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Leveraging deep learning for personalized English language learning: Adapting to student needs in the digital age

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ABSTRACT

Traditional English Language Learning (ELL) classrooms frequently face challenges regarding low motivation, limited engagement, and a lack of instructional personalization. This study investigates the integration of deep learning—conceived as a mindful, meaningful, and joyful pedagogical approach focused on deep concept comprehension and real-world connection—to enhance personalized education for secondary school EFL learners in the digital era. Employing a qualitative case study design, data were gathered through semi-structured interviews with teachers and students, classroom observations, and document analysis of lesson plans. The findings indicate that deep learning effectively facilitates material customization by leveraging initial diagnostic assessments to map individual learning profiles, narrowing student readiness gaps, and integrating multi-level process differentiation. Additionally, multi-modal assessments and collaborative peer tutoring in heterogeneous groups develop a secure learning space that boosts student motivation and language practice. However, the implementation faces cognitive and psychological barriers, such as grammatical confusion, limited vocabulary, and oral anxiety, compounded by an instant learning culture and digital distractions. This study concludes that a conscious pedagogical shift combining deep learning principles with adaptive classroom management is necessary to realize equitable, student-centered language instruction.

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1. INTRODUCTION

The integration of digital technology has transformed English Language Learning (ELL) into a borderless, highly dynamic instructional paradigm. International education frameworks demand a pedagogical shift from rigid teacher-centered formats toward

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personalized learning models that adapt directly to the diverse psychological and academic profiles of individual students (Vanista & Nurjamiludin, 2023). However, a critical issue emerges as educational institutions rapidly digitalize advanced learning platforms have inadvertently triggered a crisis of superficial engagement, where students are physically present online but cognitively disconnected.

Deep learning in education—not in the sense of Artificial Intelligence (AI), but as a learning approach emphasizing meaningful understanding, reflection, and active student involvement—can transform EFL classrooms. It focuses on understanding concepts deeply, connecting knowledge with real contexts, and developing higher-order thinking skills (Jiang, 2022; Feriyanto & Anjariyah, 2024). When implemented in EFL classrooms, this approach encourages students to learn mindfully, meaningfully, and joyfully (Benu, Beeh, & Nenotek, 2025).

Despite growing attention to deep learning and personalized education, several problems remain. Many teachers still rely on shallow learning approaches focusing mainly on grammar drills and vocabulary memorization, limiting students' ability to communicate effectively and think critically in English (Aditama et al., 2025; Dai & Sihes, 2023). There is also a gap between theory and classroom practice: while deep learning has been conceptually promoted, its practical integration in EFL settings especially in Indonesia remains limited and underexplored (Prystiananta & Noviyanti, 2025; Oraif, 2024).

The growing diversity of learners in English as a Foreign Language (EFL) classrooms makes personalization an important pedagogical concern. Students who study English in the same classroom do not necessarily begin from the same level of proficiency or progress at the same pace. They may differ in their vocabulary knowledge, grammatical understanding, reading fluency, oral confidence, learning strategies, interests, and access to learning resources. These differences influence how students understand instructions, participate in classroom activities, and demonstrate what they have learned. When instruction is delivered through a uniform sequence of tasks without sufficient attention to such variation, some students may find the learning process insufficiently challenging, whereas others may struggle to follow the lesson. Personalized learning therefore requires teachers to recognize learner diversity and make informed instructional decisions that respond to students' readiness, needs, and learning progress (Kem, 2022; Vanista & Nurjamiludin, 2023).

In language education, personalization should not be understood simply as giving students different worksheets or allowing them to complete tasks at different speeds. It also concerns the relationship between learning objectives, instructional materials, classroom interaction, feedback, and assessment. For example, students who have limited vocabulary may need visual support, explicit explanation, and opportunities to revisit key expressions, while students who have developed stronger vocabulary knowledge may benefit from tasks that require interpretation, discussion, or the use of language in unfamiliar situations. Such variation does not mean that students work toward entirely unrelated goals. Rather, teachers can maintain shared learning outcomes while adjusting the routes, resources, and levels of support through which students work toward those outcomes. This view is consistent with the broader understanding of personalized learning as a process that responds to individual learning characteristics while sustaining meaningful participation in a common learning environment (Rosalina & Sen, 2022).

