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Teacher Empowerment through Artificial Intelligence-Based LMS Training for Deep Learning

Cindy Atika Rizki[1*], Nabila Khairuniza[2], Mel Wulandini[3]

[1,2,3]Sains Komputansi dan Kecerdasan Digital, Teknologi Informasi, Universitas Pembangunan Panca Budi, Medan, Indonesia

Email: [1*]cindyatika100e@gmail.com, [2]nabilakhairuniza2@gmail.com, [3]melwulandini1@gmail.com

Corresponding Author: cindyatika100e@gmail.com

Abstract - *The rapid advancement of digital technology requires teachers to develop competencies in utilizing innovative learning technologies to support student-centered instruction. However, the adoption of Learning Management Systems (LMS) and Artificial Intelligence (AI) in educational practice remains limited due to insufficient digital competencies among teachers. This community service program aimed to enhance teachers' digital competencies through AI-based LMS training to support the implementation of Deep Learning. The program was conducted through several stages, including preparation, partner coordination, material development, training implementation, mentoring, monitoring, and evaluation. The training combined lectures, demonstrations, hands-on practice, and continuous mentoring to strengthen participants' knowledge and practical skills in using AI-supported LMS platforms. Program effectiveness was evaluated using pretests, posttests, observations, and participant questionnaires. The results demonstrated a significant improvement in teachers' understanding and skills in managing digital classrooms, developing instructional materials, creating technology-supported assessments, and utilizing AI to generate learning content and provide feedback more efficiently. Furthermore, the mentoring phase increased teachers' confidence in integrating AI-based LMS into daily teaching practices. Overall, the program successfully strengthened teachers' digital competencies and promoted the implementation of deep learning through technology-enhanced instruction. These findings indicate that AI-based LMS training is an effective community empowerment strategy for supporting sustainable digital transformation and improving the quality of teaching and learning in schools.*

Keywords: *Artificial Intelligence; community service; deep learning; digital competence; Learning Management System.*

1. INTRODUCTION

Digital transformation in the world of education has driven a change in the learning paradigm towards a more adaptive, collaborative, and student-centered process (Amelia, 2023). The development of information technology, especially artificial intelligence (AI), presents various opportunities to improve the quality of learning through the use of technology that is able to support material personalization, evaluation automation, and the provision of feedback quickly and accurately (Wahyuni et al., 2025). On the other hand, the deep learning policy that has begun to be implemented in the Indonesian education system requires teachers to design meaningful learning experiences, encourage critical thinking, creativity, collaboration, and problem-solving skills (Riska & Dwi Puspita, 2025). This condition makes mastery of digital technology, especially Learning Management Systems (LMS) integrated with AI, a competency that teachers need to possess (Uyun Thayyibah et al., 2025).

The Learning Management System (LMS) has developed into one of the main platforms in supporting the management of the learning process (Aziz et al., 2024). LMS not only functions as a medium for distributing materials and assignments, but is also able to integrate various AI-based features, such as learning content preparation, learning outcome analysis, automatic feedback, question creation, and learning activity recommendations that suit the needs of students (Zai et al., 2024). This integration allows teachers to manage learning more effectively while improving the quality of learning interactions (Zauabi et al., 2025). Thus, the use of AI-based LMS is one of the relevant strategies in supporting the implementation of deep learning (Mustoip et al., 2023).

Although various LMS platforms are available and easily accessible, their implementation in the school environment still faces various challenges (Purnomo et al., 2025). Some teachers still use LMS as a medium for storing materials and collecting assignments, so they have not taken advantage of features that support active and student-centered learning (Sulistyowati & Asriati, 2024). In addition, understanding of the use of AI in learning is also still relatively limited. Many teachers do not have the skills to use AI effectively and are responsible for

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designing learning materials, compiling authentic assessments, and analyzing student learning development (Ester Novi Kurnia Zebua & Nofamataro Zebua, 2024). This condition shows that there is a gap between technological developments and teachers' digital competencies (Laily Yunita Susanti et al., 2025).

Improving teacher competence is one of the important factors in realizing a sustainable educational transformation (Sustiana et al., 2025). Teachers are not only required to be able to operate technology, but also understand pedagogical strategies that are in accordance with the characteristics of 21st century learning (Kusnadi, 2024). Therefore, empowerment programs through training and mentoring are an effective approach to improve teachers' ability to integrate technology into the learning process. Training accompanied by hands-on practice and ongoing mentoring provides opportunities for teachers to develop skills, gain real experience, and overcome various obstacles faced during classroom implementation (MASKUR, 2023).

