situation reveals a gap between digital education transformation policies and their implementation at the school level. While the government has provided the necessary infrastructure and digital platforms, their utilization remains suboptimal due to teachers' limited competence in integrating technology with instructional strategies. This gap is consistent with findings from previous studies, which indicate that the primary challenges of digital transformation no longer lie in device availability, but rather in human resource readiness, shifts in learning culture, and the need for ongoing support. Consequently, there is a need for a community service model that goes beyond mere training in technology usage to integrate the strengthening of pedagogical competence with the practical implementation of digital technology-based instruction.

The partners for this community service activity are elementary school teachers belonging to the Kenanga Cluster in Jatibarang District, Indramayu Regency, comprising 65 teachers and 7 principals from various public elementary schools. The Kenanga Cluster was selected as a partner because it possesses characteristics representative of the implementation of digital transformation policies in elementary schools. While all the schools have received government support regarding digital facilities, there remains a need to enhance teacher competence in utilizing this technology optimally to support learning. Furthermore, as instructional leaders, principals play a strategic role in fostering a culture of technology use within their schools; thus, their involvement is crucial to the program's success.

In light of this situation, the Community Service Team from Universitas Negeri Jakarta organized a program titled "Enhancing Deep Learning through Web-Based Digital Interactive Boards from the Rumah Pendidikan Site in Elementary Schools." The program was implemented through training and mentoring activities that integrated a strengthened understanding of Deep Learning concepts, exploration of learning resources on the Rumah Pendidikan website, hands-on practice with digital interactive boards, and the development of learner-centered lesson plans. This approach was designed to ensure that participants not only grasped the concepts theoretically but were also capable of directly implementing them in classroom instruction.

The objective of this community service activity is to enhance primary school teachers' competence in understanding the concept of Deep Learning, optimize the use of the "Rumah Pendidikan" web-based

digital interactive board, and improve teachers' abilities to design and implement innovative, interactive, and learner-centered instruction. The expected contributions of this activity include enhanced professional competence among teachers, optimal utilization of government-provided digital facilities, the development of a technology-based learning culture in primary schools, and the realization of Deep Learning practices that sustainably improve the quality of students' learning experiences.

2. ISSUES AND OBJECTIVES

This community service activity was conducted based on observations, interviews, discussions, and a needs analysis involving elementary school partners within the Kenanga Cluster, Jatibarang District, Indramayu Regency. The target participants comprised 65 teachers and 7 principals from elementary schools within the Kenanga Cluster. The selection of this target group was based on the genuine need to strengthen educators' capacity to optimize the use of existing digital technologies—specifically Digital Interactive Boards (PID) and the Rumah Pendidikan web-based learning resources—to support the implementation of Deep Learning.

The primary challenge facing the partner is not merely the limited availability of technological devices, but rather the suboptimal utilization of these devices and digital learning resources within the instructional process. Although the school has acquired PID facilities, their use tends to be limited to displaying materials or presentations. The potential of PID as an interactive learning medium—capable of fostering student exploration, discussion, collaboration, problem-solving, and reflection—has not been fully realized. This situation reveals a gap between the available technological infrastructure and the teachers' pedagogical ability to integrate technology into instruction.

The second issue concerns teachers' understanding and ability to implement Deep Learning. A needs assessment indicates that teachers still require further strengthening regarding the concepts, principles, characteristics, and implementation strategies of Deep Learning within the primary school context. Instruction is not yet fully geared toward creating meaningful, mindful, and enjoyable learning experiences that enable students to grasp concepts deeply, connect knowledge to real-life contexts, apply that knowledge, and reflect on their own learning processes. This situation presents a challenge, as the shift in the learning paradigm demands not only conceptual understanding but also the ability of teachers to translate those concepts into actual lesson planning and classroom practice.

The third issue is the suboptimal utilization of learning resources on the Rumah Pendidikan website. Teachers are not yet fully accustomed to exploring, selecting, and integrating digital learning resources that align with learning objectives. The available resources have not been systematically utilized as part of learning scenarios employing PID. Yet, integrating digital learning resources with PID has the potential to enrich students' learning experiences by presenting material in ways that are more visual, interactive, contextual, and varied.

