

Utilization of AI Technology in Supporting the Optimization of Learning Principles (Mindful, Meaningful, and Joyful) in the Deep Learning Framework

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ABSTRACT

The development of Artificial Intelligence (AI) technology in education is now functioning not only as a technical tool but is also directed toward creating mindful, meaningful, and joyful learning experiences within the Deep Learning framework, although current implementations often still overlook reflective and affective aspects. This study aims to map how AI technologies can optimize mindful, meaningful, and joyful learning within deep learning frameworks by systematically analyzing their strategies, effectiveness, and implementation challenges. This study employs a Systematic Literature Review (SLR) method on 13 selected articles to map out the strategies, effectiveness, and AI features that can optimize these principles. The SLR procedure was carried out through literature identification, screening using inclusion–exclusion criteria, and the analysis–synthesis of relevant research findings. The findings indicate that the integration of AI and Deep Learning contributes significantly to creating adaptive and personalized learning through real-time feedback and the use of interactive tools such as Canva AI and Quizizz AI. Furthermore, although teacher training has been proven to improve pedagogical competence in designing AI-based learning, a gap remains between conceptual understanding and practical application in the classroom due to constraints in digital literacy and infrastructure. It is concluded that the synergy between AI and cognitivism theory is capable of realizing a reflective and empowering learning ecosystem, provided it is supported by continuous mentoring programs to address existing technical and pedagogical challenges.

Keywords: *Artificial Intelligence, Deep Learning, Joyful Learning, Meaningful Learning, Mindful Learning.*

1. INTRODUCTION

The development of AI in the field of education is beginning to create a new dimension in the teaching and learning process. Today, the use of AI is not only as an automatic correction tool or a system used for learning recommendations, but it is also starting to be directed towards creating a learning experience that is more mindful, meaningful, and joyful. These three principles are very important because they can help learners engage in deeper learning not just memorizing, but truly understanding, connecting newly acquired information with prior knowledge, and reflecting on what they have learned.

However, although the potential use of AI to support the learning process is widely recognized, its implementation in the concepts of mindful, meaningful, and joyful learning still faces several challenges. Most previous studies have focused more on technological aspects and cognitive outcomes, while affective and reflective aspects are

often overlooked. This situation makes AI-based learning often successful in improving grades or learning outcomes, but it does not necessarily enhance awareness and emotional engagement in learning. Therefore, a systematic mapping is needed on how AI implementation strategies can optimize these principles within the framework of deep learning. As an effort to address these challenges, this study aims to map out how AI technology can optimize principles of mindful, meaningful, and joyful learning in deep learning through a systematic analysis of the strategies, effectiveness, and implementation challenges.

2. METHODOLOGY

2.1. Research Design

This study uses a qualitative research approach with a Systematic Literature Review (SLR) design. This design is used to systematically map out how AI implementation strategies can optimize the principles of mindfulness, meaning, and joy within the framework of deep learning. This method aims to examine relevant literature, evaluate its effectiveness, and identify AI features that influence learning. To achieve these aims and guide the review process, three specific Research Questions (RQs) were formulated:

1. RQ1 (Strategies): What are the implementation strategies of AI technology used to support mindful, meaningful, and joyful learning principles?
2. RQ2 (Effectiveness): How effective is the utilization of AI in achieving deep learning outcomes?
3. RQ3 (Features): What specific AI features contribute most significantly to the optimization of these learning principles?

2.2. Participants of the Study

The main subjects or data in this study are scientific articles relevant to the topic of AI and deep learning integration. To ensure a comprehensive search, the data collection process utilized academic databases focusing on educational technology and regional development. The search strategy employed specific keywords and Boolean operators based on the study's key concepts:

1. Keywords: "Artificial Intelligence", "Deep Learning", "Mindful Learning", "Meaningful Learning", "Joyful Learning".
2. Search String: ("Artificial Intelligence" OR "AI") AND ("Deep Learning") AND ("Mindful" OR "Meaningful" OR "Joyful").

The initial search process yielded 30 scientific articles. From this population, a screening (filter) was conducted, resulting in a final sample of 13 articles that met the criteria for in-depth analysis.