The empowerment approach in community service activities is oriented towards increasing target capacity through a participatory process that produces real and sustainable impacts (Kamuli et al., 2023). In the context of education, teacher empowerment not only focuses on knowledge transfer, but also builds independence, confidence, and teachers' ability to develop learning innovations in accordance with school needs. Through AI-based LMS training, teachers are expected to be able to design more interactive, adaptive, and meaningful learning to support the achievement of deep learning goals.

This community service program is designed to answer teachers' needs for improving digital competencies through AI-based LMS training. Activities include needs analysis, delivery of materials on deep learning concepts, introduction of AI features in LMS, practice of preparing materials and digital assessments, implementation assistance in the classroom, and evaluation through pretest and posttest. This approach is expected not only to improve teachers' knowledge and skills, but also to produce real changes in learning practices in schools.

The advantage of this program compared to similar training activities lies in the integration of three main aspects, namely the use of LMS, the use of artificial intelligence as a learning support, and the application of deep learning principles in the learning process. The combination of these three aspects is expected to be able to produce a more effective, innovative, and sustainable model of teacher empowerment. In addition, the success of the program is measured through increasing the competency of participants based on the results of pretest and posttest, the level of skill in utilizing AI-based LMS, and the implementation of training results in learning activities. Based on this description, this community service activity aims to improve teachers' digital competence through artificial intelligence-based Learning Management System training to support the implementation of deep learning. Through this program, it is hoped that teachers will have the ability to design, manage, and evaluate learning more effectively by utilizing digital technology, so as to create an innovative, student-centered learning process, and have a positive impact on improving the quality of education in a sustainable manner.

2. IMPLEMENTATION METHOD

This community service activity uses participatory training and mentoring methods that aim to improve teachers' competence in utilizing the Artificial Intelligence/AI-based Learning Management System (LMS) to support the implementation of deep learning. The implementation method is systematically prepared from the preparation stage to evaluation so that participants gain conceptual understanding as well as practical experience in implementing AI-based LMS in the school environment. The stages of implementing the activity are presented in Figure 1.

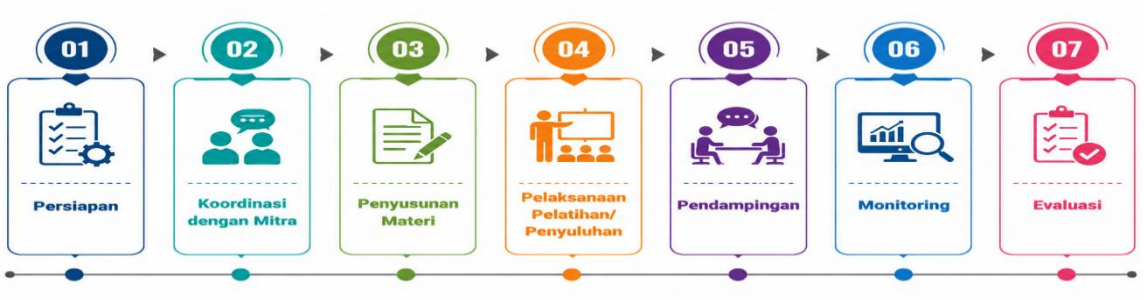


Figure 1. Stages of implementation method

2.1 Preparation

The preparation stage is carried out to ensure that all activity needs are available before the implementation of the training. Activities include preparing schedules, forming an implementation team, preparing administration, identifying hardware and software needs, as well as preparing pretest, posttest, and evaluation instruments for activities. In addition, an initial survey was conducted to determine the level of teachers' understanding of LMS and the use of AI in learning.

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2.2 Coordination with Partners

Pada tahap ini dilakukan koordinasi dengan pihak sekolah sebagai mitra pengabdian. Koordinasi bertujuan menyepakati jadwal kegiatan, jumlah peserta, fasilitas pendukung, serta materi yang akan diberikan. Diskusi dengan mitra juga dilakukan untuk mengidentifikasi permasalahan yang dihadapi guru dalam mengimplementasikan pembelajaran digital sehingga materi pelatihan sesuai dengan kebutuhan peserta.

