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The Preparedness of English Teachers to Implement Deep Learning in Middle School

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Abstract:

Indonesia is making significant adjustments to prepare students for the 21st century. Modifications are aimed at instruction that improves that enhances critical thinking, creativity, and problem-solving. Though the instruction is to prepare students for the future, it is difficult to utilize because teachers are inexperienced with the classroom and technology. This research assessed the preparation level of 50 English teachers across Bengkulu Utara junior high schools to utilize new instruction practices through the assessment of knowledge, attitude, and practical skills by surveying the teachers with simple surveys and questionnaires. Three preparation aspects were evaluated based on simple data analysis and Cronbach's alpha test to test for the level of reliance. Teachers Indicated possessing sound knowledge (mean = 3.9) and attitude (mean = 4.1) regarding deep learning but are not highly proficient with instruction based on technology lessons (mean = 3.7). It is obvious that teachers are well-informed about deep learning and desire to apply it with students but need targeted training, greater accessibility to information tools based on technology, and support from their schools, particularly those located in the countryside.

Keywords: deep learning, preparedness, teacher, technology integration

1. INTRODUCTION

In 2025, the Indonesian education system went through a remarkable reformation spurred on by growing needs for competencies relevant to the 21st century and beyond. Indonesian education's evolutionary process towards deeper learning strategies and pedagogies is in sync with international trends that keep critical thinking, creativity, and problem-solving skills at the center, anticipating that they are key elements in endowing learners with important competencies (Albani, 2025). Instead of relying solely on the practice of rote recall, deep learning advocates a more active and participate learning

experience where deep connections between theoretical precepts and their applications in concrete situations are established and internalized. Notably, this approach to pedagogy not only develops the cognitive but also the affective and psychomotor aspects of learning, ensuring all-round and balanced development and promoting reflexive and self-directed learning (Zebua, 2025). In addition, deep learning was described to be a crucial factor in sustainability education since it equips learners to cope with complex, intertwined issues that break through traditionally defined disciplinary silos (Alshamsi et al., 2024).

Despite having significant future potential, the effective implementation of deep learning curricula in Indonesia faces significant barriers, specifically relating to the recruitment of teachers with rich pedagogic experience and information and communication technology (ICT) expertise. Nevertheless, this pedagogic transformation presents significant potential for reform, particularly since it supports the government's Merdeka Curriculum (Freedom to Learn) initiative towards a more flexible, learner-centric, and contextual education system (Albani, 2025). To ensure effective implementation in practice, there are pressing needs for partnerships and collaborations at different levels, such as between governmental institutions, schools and institutions of higher learning, and industry players, in order to ensure comprehensive digital transformation and develop competent and well-prepared workers capable of maximizing the potential offered through artificial intelligence (Wijaya, 2025).

In the context of fast-changing global dynamics and complex issues faced in present-day society, deep learning becomes an exceedingly effective pedagogic practice. Not only does this pedagogy appreciably develop the cognitive, emotional, and social engagement of students but also poses important thoughts in terms of sustainability and innovation in technology (Sadownyk and Pavelka, 2023). Through developing critical thinking, teamwork, and versatility, deep learning develops skill that prepares learners to cope and thrive in a future that will perhaps be unforeseeable (Austin and Lee, 2023). However, in order to realize the potential of deep learning in its entirety, it becomes crucial that pedagogy in schools be comprehensively restructured, and this calls for extensive changes in the training of teachers, classroom strategies, and institutional structures (Gunus Martinez and Gallo Domínguez, 2024).

Innovative deep learning practices include community-oriented teaching strategies in which learning institutions are hubs for innovation and locally relevant initiatives. Community schools enable the integration of indigenous knowledge, problem-based, and collaborative learning and curricula aligned with the lived experience of the learners (Kim et al., 2023). Moreover, the advent of novel pedagogic structures—perceiving classrooms in adaptive complex systems—prompts learner-centric strategies that facilitate self-organization, discovery, and reflection-based learning processes. To reach full capacity of deep learning, instructors are required to undertake continuous professional learning, practice within professional learning communities, and develop inquiry-oriented, curiosity-based classroom pedagogies based on mutual respect. Ultimately, these methods are key preparing learners to understand cross-disciplinary issues and to engage actively within a globally networked and evolving setting (Mthethwa et al., 2022).