2.3. Instruments

The main instrument used in this study was an article selection protocol based on inclusion and exclusion criteria. This instrument was applied to the 30 articles that had been searched to determine which articles were relevant and worthy of analysis. To ensure the validity of the selection, the following specific criteria were applied:

Inclusion Criteria

1. Articles published within the last 10 years (2015–2025) to capture the evolution of AI developments in education.
2. Studies explicitly discussing the integration of AI within the Deep Learning framework.
3. Research conducted within educational contexts (Elementary to Vocational levels) or teacher training programs.
4. Articles reporting on mindful, meaningful, or joyful learning principles

Exclusion Criteria

1. Articles published more than 10 years ago (before 2015).
2. Papers focusing solely on technical AI development without pedagogical application.
3. Opinion pieces or non-peer-reviewed sources.

2.4. Data Analysis Techniques

Data analysis techniques were carried out by conducting an in-depth analysis of the 13 selected articles. The data was analyzed to answer three main objectives: to identify AI technology implementation strategies, to examine the effectiveness of AI utilization on deep learning achievements, and to identify the most contributing AI features. The analysis results were then synthesized to find key findings, similarities between studies, and research gaps as directions for new studies.

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Tabel 1. Results of data collection

No.	Author (Year)	Focus and Context	Key Findings and Implications
1.	Wardani, et al. (2025)	Deep Learning elementary school materials	Conceptual understanding and critical thinking improved. Constraints: time and access to tools.
2.	Yulita, et al. (2025)	AI Training for Elementary School Teachers	The ability to design AI-based lesson plans is increasing. Challenges in authentic assessment.

No.	Author (Year)	Focus and Context	Key Findings and Implications
3.	Jainuddin, et al. (2025)	Teacher Workshop (Cianjur)	80% of participants are more confident using AI for adaptive learning.
4.	Arjaya, et al. (2025)	Health Vocational School Teaching Materials.	Teacher readiness has increased based on the principles of mindful, meaningful, and joyful learning. Digital literacy remains a challenge.
5.	Kusmiatin & Syamsi (2025)	AI in Project based Learning.	Pedagogical competence increases; theoretical and practical understanding is strengthened.
6.	Jafar & Muadiyah (2025)	High School Biology Module	There is a high gap between theoretical understanding (81.8%) and classroom practice (9.1%).
7.	Harlis, et al. (2025)	Junior High School Science Module	Teachers are able to develop Deep Learning-based modules that are relevant and effective.
8.	Mas'ud & Malik (2025)	Mathematics Module	Improving teachers' technical competence in technology-based learning innovation.
9.	Putri (2025)	AI Media (Elementary Science)	Comprehension scores increased (65 to 83) thanks to Canva, Quizizz, & Wayground AI.
10.	Haryono, et al. (2025)	Physics Module (Lamongan)	Transformation of teacher perspective & interactive module via ChatGPT & PhET.
11.	Rissi & Sinaga (2025)	Conceptual Study	AI supports personalization, but carries risks to data privacy and dependency.
12.	Togatorop (2025)	Cognitive Theory Study	Adaptive AI cognitive and diagnostic strategies strengthen the Deep Learning framework.
13.	Siagian & Sofiyah (2024)	AI in Elementary Education	Adaptive learning & fast feedback create a meaningful learning environment.

While this review provides systematic insights, several limitations are acknowledged. First, the **sample size is limited to 13 selected articles**, which may restrict the generalizability of the findings. Second, the geographical scope is predominantly focused on the Indonesian educational context (e.g., Bandung, Cianjur, Bali), as indicated by the selected studies. Finally, the time frame is restricted to very recent publications (2024-2025), which provides an up-to-date snapshot but may not capture long-term longitudinal effects of AI implementation.

3. RESULT AND DISCUSSION

A. Theoretical Study

Various previous studies have been conducted to examine the application of artificial intelligence (AI) technology and the Deep Learning approach in educational contexts, particularly in efforts to create more meaningful, conscious, and enjoyable learning. These studies indicate that the relationship between Deep Learning -based

pedagogical approaches and the use of AI technology has great potential in supporting the principles of mindful, meaningful, and joyful learning. AI makes learning more adaptive and personalized, and is also able to foster intrinsic motivation and active student engagement. The following are several studies that provide an overview of how these concepts and applications are implemented in various educational contexts and the challenges faced in their implementation.