2.3 Material Preparation

The training materials are prepared based on the results of the analysis of teacher needs. The material includes the concept of deep learning, introduction to the Learning Management System, the use of AI features in the LMS, the preparation of digital learning materials, the creation of AI-based assessments, and the implementation strategy of LMS in the learning process. All materials are packaged in the form of presentations, modules, and hands-on practice.

2.4 Implementation of Training/Counseling

The implementation of the training is carried out through interactive lectures, demonstrations, discussions, and hands-on practice. Participants are given an understanding of the concept of deep learning and how to use AI-based LMS to create digital classes, upload materials, compile quizzes, utilize AI in the preparation of learning content, and manage student learning activities. Before the training is carried out, participants do a pretest, while after the training they are given a posttest to measure the improvement in understanding.

2.5 Mentoring

After the training, participants receive direct assistance during the LMS implementation process at school. The mentoring aims to help teachers overcome technical and pedagogical obstacles when implementing AI-based LMS in learning. The service team provides consultation, feedback, and solutions to problems that arise during the implementation process.

2.6 Monitoring

Monitoring is carried out to determine the success rate of the implementation of the training results. Monitoring activities are carried out through observation of the use of LMS, documentation of learning activities, interviews with participants, and assessment of the learning products that have been developed. The results of monitoring are used as a basis to determine the level of program achievement and sustainability of implementation.

2.7 Evaluation

Evaluation is the final stage that aims to measure the effectiveness of service activities. Evaluation is carried out through analysis of pretest and posttest results, participant satisfaction questionnaires, observation of skills in using AI-based LMS, and reflective discussions with partners.

The results of the evaluation are used to determine the improvement of teacher competence, identify the strengths and weaknesses of the program, and prepare recommendations for the implementation of the next service activities. Thus, the program not only provides an increase in knowledge, but also produces a real impact on the implementation of deep learning in schools.

3. RESULT AND DISCUSSION

This community service activity was carried out to improve teachers' competence in utilizing the Artificial Intelligence/AI-based Learning Management System (LMS) as a support for the implementation of deep learning. The entire series of activities includes training, practice, mentoring, monitoring, and evaluation designed to provide a comprehensive learning experience to participants.

The results of the activity showed an increase in teachers' knowledge, skills, and readiness to integrate digital technology into the learning process. In addition, the implementation of AI-based LMS makes it easier for teachers to compile materials, develop assessments, manage digital classrooms, and create more interactive and student-centered learning. The results obtained are then analyzed to determine the effectiveness of the service program and its impact on improving teachers' digital competence.

3.1 Implementation of Activities

Community service activities were carried out at partner schools by involving teachers from various fields of study as training participants. The program began with participant registration and the implementation of a pretest to identify the initial level of understanding of the Learning Management System (LMS), the use of artificial intelligence (AI), and the concept of deep learning. Furthermore, the service team delivered material on digital learning transformation, the use of LMS as a learning medium, and the application of AI in supporting the preparation of teaching materials, assessments, and learning evaluations.

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After the delivery of the material, participants participated in practical sessions which included creating digital classrooms, managing students, preparing learning materials, creating LMS-based quizzes, and utilizing AI features to produce materials, questions, assessment rubrics, and automatic feedback. The activity took place interactively through discussions, demonstrations, and hands-on practice so that participants could apply each material provided. The final stage of the activity was in the form of assisting the implementation of AI-based LMS in the classroom learning process. Mentoring was carried out in person and online to help participants overcome various technical and pedagogical obstacles during implementation.

3.2 Training Results

The implementation of the training showed an increase in teachers' digital competence after participating in the entire series of activities. Based on the results of the pretest and posttest, most of the participants experienced an increase in understanding of LMS concepts, the use of AI in learning, and the implementation of deep learning.

Tabel 1. Hasil pretest dan Posttest peserta

Indicator	Pretest (%)	Posttest (%)
LMS Understanding	56	90
Utilization of AI	42	87
Preparation of Digital Materials	51	89
Digital Classroom Management	58	92
Implementation of Deep Learning	47	88

Table 1 shows that all indicators have experienced a significant increase. The biggest improvement occurred in the ability to utilize AI in learning. Before the training, most teachers had never used AI as a learning support, while after the training, participants were able to utilize various AI features to produce learning materials, questions, and media more effectively.