The fourth issue concerns the digital competencies of the teachers. Participants possess varying levels

of experience and technological proficiency. While some teachers are relatively accustomed to using digital devices, others still require guidance in operating the PID, accessing learning resources via Rumah Pendidikan, selecting appropriate content, and integrating this technology into their instruction. This diversity in competence results in varying rates of adaptation among participants; consequently, the community service activity requires a training approach that is practical, collaborative, and phased, while also incorporating ongoing guidance.

The fifth issue is the lack of adequate practical experience in designing technology-based instruction that aligns with the principles of Deep Learning. It is insufficient for teachers merely to understand the functions of the PID or the existence of the Rumah Pendidikan; they must also be able to link these technologies with learning objectives, learner characteristics, subject matter, learning activities, assessment, and reflection. Consequently, the partners' needs encompass the strengthening of knowledge, technical skills, and pedagogical skills, as well as the ability to integrate these three elements within instructional practice.

To address these issues, a community service activity was designed to meet the partners' needs through training and mentoring on the use of the "Rumah Pendidikan" website-based Digital Interactive Board (PID) to support Deep Learning. The program not only fosters an understanding of Deep Learning concepts but also provides participants with hands-on experience in accessing and exploring "Rumah Pendidikan" learning resources, operating the PID, selecting resources aligned with learning objectives, and developing lesson plans that meaningfully integrate digital technology.

The primary target group for the main activities consists of 65 elementary school teachers from the Gugus Kenanga cluster who are responsible for classroom instruction. Teachers are the primary focus due to their direct role in designing, implementing, and conducting the learning process. In addition to teachers, seven school principals are included as strategic targets, given their crucial role in supporting the sustained use of technology, fostering a culture of teacher learning, providing institutional support, and encouraging the adoption of best practices within their respective schools.

Given these target characteristics, the program is expected to bring about changes at three levels. At the individual level, teachers are expected to gain a better understanding of and improved skills in implementing Deep Learning, as well as in utilizing PID and Rumah Pendidikan. At the school level, principals are expected to be capable of supporting the creation of a digital learning ecosystem and a culture of teacher collaboration. At the instructional level, the program is expected to foster learning experiences that are more interactive, contextual, meaningful, and learner-centered.

The challenges faced by the target community are directly addressed by the design of the community service activities. Limited understanding of Deep Learning is tackled through the reinforcement of concepts and strategy implementation; suboptimal use of the PID (Digital Learning Platform) is addressed through practical training on its usage; low utilization of the Rumah Pendidikan is met with the exploration and practical application of digital learning resources; and teacher competence is enhanced through mentoring,

hands-on practice, peer collaboration, and follow-up on implementation. This approach aims not merely to generate a momentary increase in knowledge but to build the capacity of teachers and schools to utilize digital technology sustainably in support of Deep Learning at the elementary school level.

3. METHOD

3.1. Approach and Types of Activities

This community service activity employs a participatory approach involving training, mentoring, empowerment, and technology transfer. The approach is tailored to the needs of 65 teachers and 7 school principals belonging to the Kenanga Cluster in Jatibarang District, Indramayu Regency—specifically regarding enhancing their competence in utilizing Digital Interactive Boards (PID) and the Rumah Pendidikan website to support Deep Learning..

The training began by reinforcing the understanding of the concepts and implementation of Deep Learning. Subsequently, participants received demonstrations and hands-on practice in accessing and utilizing Rumah Pendidikan learning resources via PID. Participants were also guided in integrating digital learning resources into lesson plans that are interactive, contextual, and learner-centered.

The activities comprise (1) material presentation, (2) reflection on the use of PID and Rumah Pendidikan, (3) hands-on practice by participants, (4) guidance on lesson plan development, and (5) reflection and evaluation. This approach is designed to ensure that participants not only understand the technology theoretically but are also capable of applying it practically in instruction.

Through this approach, the activities are expected to enhance teachers' competence in understanding Deep Learning, optimize the use of PID and Rumah Pendidikan, and develop learning experiences that are more meaningful, interactive, contextual, and learner-centered.