The need for personalization becomes particularly visible in English language learning because language development involves the gradual coordination of several interrelated competencies. Students are expected to understand and use vocabulary, construct grammatically appropriate sentences, interpret spoken and written texts, and communicate ideas with increasing confidence. Difficulties in one area may affect

performance in another. A student who understands a topic but has limited vocabulary, for instance, may find it difficult to explain an idea orally or produce a written response. Similarly, students who are hesitant to speak may require a supportive interactional environment before they can demonstrate their actual understanding. Personalization in EFL instruction should consequently address both cognitive and affective dimensions of learning. It should provide appropriate linguistic support while also creating opportunities for students to participate without excessive fear of making mistakes (Dai & Sihes, 2023; Vanista & Nurjamiludin, 2023).

Within this context, deep learning offers a pedagogical orientation for moving beyond the completion of isolated exercises toward meaningful engagement with language and ideas. In this study, the term deep learning refers to a pedagogical approach that emphasizes mindful, meaningful, and joyful learning; it does not refer to computational deep learning algorithms or artificial-intelligence systems. The distinction is important because the phrase is used in different ways across educational and technological literature. In its pedagogical sense, deep learning encourages students to connect new knowledge with prior understanding, engage with relevant problems, reflect on their learning, and apply what they have learned in contexts beyond the immediate classroom task. Fullan et al. (2018) associate deep learning with the development of competencies that enable learners to engage with and contribute to the world, while Feriyanto and Anjariyah (2024) discuss the approach through the interconnected principles of meaningful, mindful, and joyful learning. These principles provide a useful basis for considering how English lessons can become more relevant and responsive to students.

The principle of meaningful learning is particularly relevant to language education because language is learned for communication and the construction of meaning, not merely for the reproduction of grammatical forms. When students explore topics connected to their surroundings, experiences, or social concerns, they have a clearer purpose for interpreting information and expressing ideas. A lesson about environmental issues, for example, can provide opportunities to develop topic-related vocabulary, read informational texts, discuss possible solutions, and present recommendations. The language content remains central, but it is situated within a topic that gives students a reason to use English. Jiang (2022) emphasizes the importance of understanding and promoting deep learning in language education, while Benu et al. (2025) highlight strategies for fostering mindful, meaningful, and joyful learning in EFL classrooms. Taken together, these perspectives suggest that contextual relevance can support deeper engagement when it is accompanied by purposeful language practice and appropriate teacher guidance.

Mindful learning also has implications for how teachers understand students' progress. Rather than focusing exclusively on whether students produce a correct answer, teachers can attend to how learners approach a task, where they encounter difficulty, and what kinds of support help them move forward. Diagnostic assessment can provide an initial indication of students' prior knowledge, while formative assessment can help teachers monitor understanding during instruction. Reflection can then encourage students to identify what they have learned and what they still need to practice. These practices can inform subsequent instructional decisions, making personalization an ongoing process rather than a one-time adjustment. In this respect, assessment is not separate from learning: it can provide information that teachers and students use to determine appropriate next steps (Kem, 2022; Rosalina & Sen, 2022).

The principle of joyful learning should likewise be interpreted as more than making lessons entertaining. Enjoyment can emerge when students experience a sense of relevance, achievable challenge, social connection, and progress. In EFL classrooms, students may be reluctant to participate because they are concerned about pronunciation, grammar,

vocabulary limitations, or negative evaluation by others. Activities that encourage collaboration, provide manageable challenges, and recognize effort may help create conditions in which students are more willing to use English. However, enjoyable activities do not automatically result in deep learning. Games, videos, and digital quizzes need to be connected to clear language-learning purposes and followed by opportunities to process, apply, or reflect on the content. This distinction is important when considering the role of digital media in supporting personalized instruction (Aditama et al., 2025; Benu et al., 2025).

Digital technology adds further possibilities and complexities to this pedagogical discussion. Online resources and multimedia materials can offer alternative ways of presenting information, provide opportunities for repeated practice, and make learning resources accessible beyond classroom time. Digital quizzes and interactive activities may also provide immediate responses that help students and teachers notice areas requiring further attention. Research on personalized and adaptive learning has discussed the potential of digital platforms to support learning pathways and respond to learner characteristics (Kem, 2022; Naseer et al., 2024; Song, 2024). Nevertheless, the availability of technology should not be equated with personalization. A presentation projected on a screen or an online quiz used by every student in the same way may enrich the delivery of a lesson without necessarily responding to individual needs. Personalization depends on how teachers interpret learner information and use available resources to make pedagogical choices. Technology can support this process, but it does not replace the teacher's professional judgment or the need for interaction and feedback.