A study entitled "The Application of a Deep Learning Approach to Support Mathematics Learning in Elementary Schools" conducted by Iwan Usma Wardani, Rifaatul Mahmudah, et al. (2025) shows that the implementation of a deep learning approach at the elementary school level has a positive impact on improving conceptual understanding, critical thinking skills, and active student engagement in the learning process. This approach focuses on creating meaningful, mindful, and joyful learning experiences, so that students not only passively receive information but also construct deep and reflective understanding.

Researchers highlight that the future of education will be increasingly linked to the integration of AI technologies to strengthen the effectiveness of deep learning approaches. This research also identified several key challenges in its implementation, such as time constraints within the curriculum, disparities in student access to digital devices, and a lack of teacher training in implementing technology-based exploratory methods. Therefore, to optimize this immersive learning approach and align it with developments in the AI era, systematic support is needed through improved digital literacy, ongoing teacher training, and strengthening educational infrastructure.

In line with the research findings, Yulita, Sukristin, and Johri Sabaryati (2025) emphasized in their research the improvement of teacher competency in implementing artificial intelligence-based deep learning. Through AI-Based Deep Learning Training in Elementary Education, this study demonstrated an improvement in teachers' ability to design Lesson Plans (RPP) integrated with AI technology, as well as a shift in more positive attitudes toward its use as a pedagogical tool. However, challenges remain in the implementation of authentic and non-cognitive assessments. Therefore, this study emphasizes the need for ongoing support and strengthening of technological infrastructure to create an adaptive learning environment and empower students according to the principles of mindful, meaningful, and joyful learning.

Research conducted by Jainuddin, Zea Zisman Usman, and Rira Jun Fineldi (2025) strengthens previous findings by demonstrating that AI-based training can significantly improve teachers' pedagogical competence. Through the Workshop on Utilizing Artificial Intelligence to Design Deep Learning at YAPIP Cianjur, 28 teachers demonstrated significant improvements in knowledge, skills, and positive attitudes toward the application of AI in learning. More than 80% of participants stated that they felt more confident using AI to develop mindful, meaningful, and joyful learning, thus

emphasizing the role of technology in creating a more adaptive and reflective learning process. This study also recommends further mentoring and replication of similar programs in other schools so that AI-based learning innovations can be implemented sustainably.

Furthermore, research conducted by Ida Bagus Arjaya, I Made Surya Hermawan, and Sang Putu Kaler Surata (2025) highlighted the success of training in developing teaching materials based on Deep Learning and Artificial Intelligence at Bali Medika Health Vocational School, Denpasar. This activity has been proven to improve teachers' understanding and readiness to implement meaningful, mindful, and joyful learning principles, while simultaneously encouraging the adoption of AI in vocational education settings. Although challenges remain regarding teachers' digital literacy, this structured training is considered effective in strengthening educators' pedagogical and technological capabilities. Researchers recommend further, more specific training per subject area so that the development of AI-based teaching modules and learning can be implemented more optimally and contextually.

Research conducted by Ari Kusmiatin and Kastam Syamsi (2025) demonstrated the success of training on the use of artificial intelligence in project-based learning (PjBL) to support the implementation of Deep Learning for Indonesian language teachers. The training results demonstrated a significant increase in teachers' pedagogical competence, as reflected in the participants' active participation and their ability to design project-based learning integrated with AI. Evaluation of the activity indicated that this training not only strengthens theoretical understanding but also enhances teachers' practical skills in creating more engaging and meaningful learning. Therefore, further training with mentoring and collaboration between teachers is recommended to ensure the continued implementation of AI in mindful, meaningful, and joyful learning.

