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ORIGINAL ARTICLE

AI-Supported Scaffold Design for Lower-Proficiency EFL Learners: Experiences of Pre-Service Teachers in Inclusive Reading Instruction

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ABSTRACT
Teaching reading in mixed-ability EFL classrooms remains challenging as lower-proficiency learners struggle with grade-level texts. Although scaffolding is widely acknowledged as a strategy for greater accessibility and participation, designing effective scaffolds can be demanding to novice teachers. The growing availability of generative artificial intelligence (AI) offers new possibilities to support teachers throughout this process. Despite growing research on AI in language education, little has been known about how pre-service teachers employ AI to design scaffolds for inclusive reading instruction during their teaching practicum. This study explored how pre-service teachers (PSTs) utilized AI to design scaffolding materials for lower-proficiency learners during reading lessons. A qualitative research design was employed involving seven PSTs and 22 lower-proficiency secondary school learners across an eight-week teaching practicum. Data were collected via lesson plans, scaffold artifacts, reflective journals, and semi-structured interviews before being thematically analysed. Results indicated that PSTs use AI to create lexical, procedural, conceptual, and affective scaffolds that reduce barriers to reading engagement. Learners reported higher levels of behavioral, emotional, and cognitive engagement, including greater participation, confidence, and use of reading strategies. AI was considered as a valuable source of pedagogical assistance although participants noted the need to adapt AI-produced materials to better suit learners and classroom contexts. The study also suggests that AI is a teacher-facing tool for inclusive reading instruction and PSTs preparation.

1. INTRODUCTION

In English as a foreign language (EFL) education, mixed-ability classrooms are common, particularly at the secondary level, where learners differ in language proficiency, learning pace, and reading strategies (Gibbons, 2015; Suprayogi et al., 2017; Tomlinson, 2001). In such contexts, it can be difficult to offer learners equal opportunities to access reading instruction. Many reading lessons often use grade-level texts that may be too challenging for even average readers, limiting their meaningful engagement with all learning activities (Edyburn & Edyburn, 2011). This may cause learners to experience slower reading development, reduced confidence and participation in the classroom activities. From an inclusive pedagogy perspective, such barriers may place some learners at a disadvantage, even in mainstream classrooms (Florian & Black-Hawkins, 2010).

In the Vietnamese EFL context, these challenges are noticeable in upper-secondary schools, where English is taught in mixed-ability classrooms with large numbers of learners of diverse levels of English proficiency (Tran &

Ngo, 2024). Despite these differences, students are generally expected to follow the same national curriculum and work with the same prescribed textbooks, which requires teachers to balance common curricular objectives with various learner needs. As for Vietnamese pre-service English teachers, during their compulsory teaching practicum, they are expected to plan and implement lessons in these complex classroom settings, while having limited experience in designing differentiated instructional support.

Although pedagogical scaffolding is known to be an effective means of supporting learners to access challenging text types, designing appropriately differentiated and meaningful scaffolds takes much time and expertise (Ginja & Chen, 2020; Wan, 2017). Recent advances in generative artificial intelligence (AI) have opened up new opportunities to assist teachers in this process. AI can also facilitate the designing of instructional supports in the form of tiered tasks or adapted materials, helping teachers create more accessible learning environments while maintaining shared curricular goals (Hamid & Abbas, 2025).

Despite growing interest in AI for language education, relatively little is known about how pre-service teachers use AI to design scaffolds for inclusive reading instruction during teaching practicum. To address this gap, the present study explores how pre-service teachers employ AI as a tool to support the design of scaffolding resources for lower-proficiency learners in mixed-ability EFL reading classrooms, with particular attention to learners' participation and engagement.

This study is guided by the following research questions:

1. How do pre-service teachers design and implement AI-supported scaffolds to support lower-proficiency EFL learners during reading activities?

2. How do lower-proficiency EFL learners perceive the role of AI-supported scaffolds in facilitating their engagement and participation during reading activities?

3. What affordances and constraints do pre-service teachers perceive when using AI as a design-support tool for scaffolding inclusive reading instruction?

2. LITERATURE REVIEW

2.1. Inclusive Reading Instruction in Mixed-Ability EFL Classrooms

Learner diversity is a defining characteristic of contemporary EFL classrooms, particularly at the secondary level where students differ in language proficiency, learning pace, prior knowledge, motivation, and learning preferences (Suprayogi et al., 2017; Tomlinson, 2001). While such diversity enriches learning, it also presents challenges for teachers who must provide equitable learning opportunities while pursuing common curricular goals.