3.3 AI-Based LMS Implementation

After participating in the training, teachers successfully developed digital classrooms using LMS that has been integrated with various learning support features. Each teacher is able to create a virtual classroom, upload teaching materials, organize learning activities, compile online quizzes, and provide assessments to students digitally.

In addition, teachers are starting to utilize AI technology to accelerate the preparation of learning tools. AI is used as a tool in compiling learning objectives, producing sample questions, creating assessment rubrics, compiling material summaries, and providing feedback on students' work results. However, participants were also given the understanding that the results of AI outputs need to be re-verified to keep them in line with learning outcomes and student characteristics. This approach is able to increase teachers' time efficiency in preparing learning so that they have a greater opportunity to design creative and student-centered learning activities.

3.4 Mentoring Results

The mentoring shows that most teachers have been able to implement AI-based LMS independently. Teachers not only use LMS as a medium to store materials, but also use it to manage learning activities, conduct assessments, provide feedback, and monitor student learning progress.

During the mentoring process, several obstacles were still found, including limited internet networks, differences in digital capabilities between teachers, and adaptation to the use of AI features. These obstacles were overcome through direct consultation, the provision of training modules, video tutorials, and follow-up mentoring so that participants could implement the LMS optimally.

3.5 Discussion

The results of the activity showed that training and mentoring had a positive impact on improving teachers' digital competence. This improvement can be seen from the ability of participants to manage digital classrooms, compile learning materials, utilize AI as a learning support, and implement deep learning principles in the teaching and learning process.

Training that combines material delivery, hands-on practice, and mentoring has proven to be more effective than training that is only oriented towards theoretical delivery. Through hands-on practice, teachers gain real-world experience in operating LMS and utilize AI to solve various learning needs. Post-training mentoring is also an important factor in ensuring the sustainability of implementation in schools.

The integration of AI into the LMS provides added value for teachers in improving the efficiency of the preparation of learning tools, speeding up the evaluation process, and producing a more personalized learning experience for students. However, the use of AI must still consider the ethics, validity of information, and the ability of teachers to verify every result produced by the AI system.

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This service program also supports the implementation of deep learning that emphasizes students' active involvement, critical thinking skills, creativity, collaboration, and problem-solving. AI-based LMS is an effective medium to create a learning environment that is more interactive, flexible, and adaptive to the needs of students.

Overall, the service activities succeeded in achieving the goal that has been set, namely improving teachers' digital competence in utilizing artificial intelligence-based LMS to support deep learning. This success is shown through the improvement of pretest and posttest results, teachers' ability to develop digital classrooms, and the implementation of AI-based LMS in learning activities in schools. This program has the potential to be replicated in other schools as one of the strategies to accelerate digital education transformation and improve the quality of continuous learning.

4. CONCLUSION

Community service activities through learning Management System (LMS) training based on artificial intelligence (AI) have succeeded in achieving the goal that has been set, namely improving teachers' digital competence in supporting the implementation of deep learning. The program is carried out through the stages of preparation, coordination with partners, material preparation, training, mentoring, monitoring, and evaluation to provide a comprehensive learning experience to participants. The results of the evaluation show that there is an increase in teachers' knowledge and skills in operating LMS, developing digital classrooms, compiling learning materials, making assessments, and utilizing AI features to support a more effective, efficient, and innovative learning process. In addition, the assistance carried out after the training contributes to the success of LMS implementation in schools because teachers receive guidance in overcoming technical and pedagogical obstacles during the implementation of digital learning. The integration of AI in the LMS also helps teachers increase productivity in developing learning tools, providing feedback to students, and managing learning activities more systematically without reducing the role of teachers as the main facilitators in the teaching and learning process. This program not only has an impact on improving individual teacher competencies, but also encourages the creation of a technology-based learning culture that is more adaptive to the development of the digital era. Thus, this service activity provides real benefits for partner schools in strengthening the capacity of human resources in the field of educational technology while supporting the implementation of deep learning oriented towards the development of students' critical thinking skills, creativity, collaboration, communication, and problem-solving. In the future, similar activities need to be carried out on a sustainable basis with a wider scope of participants, accompanied by periodic mentoring and the development of training materials that follow the development of artificial intelligence technology so that the transformation of digital learning in the school environment can take place optimally and sustainably and have a greater impact on improving the quality of education.

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