3.2. Location and Participants

This community service activity was conducted in Jatibarang District, Indramayu Regency, in partnership with the Gugus Kenanga cluster, which oversees several elementary schools in the area. The location was selected based on the need to enhance Teachers serve as the primary participants throughout the training series, which covers reinforcing concepts of Deep Learning, an introduction to Rumah Pendidikan, practical application of PID, and the development of lesson plans. Meanwhile, school principals play a role in supporting the implementation and adoption of the technology within their respective schools.the implementation of Deep Learning.

The activity involved 72 participants, comprising 65 elementary school teachers and 7 school principals affiliated with the Kenanga Cluster. The participants possessed diverse teaching backgrounds and varying levels of digital competence. These factors were taken into account when structuring the activity, which employed an approach based on hands-on practice, mentoring, and collaboration among participants.

Participant engagement is active and participatory, involving discussions, reflection, hands-on practice, working groups, the development of lesson plans, and reflection on the activity outcomes. Consequently, participants are not merely recipients of information but are actively involved in a skill-development process that can be applied to instruction in their respective schools.

3.3. Implementation Stages

The community service activity was conducted in three main stages: preparation, implementation, and follow-up. Each stage was systematically designed to ensure the activity not only enhanced participants' understanding but also fostered teachers' ability to implement Deep Learning supported by Digital Interactive Boards and the Rumah Pendidikan website.

3.3.1. Preparation Stage

The preparation stage took place prior to the training sessions and involved coordination with partners, needs assessment, participant selection, and the development of training materials and tools. The service team communicated with the Gugus Kenanga administrators and partner schools to assess the teachers' initial competency levels, the availability of DIBs, and the participants' needs regarding the use of Rumah Pendidikan. Based on these findings, training materials were developed covering the concepts of Deep Learning, the utilization of Rumah Pendidikan, the use of DIBs, and the integration of technology into instruction.

3.3.2. Implementation Phase

The implementation phase constitutes the core activity, carried out through material presentation, resonance sessions, hands-on practice, and mentoring. Participants gain an understanding of the "Deep Learning" concept and are introduced to learning resources available via the Rumah Pendidikan website. The service team then demonstrates the use of PID and guides participants in hands-on practice. Teachers also receive guidance on integrating digital learning resources and PID into lesson plans that are interactive, contextual, and learner-centered.

3.3.3. Follow-up Phase

The follow-up phase takes place after the training and involves reflection, evaluation, and reinforcement of the training outcomes. Participants are given the opportunity to share their experiences and the challenges encountered during practice. The service team provides feedback on the developed lesson plans and encourages teachers to apply the training outcomes in their respective schools. School principals are involved to support the continued use of PID and Rumah Pendidikan, as well as to encourage the sharing of best practices within the school environment.

3.4. Tools, Media, or Materials

The tools, media, and materials used in this community service activity are aligned with the training objective: to enhance teachers' ability to implement Deep Learning through the use of Digital Interactive

Boards and the Rumah Pendidikan website. Key equipment includes Digital Interactive Boards, laptops or computers, an internet connection, a projector as a supporting device, and the participants' own digital access devices.

Training materials comprise Deep Learning modules, guides on using Rumah Pendidikan and DIBs, participant worksheets, and sample lesson plans. The materials are designed with a practical focus, enabling participants to immediately explore digital learning resources and integrate them into primary school learning activities.

The digital media employed consist of the Rumah Pendidikan website as a learning resource and the DIB as an interactive medium within the learning process. Participants are guided to access, select, and utilize learning resources relevant to learning objectives, and subsequently integrate them into lesson plans that are meaningful, interactive, and contextual.

Several instruments were used to measure the activity outcomes: (1) pre-tests and post-tests to assess changes in participants' understanding of Deep Learning and technology utilization; (2) practical observation sheets to evaluate participants' skills in using PID and Rumah Pendidikan; (3) lesson plan assessment sheets; and (4) activity evaluation questionnaires to gather participant feedback on the training materials, methods, media, and implementation.

The use of these various tools and instruments enabled a comprehensive evaluation, assessing not only gains in knowledge but also practical skills and the participants' readiness to apply the training outcomes in their schools.