This distinction is especially relevant to schools working with ordinary classroom technologies and varying levels of student access. Not every school has an intelligent tutoring platform or an adaptive system capable of automatically adjusting content to individual performance. Teachers may instead use commonly available resources, such as presentation software, videos, online exercises, and educational games, alongside observation, questioning, group work, and differentiated tasks. These practices can contribute to responsive instruction when teachers use them intentionally. At the same time, digital devices can introduce distractions, and unequal access to devices or connectivity may affect students' opportunities to participate. The educational value of technology therefore needs to be considered in relation to classroom conditions, students' experiences, and the instructional purposes for which a tool is used (Bachtiar, 2025; Prystiananta & Noviyanti, 2025).

In the Indonesian educational context, the discussion of deep learning and personalized instruction is also connected to ongoing efforts to make learning more relevant, inclusive, and responsive to students. The emphasis on meaningful and engaging learning invites teachers to consider how curriculum content can be connected with students' lived experiences and how classroom activities can accommodate differences in readiness. However, translating these broad principles into daily English teaching requires practical decisions: how teachers identify students' needs, how they select or adapt materials, how they organize classroom interaction, and how they assess learning progress. The implementation of an approach may also be shaped by class size, available resources, students' confidence, and teachers' familiarity with differentiated instruction. These contextual considerations make it necessary to examine how pedagogical principles are enacted in actual classrooms rather than assuming that the adoption of a particular educational approach will produce the same experience in every setting (Rahayu et al., 2025; Feriyanto & Anjariyah, 2024).

Although studies have discussed deep learning, personalized learning, and technology-supported instruction, these areas do not always converge in accounts of everyday EFL classroom practice. Research on digital and adaptive systems often highlights

the capacity of technology to recommend learning materials or construct individualized pathways (Mansur et al., 2019; Naseer et al., 2024; Song, 2024). By contrast, the pedagogical implementation of deep learning also depends on teachers' decisions about contextualized content, classroom participation, scaffolding, and reflection (Fullan et al., 2018; Jiang, 2022). It is therefore useful to examine personalization not only as a technological function but also as a set of teaching practices through which teachers respond to learner differences. The present study addresses this practical dimension by exploring how deep learning principles are reflected in the adaptation of English learning materials and classroom activities, as well as how students experience and respond to the learning process.

A further reason for investigating this issue is that students' responses provide an important perspective on whether instructional adaptations are experienced as useful and accessible. Teachers may intend to personalize learning by varying task difficulty, organizing collaborative groups, or using multimedia resources; however, students may still experience difficulties with grammar, vocabulary, reading, or speaking confidence. Their accounts can reveal whether the support provided is sufficient, which strategies they use when they encounter difficulty, and how they perceive the role of digital media in their learning. Considering both teacher practices and student experiences can therefore provide a more complete account of personalization than examining lesson design alone. It also allows the study to consider the relationship between instructional intentions and the challenges that emerge during classroom implementation.

Against this background, the present study investigates the use of deep learning principles to support personalized English language learning in a public secondary school in Cirebon, Indonesia. It focuses on the pedagogical practices through which teachers adapt learning materials and classroom activities to students' needs, as well as the challenges and responses reported by students. The study does not examine the technical performance of an AI-based adaptive platform. Instead, it considers how a pedagogical approach emphasizing mindful, meaningful, and joyful learning is enacted through teacher guidance, differentiated tasks, contextual materials, classroom interaction, assessment, and the use of familiar digital media. By foregrounding the experiences of both teachers and students, the study seeks to contribute a context-sensitive understanding of how personalization is practiced and experienced in an EFL classroom.

This study aims to explore how leveraging deep learning principles can enhance personalized English language learning, particularly in the digital era. Two research questions guide this investigation: (1) How can deep learning be used to personalize English learning materials to students' individual needs? (2) What are the students' challenges and responses in implementing a deep learning-based English learning system in the digital era, especially in the context of learning personalization?