New findings underscore the benefits of deep learning strategies in the realm of English language teaching. These strategies remain crucial in advocating for active engagement, evaluation, and the effective application of information. Professionals in the English arena are able to adopt thoughtful, relevant, and interactive pedagogic strategies that aim to develop linguistic ability, develop critical thinking potential, and develop cross-cultural knowledge (Sujinem, 2025). Incorporating deep learning strategies can help to generate significant improvement in key listening and speaking abilities with the implementation of AI-driven adaptive learning experiences (Fan & Long, 2024). Adoption of these strategies presents numerous difficulties that challenge effective implementation for researchers (Akbaraliyeva & Shamuratova, 2024). Professionals are capable of developing deeper learning potential through various strategies that aim to create independent learning spaces and utilize effective assessment strategies (Swar Suri, 2024). Implementation of these strategies can help to reposition English classrooms to become interactive, learner-focused places that foster broad-based skill attainment and empower future scholarly and professional achievement (Sujinem, 2025).

Recent studies highlight the crucial role that teacher preparation plays in deep learning applications in the field of education. Teachers tend to be possitive about deep learning, but significant gaps in technical proficiency and pedagogical self-efficacy persist (Santyasa et al., 2025). Barriers to successful implementation include restricted exposure to technology, insufficient training, and unsuitable curricula (Mukhoyaroh et al., 2025). Successful deep learning implementation requires professional improvement in a continuous manner, high-quality digital infrastructure, and deep pedagogical understanding relevant to deep learning (Isnaeni et al., 2025). Teachers see deep learning as an integrated process that deepens students' holistic outlooks towards learning, metacognitive capacities, and problem-solving capacities (Pașca-Tușa, 2021). In overcoming these barriers, strategies that are recommended are the conceptualization of appropriate modules of instruction, special training in educational technology, and preparation of a conducive school climate (Ramadhani, 2025). Cooperation between governmental institutions, schools, and instructors plays a crucial role in successful deep learning infusion in instructional practice (Isnaeni et al., 2025).

The key role of educators in ensuring deep learning requires an evaluation of their readiness in various educational settings. There are few research studies in Indonesia that are relevant to this topic, specifically in relation to junior high schools located in areas like Bengkulu Utara. These regions are often visited by these communities where they experience issues that include gaps in training needs, outdated learning and teaching instruments, and inadequate institutional backing. To enable informed professional development and supporting systems, this study seeks to investigate the readiness of English instructors in Bengkulu Utara to adopt deep learning strategies. Results derived from this research will be significant in aiding policymakers and education leaders in developing specific professional development programs and supporting systems. To ensure equitable educational progression, deep learning that includes critical thinking, creativity, and problem-solving needs to be made accessible to all learners within their unique settings.

In accordance with the defined research questions and their respective significance, this research seeks to assess junior high school-level English instructors in Bengkulu Utara in terms of their implementation of deep learning practice. Specific focus lies in gaining insights into their knowledge, attitudes, and pedagogies and in determining their areas of strength and improvement in the context of readiness. These are expected to inform professional training programs for instructors, shape policymaking, and guide resource distribution, especially in rural school settings. As such, the key research query remains defined in the following manner: To what extent are middle school-level English instructors in Bengkulu Utara prepared to practice deep learning strategies in their pedagogic work?

2. LITERATURE REVIEW

Among adaptive needs of 21st-century learning, deep learning has emerged as a transformative methodology dedicated to ensuring substantive learner engagement and long-term scholarly achievement. This pedagogic revolution goes beyond simplistic memory and traditional pedagogy; consequently, it enables key learner capabilities like critical evaluation, innovation, co-operation, data presentation, and problem-solving (Sun, 2023). Through linking curricula content to pragmatic applications, deep learning obliges learners to ponder the utility and applicability of newly learned information and at the same time incorporates cognitive, emotive, and physical aspects of learning, consequently fostering adaptive and transformative learning experiences. Such experiences enable learners not merely to attain scholarly excellence but navigate future prospects and impediments found in wider societally located contexts (Zebua, 2025; Mahrunnisya, 2025).