Research conducted by Jusmiati Jafar and Afifah Afra Muadyah (2025) evaluated the implementation of the Workshop on Designing Teaching Modules with a Deep Learning Approach Using AI for High School/Islamic High School Biology teachers in Parepare City. The evaluation results revealed a significant gap between teachers' high conceptual understanding of Deep Learning (81.8%) and their low level of practical classroom implementation (9.1%). This figure shows that short-term workshops or training often only touch the surface cognitive level (knowing) but fail to change long-term instructional behavior (doing). Some factors contributing to this paradox include: (1) Time constraints in busy school schedules, which force teachers to revert to lecture methods in order to meet material targets; (2) Lack of specific guidance resources for each subject; and (3) Uneven digital infrastructure, where schools have not been able to fully access the necessary AI technology. Although most participants were satisfied with the workshop, they assessed the need for more in-depth follow-up training on

integrating AI into learning practices. These findings emphasize the need for improved technological literacy and ongoing mentoring programs to effectively implement teachers' theoretical understanding in mindful, meaningful, and joyful learning.

Research conducted by Harlis, Dara Mutiara Aswan, and Asni Johari (2025) through a Workshop on optimizing the Role of AI in Developing Deep Learning Teaching Modules for Junior High School Science Teachers in Muaro Jambi Regency demonstrated positive results in improving teacher competency. This workshop successfully encouraged teachers to utilize artificial intelligence optimally in developing Deep Learning-based teaching. This activity not only broadens teachers' insights into the application of AI in learning but also inspires them to innovate and create more effective and relevant learning processes. Thus, this activity makes a real contribution to the effort to realize meaningful, mindful, and joyful learning at the secondary education level.

Furthermore, research conducted by Mas'ud B. and Marwati Abd. Malik (2025), through a Workshop on Creating Deep Learning Teaching Modules Using AI showed positive results in improving teacher competency in designing technology-based learning. This workshop successfully helped teachers understand the important concepts of Deep Learning and directly practice creating AI-based teaching modules, especially in Mathematics. The new skills acquired by teachers became the basis for technology-based learning innovation in schools. The authors recommend that similar programs continue to be developed sustainably to expand their benefits for teachers in creating mindful, meaningful, and joyful learning processes.

In a study conducted by Ryan Amanda Putri (2025), the application of Deep Learning- based learning technology was proven to improve the understanding of Natural Science (IPA) concepts in sixth-grade elementary school students. Through the use of various AI-based media such as Canva AI, Quizizz AI, and Wayground AI, the learning process becomes more interactive and adaptive to students' needs. Canva AI is used to present material visually and attractively, while Quizizz AI and Wayground AI function as evaluation tools provides instant feedback and adapts the difficulty level to the learner's abilities. The results showed a significant increase in students' average conceptual understanding score, from 65 in the pre-action to 83 after the second cycle. The integration of AI into this learning not only improves learning outcomes but also provides a more enjoyable, meaningful, and active learning experience, in line with the principles of mindful, meaningful, and joyful learning.

Research by Haryono, Almubarokah, Faridah, Mustofa, Hamidah, and Sasomo (2025) made a significant contribution to strengthening teacher competency through the Deep Learning Teaching Module Workshop for Physics Teachers in Lamongan Regency. This training program was systematically designed, starting from needs identification to hands-on practice in developing Deep Learning -based teaching

modules with the support of various artificial intelligence tools such as ChatGPT, Canva, PhET, and Quizizz. Evaluation results showed a significant increase in teachers' understanding of deep learning concepts and their technical skills in using AI to design contextual and relevant learning based on student characteristics. In addition to producing more interactive teaching modules, this activity also led to a transformation in teachers' perspectives on the use of technology in education. Overall, this training is an innovative model that can be replicated in various other fields of study to support the implementation of the Independent Curriculum and create more adaptive, meaningful, and enjoyable learning for students.

Conceptual research conducted by Andrie Riomalen Yordan Rissi and Dameria Sinaga (2025) highlights the significant potential of collaboration between artificial intelligence (AI) and deep learning approaches to improve educational effectiveness in the digital age. Through the use of AI, the learning process can be personalized to individual students' needs and accompanied by real-time feedback that accelerates conceptual understanding. This integration is believed to be able to create a learning system that is more adaptive, efficient, and responsive to the differences in student learning styles. However, the authors also emphasize several challenges that need to be anticipated, such as the risk of dependence on technology, decreased humanistic interactions between teachers and students, data privacy issues, and limited infrastructure and educator training. Therefore, this study recommends the importance of cross-sector collaboration and careful planning so that the implementation of AI in education can be ethical, sustainable, and oriented towards improving the quality of meaningful learning.