Personalized English Language Learning (ELL) refers to an instructional approach that tailors the learning process to accommodate each student's individual needs, preferences, goals, and learning pace. According to Kem (2022), personalized learning is a learner-centered model that uses flexible methods, adaptive technologies, and customized learning pathways to ensure that instruction aligns with students' cognitive and emotional needs. In the context of English language learning, personalized learning involves designing instruction that adapts to the learner's language proficiency, communication needs, and learning style. Personalized ELL is characterized by several essential features: learner autonomy, adaptive learning, data-informed decision-making, and meaningful engagement (Rosalina & Sen, 2022). These features align with the principles of the Merdeka Curriculum, which emphasizes student agency, flexible learning, and meaningful understanding in the Indonesian educational context (Rahayu et al., 2025). Types of personalization in ELL

contexts include content personalization, pace personalization, path personalization, and goal personalization (Naseer et al., 2024; Song, 2024).

Deep learning in education refers to a transformative pedagogical approach that emphasizes critical thinking, creativity, collaboration, and the ability to apply knowledge in authentic contexts. As defined by Fullan, Quinn, and McEachen (2018), deep learning engages students in learning that matters to them and prepares them to make a difference in the world. In the Indonesian educational context, deep learning is integrated with three core principles: Mindful Learning (conscious, attentive, reflective learning), Meaningful Learning (connecting new material with personal experiences and real-life contexts), and Joyful Learning (instruction within a positive emotional atmosphere that fosters intrinsic motivation) (Benu et al., 2025).

The strengths of deep learning are reflected in its impact on both academic and personal development: it enhances student engagement and motivation by connecting lessons with real-life experiences, promotes critical and creative thinking, and improves student attention and participation (Parambil et al., 2022; Benu et al., 2025). Despite its advantages, deep learning faces challenges including lack of teacher training and digital literacy, the complexity of designing and assessing deep learning experiences, and technological inequalities (Bachtiar, 2025; Aditama et al., 2025).

Deep learning has a significant influence on personalized EFL learning because it provides a pedagogical and technological framework that enables learning experiences to be more meaningful, relevant, and personalized for each student (Benu et al., 2025). The deep learning process, which includes reflection, collaboration, knowledge construction, and knowledge transfer to real contexts creates conditions that make students more actively engaged, gain greater autonomy, and experience learning that is relevant to their personal needs. The integration of both approaches creates a powerful way to develop student-centered EFL instruction that supports learners' autonomy, involvement, and use of language in real life (Naseer et al., 2024; Wang & Wang, 2025).

2. METHODS

This research employed a qualitative approach using a case study design (Yin, 2018; Creswell & Creswell, 2018). The qualitative approach allows exploration of participants' experiences, perceptions, and reflections in a natural setting. The case study design enables in-depth investigation into a specific educational context where the deep learning approach is applied to personalize English learning. The research was conducted at a public secondary school in Cirebon, Indonesia, that has begun integrating digital platforms and innovative learning approaches in English language teaching. Participants were selected through purposive sampling: two English teachers and seven students who participated in at least one semester of digitally mediated English learning activities. Data were collected through three techniques: (1) semi-structured interviews with teachers and students; (2) classroom observations using a structured observation checklist; and (3) document analysis of lesson plans based on Tomlinson's theory of content, process, and product differentiation (Bowen, 2009). Data were analyzed using thematic analysis following Miles, Huberman, and Saldaña (2014) through data reduction, data display, and conclusion drawing/verification.

3. RESULTS AND DISCUSSION

3.1 Deep Learning Personalizes English Learning Materials

The findings reveal five interrelated themes characterizing how deep learning supports the personalization of English learning materials:

First, Meaningful Understanding as the Foundation of Personalization. Teachers employed diagnostic pre-assessments and real-world contextual topics to map students' prior knowledge and establish a meaningful learning foundation. This approach created long-term memory retention and bridged the readiness gap among students. The use of contextual topics (e.g., flood mitigation and environmental issues) aligned content with students' daily experiences, reflecting the principle of meaningful learning.

Second, Differentiation in the Learning Process. Teachers implemented differentiated instruction through heterogeneous group formation and tiered task design. Levels of task difficulty (easy, medium, and hard) were applied to accommodate diverse learner readiness. Teachers provided scaffolding during discussions, offering individualized guidance that ensured even lower-achieving students could participate and progress.

Third, Contextual Connection and Relevance to Real Life. Learning materials were consistently linked to real-world phenomena familiar to students. This contextual approach encouraged higher-order thinking and authentic language use. Students reported that real-life connections made abstract content more comprehensible and memorable (S7: "it helps me because there are examples related to everyday life, making it easier to understand").