In order to effectively attain these goals, deep learning often incorporates project-based learning with computer-based technologies focused on increasing learner autonomy, creativity, and integrated understanding of global concerns (Karim & Parhan, 2025). In addition, it champions education policies thought to be reflexive, significant, and interactive, consequently playing a central role in ensuring effective preparation of future scholars and individual growth (Andayanie et al., 2025). Moreover, deep learning permits interdisciplinary knowledge transfer and fosters improved teamwork through experience-based learning strategies like group work and internships, bridging the gap between theoretical settings and practice-based settings in effective ways (Elbashbishy, 2024). By synthesizing pedagogic strategies with active, reflexive, and learner-focused paradigms, deep learning presents a workable and integrated lens through which learning practices might be rethought in ways effective to deal with the issues posed through global society today.

The incorporation of deep learning strategies in English language teaching remains of greatest significance, with a focus on active engagement, analytical thinking, and extensive application of knowledge (Nafi'ah, J., & Faruq, 2025). Teachers in the English language setting remain critical to the implementation of programs that develop deep learning skills, including the creation of self-directed learning settings and the implementation of appropriate assessment strategies (Bland, 2022). Assessment strategies are crucial in differentiating between superficial and deep learning achievements within the realm of English language teaching (Basharova & Shamuratova, 2024). To properly enact deep learning strategies, instructors remain required to identify

barriers and design relevant solutions (Jiang, 2022). Application of deliberate, relevant, and interactive learning strategies, in addition to technology-enriched content like artificial intelligence and virtual reality, In Transform English language classrooms into interactive student centered environments. This integrated approach enhances not only language skills but also fosters critical thinking, creativity, and intercultural ability, preparing learners to thrive in 21st-century pedagogic and professional situations (Itoi, 2024).

Latest studies highlight the significance of deep learning strategies in English language pedagogy. Active learning pedagogies emphasize more active learner participation in critical thinking, problem-solving, and proper application of knowledge and give more significance to intentional, meaningful, and fun learning practices (Dogani, 2023). By using intentional, meaningful, and fun learning practices, instructors are able to create lively learner-centric settings and consequently improve language proficiency and build 21st-century skills (Jeet and Pant, 2023). AI-based pedagogy can improve learner pronunciations, fluency, and learner participation in EFL contexts (Wang & Li, 2025). In contrast, deep learning strategies present concerns with a need for pragmatic interventions to ensure successful implementation (Idrus, 2025). Teacher-centric to learner-centric transformations are imperative and are substantiated through experimental research conducted with English language instructors (Shaniga and Ilankumaran, 2024). These innovation-driven, learner-centric practices not only develop English language proficiency but creativity, adaptability, and inclusiveness in ESL pedagogy as well.

The convergence between deep learning architectures and immersive technologies in educational environments presents great potential towards maximizing the efficiency of learning procedures; at the same time, it simultaneously poses a series of issues (Kok et al., 2024). Motivational gaming elements through artificial intelligence with immersive environments like virtual and augmented reality fosters interactive and customized learning spaces (Kok et al., 2024). Empirical studies validate these technologies in enhancing learner focus, information retention, and comprehension rates (Bekteshi, 2025). Incorporating deep learning into educational architectures presents enormous ethical issues and complex complications (Rospigliosi, 2022). Main concerns include poor infrastructure, educators' technical incompetencies, and data protection issues. Despite these hindrances, deep learning architectures are central to overcoming future educational issues, enhancing predictive intelligence towards academic achievement, supporting adaptive learning strategies, and developing natural language processing in educational systems (Prihantini et al., 2025). Effective deployment of these technologies necessitates careful consideration Of ethical considerations and joint implementation plans.

The latest studies emphasize the worth of teacher preparation in imbedding deep learning strategies within schooling settings. Despite the deep-seated predisposition that educators share in adopting deep learning fundamentals, they often experience technical proficiency and pedagogic confidence deficits (Rahayu, 2025). Integrations of educational tech innovations face significant roadblocks, especially in rural areas and resource-scarce settings. Overriding impediments are limited accessibility to technology and infrastructure, restricted professional improvement opportunities for educators, and

scarcities of extensive curricular direction (Kumari and Srivastava, 2023). To enable effective deep learning strategies implementation within schooling systems, broad-based interventions in curriculum planning, professional training, and infrastructural improvement are necessary (Waruwu & Setiawati, 2025). Important strategies include project-based and inquiry-based designs with customized learning experiences (Solihu et al., 2023). These strategies hold the potential to bring about critical thinking, increased learner engagement, and conceptual depth (Suwandi et al., 2024). Teacher training programs must focus on building capacities and mindsets essential for educators to excel in deeper learning environments. Effective incorporation of deep learning amidst different schooling settings requires a concerted effort among governmental authorities, educational institutions, and educators (Darling et al., 2023).