In a literature review conducted by Fresty Handayani Togatorop (2025), the relationship between cognitive learning theory and the effectiveness of Deep Learning implementation in education is discussed in depth. Cognitive theory, which focuses on internal mental processes, information management, and cognitive load, is considered highly relevant for strengthening deep learning that demands conceptual and reflective understanding. The results of the literature review indicate that various cognitive strategies, such as worked examples, chunking, and metacognitive development, can improve higher-order thinking skills and deepen students' understanding. Furthermore, this study also highlights that adaptive learning—such as neural cognitive diagnosis—is designed based on cognitive principles to support personalized learning. The synergy between cognitivism and deep learning is considered to create a more meaningful, reflective learning framework, aligned with the principles of mindful, meaningful, and joyful learning in the digital age.

Research conducted by Siti Kholilah Siagian and Khotna Sofiyah (2024) highlights the significant potential of applying artificial intelligence (AI) in elementary education to develop students' learning abilities, competencies, and creativity in the digital era.

Through the use of technologies such as adaptive learning systems and virtual tutors, AI enables a more personalized learning process tailored to individual learners' needs. This approach helps students understand the material more deeply and obtain fast and accurate feedback on their learning progress. The results of this study confirm that the integration of AI at the elementary school level not only improves learning effectiveness but also creates a more meaningful, reflective, and enjoyable learning environment, in line with the principles of mindful, meaningful, and joyful learning.

Based on various studies reviewed, it can be concluded that the integration of Artificial Intelligence (AI) and Deep Learning approaches contributes significantly to creating a more adaptive, reflective, and meaningful learning process. The majority of studies show that the application of AI can strengthen the implementation of the principles of mindful, meaningful, and joyful learning through personalized learning, real-time feedback, and activity designs that encourage active student participation. Furthermore, improving teacher competency through AI-based training and workshops has also proven to be a key factor in the successful implementation of deep learning. However, several challenges such as limited digital literacy, infrastructure readiness, and the need for ongoing mentoring still need to be addressed to ensure optimal and sustainable implementation of AI in education.

To strengthen the conceptual basis of this research, it is necessary to examine theories relevant to the focus of the study, namely deep learning theory, the principles of mindful, meaningful, and joyful learning, and theories that support the use of AI technology in learning.

1. Deep Learning Theory

The concept of deep learning in an educational context was first proposed by Marton and Säljö (1976), who distinguished between surface learning and deep learning approaches. Deep learning focuses on conceptual understanding, the connections between ideas, and students' ability to apply knowledge meaningfully. In practice, this approach emphasizes reflection, problem-solving, and active student engagement. AI integration has the potential to strengthen these principles through adaptive systems that adapt content and learning activities to students' abilities and needs.

2. Principles of Mindful, Meaningful, and Joyful Learning

The principle of mindful learning refers to the ideas of Ellen Langer (1997), who emphasized the importance of awareness and openness to new perspectives in learning. Meanwhile, the concept of meaningful learning according to David Ausubel (1978) emphasizes the connection between new knowledge and students' existing cognitive structures. Joyful learning, as explained by Rantala and Määttä (2012),

highlights the importance of a pleasant learning environment and fostering intrinsic motivation. These three principles form the foundation of deep learning because they encourage a balance between cognitive, affective, and socio-emotional aspects of the learning process.

3. Theory of Technology and Artificial Intelligence Utilization in Learning

In the context of technology integration, Davis's (1989) Technology Acceptance Model (TAM) explains that the acceptance and use of educational technology is determined by perceived ease of use and perceived usefulness. In addition, Mishra and Koehler's (2006) Technological Pedagogical Content Knowledge (TPACK) framework explains the importance of a balance between technological, pedagogical, and content aspects so that technology—including AI—can be used effectively in learning. In the digital era, Artificial Intelligence in Education (AIED) is understood as the application of intelligent algorithms to facilitate personalized learning, adaptive evaluation, and automated feedback (Luckin et al., 2016). Through this approach, AI functions not only as a tool but also as a pedagogical partner that supports a mindful, meaningful, and joyful in-depth learning process.