Fourth, Supportive and Responsive Learning Environment. Teachers employed one-on-one guidance, peer tutoring, and ongoing classroom monitoring to create an emotionally safe atmosphere. Collaborative peer tutoring in heterogeneous groups emerged as an effective support mechanism, where more capable students guided peers with difficulties, developing confidence for all learners.

Fifth, Adaptive Assessment and Ongoing Reflection. Teachers employed a multi-modal assessment approach encompassing diagnostic pre-tests, process-based formative evaluation, and outcome assessments through oral presentations. Reflection activities at the end of each lesson supported metacognitive development. However, these reflections disproportionately engaged active students, indicating a need for more inclusive approaches.

3.2 Students' Challenges and Responses

The findings identify three main themes related to students' challenges and responses in implementing deep learning-based personalized English learning:

First, Academic and Psychological Challenges. Students reported significant cognitive barriers including difficulty understanding grammar patterns, limited vocabulary, and challenges with reading pace. As S1 stated:

"I have trouble understanding the rules and remembering new vocabulary."

These academic difficulties were compounded by psychological barriers: fear of making mistakes, shyness, and low self-confidence when speaking English in front of classmates. The "instant learning culture" among Gen Z and Alpha students further challenged deep learning implementation, as students showed low learning endurance when dealing with complex analytical tasks (Teacher 2: "students today want it instantly, they don't want to be tired").

Second, Students' Adaptation Strategies and Learning Support. Students actively developed coping strategies: (1) independent learning strategies such as reviewing notes and textbooks after class; (2) peer tutoring and group collaboration, which provided a psychologically safe space for lower-ability students; and (3) digital technology use, including Google Translate and internet resources as supplementary support. Peer collaboration was particularly effective, as Teacher 2 noted, heterogeneous grouping created

a sense of security for students with limited English proficiency, enabling them to participate alongside stronger students.

Third, Integration of Technology and Real-Context Learning. Students responded positively to the use of digital media (PowerPoint, videos, online quizzes, games), reporting increased motivation and engagement (S1: "I feel more enthusiastic about learning when I use technology"; S2: "learning has become easier and more fun"). However, a "technology paradox" emerged: uncontrolled smartphone use became a source of distraction, reducing concentration. Teachers mitigated this through attention-gathering strategies, including interactive games at the start of lessons, especially during afternoon sessions when students were tired.

The findings suggest that personalization in this case was not limited to allowing students to choose different materials or work at different speeds. Rather, it was enacted through a sequence of pedagogical decisions: identifying students' starting points, connecting content with familiar situations, adjusting the level of classroom tasks, and providing support while students worked. Diagnostic assessment therefore served as a basis for instructional decisions rather than functioning only as a preliminary test. This interpretation is consistent with the view of personalized learning as an approach that aligns learning pathways with students' cognitive and emotional needs (Kem, 2022). It also extends the discussion in Rosalina and Sen (2022) by illustrating how personalization may be enacted through everyday classroom practices, even when teachers do not rely on sophisticated adaptive-learning platforms.

The use of topics such as flood mitigation and environmental issues is particularly relevant to the principle of meaningful learning. By connecting English lessons with situations that students can recognize, teachers create opportunities for learners to use language to interpret and discuss issues beyond the textbook. This finding is compatible with Fullan, Quinn, and McEachen's (2018) emphasis on learning that matters to learners and prepares them to engage with the world. It also reflects the Indonesian deep-learning principles of mindful, meaningful, and joyful learning described by Benu et al. (2025). In this study, however, the evidence most clearly illustrates meaningful learning through contextualized content. The evidence for mindful and joyful learning is more indirect and is reflected mainly in classroom reflection, participation, and students' reported motivation. These dimensions should therefore not be treated as equally demonstrated.

The reported use of heterogeneous groups and tiered tasks indicates that teachers responded to differences in learner readiness by varying the support and level of challenge. This is important in EFL classrooms because students may encounter the same lesson with different levels of vocabulary knowledge, grammatical understanding, reading speed, and confidence. A uniform task can consequently create unequal opportunities to participate: a task that is manageable for a more proficient learner may be inaccessible to a classmate who needs additional language support. The teachers' use of easy, medium, and challenging tasks, together with scaffolding during discussion, represents an attempt to address this variation within a shared classroom environment.