Recent studies highlight the growing focus on incorporating deep learning (DL) methodologies within the Indonesian educational system. Despite the growing fervor to introduce DL theories, instructors face various issues related to technical expertise and pedagogic self-efficacy (Rahayu, 2025). Key issues include pedagogic imbalances, poor infrastructure, ethical concerns, and a lack of teacher preparedness (Manik et al., 2025). To overcome these issues, comprehensive strategies that include professional training, curriculum blueprinting, and infrastructure improvement must be introduced (Subiyantoro & Musa, 2024). Incorporation of DL methodologies, such as that suggested by Abdul Mu`ti, will likely upgrade critical thinking skills and promote greater learner engagement (Suwandi et al., 2024). Pedagogic understanding among instructors plays a crucial role in making the DL approach effective within the Independent Curriculum framework (Arina & Isyanto, 2025). Some of the recommended steps include adopting project-based curriculum blueprints, making use of cloud-based services, comprehensive training programs for instructors, and the implementation of comprehensive ethical guidelines. Phased implementation methodologies, especially localized ones with a focus on interactions among different stakeholders, are advised in order to deal with the challenge of technology and human resource (Manik et al., 2025).

A literature review related to the topic exhibit considerable scholarly curiosity in deep learning's usage in educational settings. Specifically, prior studies present varying perspectives regarding educator preparedness, instructional practice implementation, technology infusion, and learner accomplishment. Subiyantoro and Musa (2024) reported that Indonesian primary instructors indicated a desire to utilize deep learning strategies; they found, however, moderate technical expertise barriers, pedagogical ambiguity, and systemic barriers like inadequate training, poor infrastructure, and institutional limitations. Similarly, Kasi et al. (2024) found that despite the comprehension of 21st-century skills and deep learning principles, the implementation through governmental structures and educator infrastructure remained suboptimal. From the learner's standpoint, Shi and Lan (2024) found self-efficacy, engagement, and instructor-student interaction quality to be crucial determinants of high school learners' proficiency in English in blended learning settings. Moreover, Stepanechko and Kozub (2022) found that tech-supported second language learning heightened learner desire and self-motivation but necessitated instructor facilitation to foster deeper comprehension. In the realm of elementary education, a systematic literature review concluded that deep learning architectures like RNN and LSTM hold considerable potential to predict learning loss; their implementation

is, however, hampered through data availability and composability of the model issues. Further conceptual studies through Sujinem (2025) indicated that the combination of artificial intelligence, virtual reality, and podcasting with intentional, meaningful, and learner-focused instructional applications presents considerable potential to expand learners' linguistic ability, creativity, and cross-cultural understanding.

Other research studies looked at the implementation of technology beyond the learning of students, with a focus on the performance and readiness of teachers. Tian and Zhang (2025) established a deep learning model that achieved 87.61% accuracy in classifying teaching behaviors in the classroom, but Hu et al. (2022) utilized metaheuristics to fine-tune CNN-based algorithms in evaluating EFL instruction effectively. In Islamic educational settings, Isnaeni et al. (2025) and Gustina et al. (2025) found that instructors indicated interest in deep learning but faced barriers like limited access to technology, training, and backing from policies. Similar readiness issues were recorded in Pajo District, where Bulan et al. (2025) found that primary-level educators were not trained, lacked resources, and did not confidently adopt the English curriculum. Studies done outside of Indonesia, like Rajapakse et al. (2024), found ICT instructors in Sri Lanka practiced low self-efficacy in teaching AI but under the influence of emotion more than experience-based mastery. Case studies like Nurmala and Dewanti (2024) placed more focus on positive attitudes toward integrated technology from instructors and learners but stressed the need for better infrastructure and stage-based professional preparation. More research done by Zhai et al. (2024) proved that AI-based electronic image recognition would complement the assessment of literacy in a more effective manner, and Ying and Su (2024) proposed instructional designs to stimulate deeper comprehension of reading through integration and transfer of knowledge. In junior highs, Hidayani et al. (2025) depicted that problem-based and project-based learning made critical thinking, teamwork, and interpersonal skills accessible but more training for instructors and more effective curriculum are in order. Ultimately, Suri (2024) found specific class strategies that help instructors infuse deeper learning skills in English lessons through aligning theoretical orientations with practical application.