B. Analysis Synthesis

After analyzing 13 articles that passed the selection process and reviewing supporting theories, researchers found key findings, alignment between studies, and several gaps that indicate new research directions.

1. Finding

The literature review that has been conducted has successfully identified several findings that answer the research question regarding how AI can optimize the principles of mindful, meaningful, and joyful learning within the deep learning framework.

a. Improving Teacher Competence as a Prerequisite for

Implementation Most of the literature reviewed (8 of 13 articles) focused on teacher training as the primary intervention. The findings consistently demonstrate that structured workshops and training are effective strategies for improving educators' pedagogical and technological competencies. These trainings have been shown to improve teachers' "knowledge, skills, and positive attitudes" toward AI, even making more than 80% of participants feel "more confident" in implementing it. This competency improvement includes practical skills in designing AI-integrated Lesson Plans (RPPs), developing teaching materials, and developing deep learning modules. learning using various AI tools such as ChatGPT, Canva, PhET, and Quizizz.

b. Positive and Measurable Impact on Student Learning Experiences While

The primary focus is on teachers, research directly involving students provides quantitative evidence of AI's effectiveness. A study by Putri (2025) showed that the use of AI (Canva AI, Quizizz AI, Wayground AI) significantly improved learning outcomes. This was evidenced by an increase in students' average science concept understanding score, which rose from 65 in the pre-action to 83 after the second cycle. AI successfully created a more interactive, adaptive learning process and provided instant feedback. This not only improved cognitive outcomes but also explicitly presented a learning experience that was "more enjoyable, meaningful, and involved active student participation," in line with the principles of mindful, meaningful, and joyful learning.

c. The Gap between Conceptual Understanding and Practical Application

One of the most crucial findings was revealed by Jafar & Muadyah (2025). Their research highlighted a "significant gap" between teachers' high conceptual understanding of Deep Learning (reaching 81.8%) and their very low level of practical classroom application (only 9.1%). This finding indicates that workshops and training, while successful in increasing knowledge (the "knowing" aspect), are not sufficient to bridge the gap to actual implementation (the "doing" aspect). The teachers themselves are aware of this and assess the need for further training and ongoing mentoring.

d. Theoretical Synergy between Cognitivism, Deep Learning, and AI.

Theoretical studies strengthen the foundation for AI implementation. In particular, the synergy between cognitivism and deep learning theories is considered highly relevant. Cognitivist principles, which focus on "internal mental processes" and "information management," provide a framework for deep learning strategies such as chunking and the development of metacognition. AI technologies, particularly adaptive AI such as neural cognitive diagnosis, are designed based on these cognitive principles to support personalization. This synergy creates a more meaningful and reflective learning framework, directly supporting the principles of mindful learning and meaningful learning (connecting new knowledge with existing cognitive structures).

2. Research Alignment

Although the research was conducted in diverse contexts (ranging from elementary, middle, high school, to vocational school) and using different methods (case studies, workshops, literature reviews), there were three main points of alignment that the researchers found.

- a. The Central Role of AI as a Facilitator of Personalization and Adaptability, All reviewed literature agrees that AI's greatest potential in education lies in its ability to facilitate personalization. AI is no longer seen simply as an "autocorrection tool," but rather as a "pedagogical partner." AI enables more adaptive learning, tailoring

content and difficulty levels to individual student needs. AI's ability to provide realtime feedback is seen as a key mechanism for accelerating comprehension and strengthening deep learning.

- b. Mindful, Meaningful, and Joyful as Holistic Goals, There is a clear consensus that the integration of AI and deep learning must go beyond simply improving cognitive outcomes. The terms "mindful, meaningful, and joyful" appear consistently in almost all studies as the ultimate goal to be achieved. This indicates a paradigm shift towards a more holistic learning experience, one that balances cognitive, affective, and socio-emotional aspects, and creates a "warm, reflective, and joyful" learning process.
- c. Identification of Uniform Barriers, almost every study, either directly or indirectly, identifies a similar set of challenges. The most frequently mentioned barriers are: (1) Limited digital literacy of teachers; (2) Infrastructure gaps and access to devices; and (3) An urgent need for training and "ongoing mentoring" was identified. In addition to technical challenges, conceptual and ethical challenges were also identified, such as "the risk of technology dependency," "the decline of human interaction," and "data privacy issues."