3.5. Monitoring and Evaluation

Monitoring and evaluation were conducted systematically and continuously to assess the implementation of activities and changes in participants' knowledge and skills following the training. The evaluation involved 65 teachers and 7 school principals belonging to the Kenanga Cluster in Jatibarang District, Indramayu Regency.

Monitoring took place throughout the activities, focusing on participant engagement, active participation in discussions, proficiency in using the Digital Interactive Board (PID), and the ability to access and utilize learning resources from the Rumah Pendidikan website. The service team utilized observation sheets to record participants' progress during the sessions and practical exercises.

Evaluation of outcomes was conducted using pre-tests and post-tests. A pre-test was administered prior to the training to assess participants' baseline knowledge, while a post-test was given afterward to measure improvements in understanding regarding Deep Learning, the use of the PID, and Rumah Pendidikan. Changes in results were analyzed by comparing the average pre-test and post-test scores.

In addition to assessing knowledge, the evaluation included an assessment of practical skills and lesson plans. Participants were evaluated based on their ability to operate the PID, access and select Rumah Pendidikan learning resources, and integrate these resources into lesson plans that support Deep Learning.

The evaluation process was conducted through participant response questionnaires and discussions/reflection sessions. Questionnaires were used to gather information regarding the relevance of the material, training methods, quality of mentoring, ease of using the media, and the benefits of the activity for participants. Discussions and reflection sessions served to identify challenges and the need for further mentoring.

Program effectiveness was determined based on three key indicators: (1) knowledge improvement, demonstrated by comparing pre-test and post-test scores; (2) skill enhancement in using the PID and Rumah Pendidikan, based on observations of practical application; and (3) implementation readiness, based on the quality of lesson plans and participant feedback. The evaluation results subsequently served as the basis for determining mentoring needs and program improvements for the next stage.

Through this mechanism, the evaluation not only measures the success of the training implementation but also assesses the extent to which the activities foster improvements in teacher competence and readiness to implement Deep Learning—supported by PID and Rumah Pendidikan—in primary school instruction.

4. RESULTS AND DISCUSSION

4.1. Implementation of Community Service Activities

This community service activity was conducted to enhance the capacity of elementary school teachers in implementing Deep Learning through the use of Digital Interactive Boards (DIB) and Augmented Reality (AR)-based media within the Rumah Pendidikan learning resources. The core activities took place over two days—July 27–28, 2026—at UPTD SDN 02 Jatibarang, Indramayu Regency, involving 65 participants comprising school principals and elementary school teachers from across the Jatibarang District.



Figure 1. Participants in the PKM training in Jatibarang District, Indramayu Regency.

The activity began with an introductory session for partners, followed by training, hands-on practice with technology, mentoring, and evaluation. Training topics covered asset-based thinking in school development, the concept of Deep Learning, learning assessment, and the use of Rumah Pendidikan based learning resources via the Digital Inspiration Platform (PID).

The training employed interactive and collaborative methods. Participants did not merely receive theoretical material; they were organized into groups to discuss the content, create mind maps, present their work, and share experiences regarding implementation in their respective schools. Participants also had the opportunity to gain hands-on experience with Rumah Pendidikan based learning resources, utilizing them as interactive and contextual instructional media.

These findings indicate that the community service process has shifted from a one-way knowledge transfer model toward "learning by doing" and collaborative learning. This approach is relevant to the development of teachers' digital competencies, as integrating technology requires more than just introducing devices; it necessitates practical experience, peer support, and mentoring. Systematic studies on technology-based teacher professional development also show that effective training tends to combine hands-on experience, collaborative learning, ongoing mentoring, and institutional support.

4.2. Enhanced Understanding of Deep Learning

One of the program's key achievements was improving participants' understanding of the concepts and implementation of Deep Learning. According to progress reports, all participants received materials covering Deep Learning concepts and their application in primary school instruction; consequently, the target for this aspect was deemed to have been fully met (100%).