Previous studies related to deep learning have largely focused on primary and lower-secondary schooling and left junior high school English educators' preparedness with a deficient understanding that follows. There are few studies that focus on the unique issues faced by these educators, including inadequate training, poor infrastructure, and poor supporting policies. There are few workable studies that look at the connections between preparedness and student achievement and technology-enhanced readiness. This gap in work is particularly severe in rural areas like North Bengkulu, where few resources and episodic training hinder effective practice implementation.

This study remedies a major gap in the literature by researching junior high school English teachers' preparedness to adopt deep learning strategies in a rural Indonesian context. It probes personal qualities like technology proficiency and pedagogic self-efficacy together with organizational variables like availability of professional learning opportunities, in-place resource structures, and administrative supports. By focusing on the special needs relating to technology and local conditions, this work seeks to provide actionable recommendations that will guide specialist training programs, formulation of

policies, and resource distribution to enable effective implementation of deep learning practices.

3. RESEARCH METHODOLOGY

Following section defines the methodological approach that was employed in the study. The approach incorporates the research design, the participants, instruments, data analysis

3.1. Research Design

A descriptive quantitative approach was used in this study, Applying a structured questionnaire to assess the preparedness of junior high school English teachers in implementing deep learning strategies. According to Creswell (2012), questionnaires are considered a vital component of quantitative surveys, serving to collate numerical data pertaining to attitudes, opinions, and behaviors through the application of clear, closed ended questions.

3.1. Research Design

The study followed a descriptive research design with a quantitative framework to evaluate the preparedness of junior high school English teachers in implementing deep learning strategies. Descriptive quantitative research focuses on collecting and analyzing numerical data to describe existing conditions, trends, and relationships without manipulating variables (Creswell, 2012). This design is particularly appropriate when the aim is to measure the prevalence or distribution of specific characteristics—in this case, teachers' knowledge, attitudes, and skills—across a defined population (Paniamogan and Dioso, 2024)

3.2. Participants

The study involved 50 English teachers currently teaching at the junior high school level in Bengkulu Utara. A representative sample of educators from different school settings in the region was selected. According to Fraenkel et al. (2006), An appropriate sample size is necessary to ensure statistical validity and generalizability in survey-based research.Confidentiality and voluntary participation were emphasized to elicit genuine responses (Syafryadin et al., 2022)

3.3. Instruments

Data were collected using a structured questionnaire developed specifically to measure teachers' preparedness for implementing deep learning strategies. The instrument consisted of closed-ended items designed to assess three dimensions: knowledge, attitudes, and practical skills. Questionnaire development followed established procedures in educational measurement, including expert review for content

validity, pilot testing for clarity, and reliability analysis. As noted by Gay et al. (2012), structured questionnaires are effective for obtaining standardized data that can be easily quantified and statistically analyzed (Martins and Bueno, 2025)

3.4. Data Analysis

Descriptive statistics means standard deviations and frequencies were used to summarize teachers preparedness levels. Inferential statistical techniques were applied to explore potential correlations between variables. Cronbachs's alpha was used to test the questionnaires reliability (Gliem, 2003) aligning with best practices for valid and reliable research findings (Reyes, 2025)

4. RESULTS

The section presents the findings from descriptive data for quantitative educational research ensuring that the findings are both reliable and valid raise ET al 2025 1930 He is a paraphrased version : m the data collected through the validated questionnaire, which was designed to assess the preparedness English teachers of junior high school in Bengkulu Utara in implementing deep learning strategies. A total of 50 teachers participated in this study. The questionnaire measured three key aspects: knowledge, skills, and attitudes related to deep learning in English teaching.