3. New Research

Directions After reviewing the findings, researchers can discuss new research directions. First, this new research direction should focus on the 9.1% implementation gap identified, where teachers' conceptual understanding (81.8%) does not align with practical application (9.1%). This finding, coupled with teachers' explicit request for "ongoing mentoring," suggests that the workshop model alone has failed. Therefore, future research should shift from testing the effectiveness of workshops to testing a hybrid mentoring model. This model could be "AI-Augmented Peer Coaching," where AI is no longer the object of study but becomes a facilitator that provides objective data (e.g., video analysis of teaching) for peer discussion. The second research direction is to address the finding that "affective and reflective aspects are often neglected." Current research focuses too much on AI as a cognitive feedback tool (such as Quizizz AI). New research should explore AI designs that specifically trigger metacognition (mindful learning). An example is testing the "Cognitive Mirror" framework where the roles are reversed: the student "teaches" the AI a concept. The AI will then act "confused" if students' explanations are incomplete, thus "forcing" students to reflect on their own thinking processes to improve their understanding.

The third research direction addresses a crucial methodological weakness: "challenges in implementing non-cognitive assessments." Many studies claim AI makes learning "more fun and meaningful," but the evidence remains cognitive (score improvements). Future research should use validated instruments to empirically

measure the Mindful, Meaningful, and Joyful (MMJ) construct. For example, using a qualitative reflection rubric to measure mindfulness and using the Student Engagement Questionnaire (SEQ), which has been adapted and validated in Indonesia, as a quantitative measure to measure meaningful and joyful learning. Finally, the fourth research direction should directly confront concerns about the "decrease in humanistic interaction."

New research is needed to test a rival hypothesis, namely the concept of the "Augmented Teacher". (Amplified Teacher). Rather than replacing teachers, AI acts as an assistant, automating administrative tasks. Ideally, this research would involve a longitudinal study that could measure whether AI, freeing up teacher time, actually increases the quantity and quality of warm, reflective, humanistic interactions in the classroom.

4. CONCLUSION

This study concludes that the integration of Artificial Intelligence (AI) into a Deep Learning framework significantly contributes to creating an adaptive, reflective, and meaningful learning process. Empirically, the use of tools such as Canva AI and Quizizz AI has been shown to significantly improve students' conceptual understanding, as indicated by an average score increase from 65 to 83, while creating a more enjoyable learning experience. However, crucial findings highlight a significant implementation gap; although the training successfully improved teachers' conceptual understanding by 81.8%, the level of practical application in the classroom remains very low, at only 9.1%. This disparity confirms that professional development models that rely solely on sporadic workshops are insufficiently effective in driving sustainable changes in instructional behavior.

Theoretically, this study strengthens the synergy between cognitivism theory and Deep Learning, positioning AI not merely as a technical tool but as a "pedagogical partner" that supports personalization to achieve mindful, meaningful, and joyful principles. As a practical implication, this study recommends a strategic shift from a single training model to a "continuous mentoring" model to bridge the gap between theory and practice. Additionally, to address concerns about the decline in humanistic interactions, practitioners are advised to adopt the concept of Augmented Teacher, where AI automates administrative tasks so teachers can focus time on quality interactions, while ensuring future evaluations use validated instruments to empirically measure non-cognitive outcomes.

ACKNOWLEDGMENTS

The authors would like to express their sincere gratitude to the lecturers and academic staff of the Educational Technology Study Program (Program Studi Teknologi

Pendidikan), Universitas Pendidikan Indonesia, for their guidance, support, and meaningful feedback throughout the completion of this study. We also extend our appreciation to Universitas Pendidikan Indonesia for providing a supportive academic environment that enabled the development of this research. Our deepest thanks are given to the authors of the articles included in this review, whose scholarly work formed an essential foundation for this study. Lastly, we would like to thank all individuals who have offered encouragement and assistance, both directly and indirectly, during the preparation of this paper.

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