Reinforcing the concept is crucial because Deep Learning should not be understood merely as the use of technology or learning involving a greater volume of material. Consistent with research by Renata, Sarifah, and Yunus (2025), this approach focuses on learning experiences that are attentive, meaningful, and joyful; consequently, learners do not simply receive information but grasp its significance, connect knowledge to context, and actively engage in the learning process. Recent literature also positions Deep Learning as a pedagogical approach oriented toward learning experiences that are holistic, reflective, and meaningful, aligning with 21st-century learning needs (Nurita et al., 2024).

Participants begin to translate this understanding into practice through discussions, mind mapping, presentations, and the sharing of learning experiences. Thus, achieving a 100% success rate in conceptual reinforcement is realized not only through the delivery of material but also through participant engagement in activities that foster the construction of meaning and reflection on instructional practices.

4.3. Utilization of Digital Interactive Boards and Augmented Reality

The next achievement relates to enhancing teachers' proficiency in using Digital Interactive Boards (DIBs). Reports indicate that teachers have undergone training and practical sessions on utilizing DIBs for instruction, with an interim achievement rate of 90%. Regarding the use of AR-based media, the

achievement rate also reached 90%, evidenced by participant engagement in hands-on practice with AR-based learning resources available on the Digital Inspiration Platform.

These results demonstrate that the initiative successfully narrowed the gap between technology availability and the ability to utilize it effectively. Prior to the activity, a key issue faced by the partner was the suboptimal use of DIBs and "Rumah Pendidikan" learning resources. Following the training, teachers moved beyond merely being introduced to the device's functions; they gained direct experience exploring DIB features, accessing AR learning resources, and discussing potential ways to integrate these tools into their teaching.

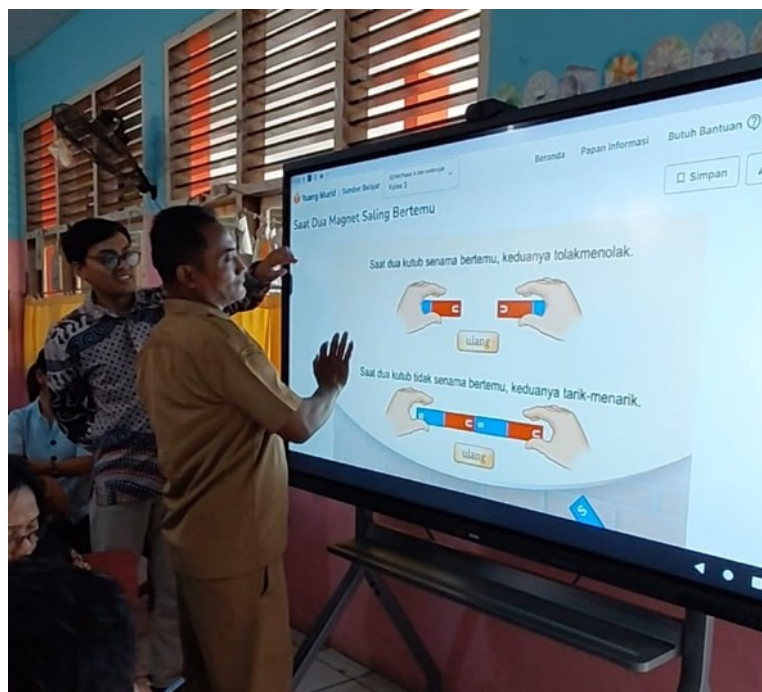


Figure 2. Training participants practicing the use of the PID.

These findings align with research by Maharani, Usman, & Yunus (2025), which indicates that the use of interactive whiteboards (PID) by K–12 teachers is influenced by facilitating conditions, habits, motivation, and usage intensity. According to Adibah et al. (2024), merely providing the equipment does not guarantee optimal utilization; teachers require facilitating conditions and effective usage experiences.

17 The use of the Rumah Pendidikan website also holds pedagogical relevance, as it enables learning materials to be visualized in a more concrete and interactive manner. Studies on the use of the Rumah Pendidikan website in instruction demonstrate its potential to provide additional visualizations, support collaborative learning, and help students engage with concepts that are difficult to represent through conventional media (Fadhilah, Wardatussa'idah, & Yunus, 2025). However, the effectiveness of the Rumah Pendidikan website ultimately depends on instructional design and user readiness, rather than solely on technological sophistication.