Table 1: The teachers self reported levels of preparedness and utilization of strategy (Adapted from: Dar et al., 2023)

Aspect	Number of Elements	Selection of Item	Mean Value	Interpretation
Knowledge	6	I appreciate the framework of deep learning in ELT	3.9	Excellent
Skill	7	I can develop interactive activities for my class	3.7	Fairly strong
Attitudes	5	I am convinced that deep learning enhances student achievement	4.1	Excellent
Total	18	-	39	

Note: Measurement scale 1 equals strongly disagree 5 equals strongly Agree

Founded on the result table above that is mean teachers reported high levels of awareness and positive towards deep learning approaches in English teaching. Items related to skill slightly lower scores than items related to knowledge and attitudes, suggesting a need for more hands-on training and classroom based practice.

The overall preparedness score was 3.9, indicating that, while teachers are generally ready to implement deep learning strategies, they would benefit from targeted professional development, particularly will regard to lesson design and technology integration.

5. DISCUSSION

The research assessed the readiness of junior high school English teachers of Bengkulu Utara to apply deep learning strategies. It is suggested that, while the teachers demonstrate a good understanding and positive attitudes to deep learning strategies, their practical skills are surprisingly behind their conceptual knowledge.

Educators showed "Excellent" levels of knowledge about deep learning frameworks (mean = 3.9) and equally favorable attitudes (mean = 4.1), reflecting trust in the benefits they hold for promoting student performance. Their actual competency for the construction of interactive deep learning-focused activities was assessed at the lesser level (mean = 3.7), suggesting that knowledge does not always translate into practical effectiveness. Similar patterns have emerged in past studies to illustrate that teachers often value deep learning but struggle with its implementation based on factors including inadequate preparation, sparsity of information on technology applications, and limiting curricular structures (Santyasa et al., 2025; Mukhoyaroh et al., 2025).

The findings of this study are concordant with other research where the importance of deep learning is highlighted by educators' awareness; they often encounter difficulty applying project-based and inquiry-based learning environments (Solihu et al., 2023; Hidayani et al., 2025). It sheds light on the common problem that educators understand the importance of deep learning but are often not provided with adequate support to utilize the related methodologies effectively. Without practical skills, the potential of deep learning To promote critical thinking creative problem solving and decision making (Albani, 2025; Zebua, 2025) is not actualized.

The research highlights the need for teacher professional development activities to build practical abilities instead of merely transmitting theoretical information. Participation in workshops, teacher mentorship, and teacher learning communities is able to help teachers with lesson planning, technology implementation, and the organization of collaborative activities. It is furthermore critical for schools and educators to ensure adequate infrastructure and curricular adaptability since both are essential for the sustaining of deep learning practices (Isnaeni et al., 2025; Ramadhani, 2025). Teacher practical skills enhancement is able to considerably enhance students' engagement as well as readiness for future learning activities and real-world applications (Austin & Lee, 2023).

The lack of surprising results is deemed rational given that the differences are aligned with worries often discussed within the research literature concerning the integration of technology and pedagogical reform within the rural context. The overall favorable dispositions of educators, despite the existing shortfalls, demonstrate extensive willingness for reform accordingly and promote a context for subsequent reform activities.

This study has limitations. Its sample size fifty teachers restricts generalization to other regions, and reliance on self-reported questionnaires may introduce bias. Additionally, The lack of classroom observations and student outcome data restricts the capacity to assess how reported preparedness translates into practice and learning results.

Subsequent research should compare more extensive and diverse groups of teachers, utilize longitudinal analyses to track the impact of preparation on teacher confidence and student achievement, and add classroom observations to verify information based on teacher reports. Research on leadership endorsement, government policies, and targeted intervention procedures would similarly enhance the understanding of the systemic factors shaping the implementation of deep learning. Generally, the English teachers of Bengkulu Utara demonstrate extensive understanding of core concepts and have favorable dispositions for extensive learning; they need to strengthen their practical skills for the successful implementation of the strategies. Remedying the gaps in their skills through specific training, better resources, and cooperative support will help introduce the deep learning strategies and promote the cognitive and creative skills essential for future career advancement.

6. CONCLUSION

The data revealed the preparedness of junior high school English teachers in Bengkulu Utara to adopt deep learning practices. The outcomes demonstrate that teachers are largely well prepared, especially in their knowledge and attitudes, with an overall score of 3.9. While they understand deep learning concepts and realize their benefits, there is still a need to develop their expertise in crafting interactive student-centered lessons. Effective use of deep learning can transform classrooms into setting that encourages critical thinking and real-world.

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