The findings also invite a distinction between differentiation and simply assigning students to groups. Heterogeneous grouping can support peer learning, but it does not automatically ensure that all members contribute or receive appropriate assistance. The reported peer-tutoring practice appears valuable because students with greater confidence or proficiency can help classmates understand tasks. Nevertheless, teachers remain responsible for monitoring participation and ensuring that peer support does not turn into a situation in which more proficient students complete the work on behalf of others. This interpretation is consistent with the learner-centered orientation of personalized learning (Kem, 2022) and with the emphasis on collaboration and knowledge construction in deep learning (Fullan et

al., 2018). The implication is that grouping needs to be accompanied by clear roles, achievable shared goals, and teacher monitoring.

Students' positive response to familiar real-world examples suggests that contextual relevance can help make English learning more comprehensible and purposeful. The student comment that everyday examples made the material easier to understand provides direct evidence of perceived relevance. When students discuss environmental or community issues, they are not only practising isolated language forms; they are also using English to explain, interpret, and respond to content. This creates a potential connection between language learning and higher-order thinking, which is central to the conceptualization of deep learning presented by Jiang (2022) and Fullan et al. (2018).

However, contextualization should not be equated automatically with deep learning. A real-world topic may still be taught through memorization or short-answer exercises if students are not asked to interpret information, justify opinions, compare perspectives, or apply what they have learned. The pedagogical value of contextual materials therefore depends on the cognitive and communicative work that students are asked to undertake. In this case, the findings indicate that teachers used familiar issues to support understanding and engagement, but the manuscript provides limited examples of students' actual language products or extended reasoning. Future classroom documentation could include samples of student work, discussion transcripts, or task instructions to show more clearly how contextual topics lead to deeper language use.

An important contribution of the findings is the recognition that personalization involves emotional as well as academic responsiveness. Students reported fear of making mistakes, shyness, and limited confidence when speaking English. These experiences can restrict participation even when students understand the task or are interested in its topic. The use of one-on-one guidance, peer tutoring, and classroom monitoring may help reduce this barrier by giving learners more than one source of assistance. In this respect, the supportive learning environment described by the teachers is not an additional feature separate from instruction; it is part of the conditions that make participation possible.

The findings also suggest that support needs to be distributed inclusively. The observation that end-of-lesson reflection disproportionately involved active students is significant because it reveals a possible mismatch between the intention to hear learners' voices and the actual participation structure. If only confident students contribute, teachers may receive an incomplete picture of the class's learning needs. This issue is especially relevant to personalized learning, which depends on accurate information about individual progress and difficulty (Rosalina & Sen, 2022). Anonymous or individually completed reflection activities may help broaden participation, although their effectiveness would need to be evaluated in the specific classroom. The central point is that emotional safety must be translated into participation structures that allow quieter students to communicate their needs without being put under unnecessary pressure.

Students' responses to PowerPoint presentations, videos, online quizzes, and educational games indicate that digital media were perceived as engaging and helpful. These tools may support personalization by presenting information in different modes and offering varied ways to practice or respond. The students' comments about increased enthusiasm and easier learning are consistent with the emphasis on meaningful engagement in personalized learning (Rosalina & Sen, 2022). They also illustrate how digital resources can complement classroom interaction rather than replace the teacher's role.

At the same time, the findings reveal an important tension: the same smartphones and digital environment that provide access to learning resources can also distract students. This technology paradox complicates the assumption that greater technology use necessarily produces deeper learning. Digital tools contribute to learning only when their use is

connected to a clear pedagogical purpose and supported by classroom routines. The teachers' use of attention-gathering games, particularly during afternoon lessons, represents one response to fluctuating student attention. Yet games should function as purposeful learning activities rather than as entertainment alone. This interpretation resonates with the challenges identified in the literature concerning digital literacy, teacher preparation, and the design of deep-learning experiences (Bachtiar, 2025; Aditama et al., 2025). The findings therefore point to the importance of teacher mediation: teachers need to establish when devices are learning resources, what students are expected to do with them, and how off-task use will be managed.