The primary contribution of this activity lies not only in enhancing teachers' technical skills in

operating the PID and the Rumah Pendidikan website but also in beginning to build pedagogical-technological competence—specifically, the ability to link technology with learning objectives and activities.

4.4. Ability to Design Technology-Based Instruction

Regarding the ability to design technology-based instruction, the interim achievement level stands at 80%. Teachers have participated in discussions, practical exercises, and the drafting of technology-based lesson plans, although full classroom implementation is still underway.

This 80% achievement indicates that the transfer of competence is shifting from the stages of understanding and technical skill toward pedagogical integration. However, it also signals that teachers still require guidance to fully develop lesson plans and implement them in real classroom settings.

These findings are significant because digital technology in instruction is often still utilized for teacher-centered purposes—such as serving merely as a presentation tool. Systematic studies on digital technology integration demonstrate that technology use in schools is a complex process influenced by teacher competence, leadership, strategic planning, professional collaboration, and school culture (Simbolon et al., 2024).

Therefore, the use of PID in this initiative is intended not merely to replace conventional whiteboards, but to serve as a medium supporting exploration, discussion, visualization, collaboration, and reflection. Integration with the Rumah Pendidikan learning resources offers teachers the opportunity to present more contextual material and enables students to interact more actively with learning resources.

4.5. Participant Participation and Collaboration

Beyond competency attainment, the activities demonstrated a high level of participant engagement. Teachers and school principals actively participated in discussions, asked questions, shared experiences, created mind maps, delivered presentations, and experimented with the Rumah Pendidikan website-based learning media. Activity reports indicate that these activities facilitated knowledge transfer and fostered teacher readiness to implement the training outcomes in the classroom.

Collaboration among participants was a key strength of the program. According to Suneki, Hadi, and Yunus (2022), teachers with greater technological proficiency can assist peers who are still facing difficulties. This strategy was further reinforced through the formation of heterogeneous groups and the provision of individual mentoring (Yunus et al., 2025).

This collaborative approach has significant implications for the program's sustainability. Teacher competency development becomes more sustainable when schools do not rely solely on external training but instead establish mechanisms for sharing best practices through professional communities. This aligns with findings by Hadi et al. (2022), which suggest that technology-based professional development is more likely to drive change when combined with mentoring relationships and socio-professional support, rather than merely providing digital materials.

4.6. Program Achievements and Interim Impact

Overall, most targets for the initial phase have been met. Table 1 shows that the implementation of training and mentoring, as well as the improvement in understanding of Deep Learning, reached 100%. Utilization of the PID and the Rumah Pendidikan website each reached 90%, and the ability to design technology-based instruction reached 80%, while the partnership network between Universitas Negeri Jakarta and partner schools reached 100%.

Table 1. Interim Achievements of the Community Service Program

No.	Performance Indicators	Achievements
1	Training and mentoring for teachers/principals	100%
2	Understanding of Deep Learning concepts	100%
3	Competence in utilizing PID	90%
4	Skills in utilizing the Rumah Pendidikan Web	90%
5	Ability to design technology-based instruction	80%
6	Partnership network between UNJ and partner schools	100%

Source: Data from the 2026 Community Service Team.

The data reveal an interesting pattern of achievement. The conceptual aspects and program feasibility achieved the highest scores, whereas the ability to design technology-based instruction scored relatively lower. This suggests that while participants grasped basic concepts and skills relatively quickly, they required more time to translate these skills into fully developed instructional materials and practices.

These findings align with the realities of the community service implementation. Variations in digital literacy competence, limited experience with the "Rumah Pendidikan" web-based platform, and time constraints during training meant that some participants still required ongoing guidance.

The program's success at this stage should be viewed as an improvement in initial capacity and implementation readiness, rather than definitive proof of enhanced instructional quality or improved student learning outcomes. The report also emphasizes that the program is still in its early stages; consequently, its impact on the learning process and student outcomes cannot yet be comprehensively measured.