The academic and psychological challenges reported by students show that personalization does not remove learning difficulties; rather, it makes those difficulties more visible and creates opportunities to respond to them. Grammar confusion, limited vocabulary, and difficulty maintaining an appropriate reading pace are language-related barriers that may require explicit explanation, vocabulary preparation, guided reading, and repeated practice. Fear of making mistakes and shyness, by contrast, require a supportive interactional environment and opportunities to rehearse before performing in front of the whole class. Treating these challenges as a single problem would overlook the different forms of support students need.

Students' reported strategies, reviewing notes and textbooks, working with peers, and consulting Google Translate or online resources also indicate that learners participate in their own learning adaptation. These practices can be understood as expressions of learner agency, although the quality and independence of such learning cannot be determined from the available accounts alone. Digital translation, for example, may help students understand unfamiliar words, but it does not necessarily develop the ability to use those words accurately in communication. Teachers can connect independent resource use to classroom tasks by asking students to apply newly learned vocabulary in sentences, discussions, or short presentations. In this way, external resources become part of a guided learning process rather than substitutes for active language practice.

Taken together, the findings indicate that personalized deep learning in this setting is best understood as a coordinated pedagogical process rather than the use of a single method or digital application. It involves (a) identifying learner readiness, (b) selecting content connected to students' lives, (c) differentiating tasks and scaffolding participation, (d) maintaining an emotionally supportive environment, and (e) using assessment and reflection to adjust subsequent instruction. These elements are interdependent. Diagnostic information has limited value unless teachers use it to adapt instruction; differentiated tasks are less inclusive without monitoring; and digital resources are unlikely to support deep learning when their use is not guided by clear learning purposes.

For EFL teachers, this suggests several practical priorities. First, diagnostic activities should examine specific language needs, not merely produce a general score. Second, tiered tasks should preserve a common learning objective while varying the degree of support or complexity. Third, peer tutoring should be structured so that all students have an active role. Fourth, reflection should include students who are less willing to speak publicly. Finally, digital tools should be selected according to the language practice and thinking they enable, with clear expectations for responsible use. These implications are grounded in the classroom practices and student accounts reported in this study; they are not claims that the study has measured improved language achievement.

The findings should be interpreted in relation to the scope of this qualitative case study. The research involved two English teachers and seven students at one public secondary school, and the evidence was collected through interviews, classroom observations, and lesson-plan analysis. This design provides contextual insight into

participants' experiences and reported practices, but it does not establish that deep learning caused improvements in achievement, motivation, or long-term retention. The abstract's wording that deep learning "effectively" enhances personalization should therefore be understood as a description of perceived and observed classroom processes, not as a causal conclusion.

There are also areas where further methodological detail would strengthen the interpretation. The manuscript would benefit from presenting more observation examples, explaining how the interview and observation data were coded into the reported themes, and showing how lesson-plan documents corroborated or differed from participants' accounts. In addition, the literature review discusses personalized learning in relation to adaptive technologies, whereas the reported findings mainly describe teacher-led differentiation and common digital media. This distinction matters: the study offers evidence of pedagogical personalization supported by digital resources, but it does not appear to examine an algorithmic or AI-driven adaptive-learning system. Future studies could investigate how these classroom practices develop over time and whether they are associated with changes in students' language performance, engagement, and learner autonomy.

4. CONCLUSION

This study demonstrates that the integration of deep learning principles into EFL instruction can significantly enhance the personalization of English language learning. Deep learning effectively personalizes materials through diagnostic assessments linked to real-world contexts, process differentiation via heterogeneous grouping and scaffolding, and multi-modal adaptive assessment. These mechanisms address diverse student readiness levels while fostering engagement, motivation, and authentic language use. However, the successful implementation of personalized deep learning faces persistent challenges: cognitive barriers (grammar and vocabulary difficulties), psychological anxieties (fear of making mistakes and low speaking confidence), the instant learning culture of digital-native generations, and the dual-edged nature of digital technology integration. Addressing these challenges requires teachers to implement adaptive classroom management, inclusive reflective practices, and structured attention-gathering strategies. For practitioners, it is recommended that teachers design systematic frameworks for interactive digital media, employ anonymous digital reflection tools (e.g., Padlet or Mentimeter) to ensure all students, including passive learners can articulate their learning progress, and utilize peer-support networks as structured learning strategies. Future research should explore the long-term impacts of personalized deep learning through quantitative or mixed-method longitudinal designs and investigate teacher training modules for adaptive classroom management across diverse educational contexts in Indonesia.

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