4.7. Program Challenges and Adaptive Responses

The implementation of activities encountered three main challenges: variations in participants' digital literacy competencies, limited experience using the Rumah Pendidikan website-based PID (Digital Learning Platform), and time constraints.

To address competency variations, the team implemented differentiated and collaborative learning strategies, utilizing heterogeneous small groups, individual mentoring, and step-by-step demonstrations. To overcome limited technological experience, a "learning-by-doing" approach was adopted, wherein participants directly explored PID features, accessed learning resources on the Rumah Pendidikan website, and attempted to integrate these tools into lesson scenarios. Meanwhile, time constraints were managed by

prioritizing essential content and deferring topics requiring in-depth study—such as the development of instructional materials and teaching practice—to a subsequent mentoring phase.

These adjustments demonstrate the program's application of adaptive professional development principles. Methods were not rigidly maintained but were instead tailored to the participants' actual circumstances. Adjustments—including scaffolding, small-group mentoring, individual consultations, and extended practice time—served as responses to the participants' diverse needs.

This is significant because one-off technology training sessions risk resulting in only temporary technical proficiency. Literature on technology-based teacher professional development in low- and middle-income countries highlights the importance of sustainability, facilitator support, and human connection within the mentoring process.

4.8. Program Implications and Sustainability

The activity results indicate that the training has established a solid foundation for the subsequent implementation phase. Identified interim impacts include teachers' improved understanding of Deep Learning, enhanced competence in utilizing PID, increased skills in using the Rumah Pendidikan website, improved ability to design technology-based instruction, greater teacher collaboration, and increased motivation to innovate in teaching.

This initial competence enhancement must be followed by actual classroom implementation. Therefore, the next phase focuses on providing guidance for developing Deep Learning instructional materials, classroom implementation, monitoring and evaluation, impact assessment, and strengthening teacher learning communities.

This strategy aligns with research evidence showing that effective teacher professional development requires a continuous process involving hands-on practice, mentoring, collaboration, and institutional support. In the context of the Gugus Kenanga cluster, the involvement of school principals, Teacher Working Groups (KKG), and school clusters serves as a vital mechanism for sustaining the use of PID and Rumah Pendidikan learning resources after the community service program concludes.

Overall, the academic contribution of this activity lies in the simultaneous integration of three components: strengthening Deep Learning pedagogy, utilizing PID, and exploring AR-based learning resources via Rumah Pendidikan. Consequently, technology is positioned as part of the pedagogical strategy rather than as the learning objective itself. This approach enhances the potential for creating learning experiences that are more visual, interactive, contextual, and learner-centered.

5. CONCLUSION

The community service activity titled "Strengthening Deep Learning through Digital Interactive Boards and 'Rumah Pendidikan' Learning Resources in Elementary Schools" was successfully conducted to enhance teachers' capacity to utilize digital technology in support of learning that is more meaningful,

interactive, and student-centered. Involving elementary school teachers and principals in Jatibarang District, Indramayu Regency, the activity successfully strengthened their understanding of Deep Learning concepts and provided foundational skills in using Digital Interactive Boards (PID) and "Rumah Pendidikan" learning resources.

The training—delivered through presentations, demonstrations, hands-on practice, discussions, and mentoring—encouraged participants not only to understand the technology's functions but also to begin integrating it with instructional needs. Utilizing PIDs in conjunction with "Rumah Pendidikan" resources enabled teachers to create learning experiences that are more visual, interactive, and contextual, thereby fostering active student engagement. Thus, the program has made an initial contribution toward bridging the gap between the availability of educational technology and teachers' ability to utilize it effectively from a pedagogical standpoint.

However, as the activity remains at the initial capacity-building stage, the long-term impact on changes in teaching practices and student learning outcomes cannot yet be determined. Therefore, the program's continuity should focus on classroom implementation support, the development of PID- and "Rumah Pendidikan"-assisted Deep Learning materials, the monitoring of instructional practices, and the strengthening of teacher learning communities. These efforts are essential to ensure that technology utilization moves beyond mere technical proficiency and evolves into sustainable pedagogical practice that supports Deep Learning in elementary schools.

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