Inclusive education has increasingly been promoted as a means of addressing learner diversity. Rather than viewing inclusion as the provision of specialized support for particular groups, inclusive pedagogy emphasizes creating learning environments that enable meaningful participation for all learners (Florian, 2015; Florian & Black-Hawkins, 2010). From this perspective, learner differences are considered a normal feature of classrooms, and the focus shifts from identifying deficits to designing instruction that expands learning opportunities for everyone. This viewpoint is especially relevant in mixed-ability EFL classrooms, where lower-proficiency learners often face the same curriculum and assessment requirements as their counterparts. Lower proficiency is better viewed as a matter of readiness rather than a fixed deficit, reflecting the alignment between learners' current linguistic resources and task demands (Tomlinson, 2001, 2005). Thus, these learners may require additional support to access learning opportunities that are available to the rest of the class (Wu, 2019; Zakarneh et al., 2020).

Differentiated instruction provides one practical means of enacting inclusive pedagogy. Differentiation aims to increase participation without lowering expectations or segregating learners while maintaining shared learning goals and offering varying forms of support (Tomlinson & Imbeau, 2010). This is especially important in reading instruction, where standardized texts may disadvantage learners whose language proficiency falls below the expected level. As discussed by Florian (2015), as learners are physically present, yet not being engaged meaningfully in the classroom, risks of exclusion or marginalization can occur.

2.2. Lower-Proficiency Learners and Reading Accessibility

Reading comprehension is a complex process in which learners are required to actively integrate textual information with their prior linguistic and conceptual knowledge (Bernhardt, 1984; Chun & Plass, 2000; Gibbons,

2015). In EFL contexts, successful reading entails many cognitive processes, including vocabulary recognition, syntactic processing, inference-making, and comprehension monitoring (Koda, 1992). While proficient readers typically handle these processes efficiently, lower-proficiency learners struggle due to insufficient linguistic resources and less developed reading strategies.

Within inclusive and differentiated educational frameworks, lower proficiency is best understood as a matter of learner readiness rather than a fixed deficit (Tomlinson, 2001, 2005). Difficulties arise when the linguistic demands of instructional materials are above learners' current language resources (Wu, 2019; Zakarneh et al., 2020). This challenge is particularly evident in reading lessons that rely on grade-level texts containing unfamiliar vocabulary, complex sentence structures, and abstract concepts (Reynolds & Goodwin, 2016). Consequently, lower-proficiency learners may devote substantial cognitive effort to decoding language, leaving fewer resources available for deeper comprehension and meaning-making (Gibbons, 2015; Tsai & Huang, 2023).

These challenges can be explained by Cognitive Load Theory (Sweller, 2020) in which working memory has limited capacity, so learners may experience cognitive overload when processing unfamiliar language and constructing meaning at the same time. As a consequence, reading difficulties are not merely linguistic but also cognitive in nature. Repeated struggles with reading can lead to learners' emotional and behavioral disengagement, resulting in anxiety, frustration, reduced confidence, and classroom withdrawal (MacIntyre & Gardner, 1991; Westbrook et al., 2019). Such disengagement often reflects instructional environments that do not adequately accommodate differences in learner readiness (Dincer et al., 2019; Florian, 2015). As Gibbons (2015) argues, learners should not be denied access to challenging content simply because they need further assistance. Therefore, improving reading accessibility is essential for inclusive participation. One widely recognized approach to achieving this goal is scaffolding, which provides temporary and strategic support to help learners engage successfully with tasks beyond their independent capabilities.

2.3. Scaffolding for Inclusive Reading Instruction

The challenges faced by lower-proficiency learners highlight the need for instructional approaches that support access to learning without lowering academic expectations. Within language education, scaffolding has emerged as a key framework for addressing learner diversity while promoting participation in shared classroom activities. Scaffolding does not simplify content, rather it offers temporary and strategic support that enables learners to undertake tasks that may be challenging for them to do independently. (Gibbons, 2015; Wood et al., 1976).

The concept is rooted in Vygotsky's (1978) Sociocultural Theory, particularly the Zone of Proximal Development (ZPD), which refers to the gap between what learners can achieve independently and what they can accomplish with appropriate support. Learning therefore involves providing assistance that enables learners to participate successfully in challenging tasks. Building on this idea, Wood et al. (1976) introduced scaffolding as temporary assistance that supports learning and enables learners to take more responsibility for learning themselves. Effective scaffolding is responsive to learners' needs and is gradually withdrawn as competence develops (van de Pol et al., 2010).

In EFL reading instruction, scaffolding allows learners to engage with grade-level texts with minimized obstacles to participation. Instead of replacing challenging materials with simplified versions, teachers can provide support that makes the same curricular content more accessible (Florian, 2015; Gibbons, 2015). Research has identified several types of scaffolding relevant to reading instruction. Lexical scaffolding is commonly used to assist vocabulary comprehension through glossaries, translations, and annotations (Chun & Plass, 2000; Reynolds & Goodwin, 2016). Procedural scaffolding involves instructing learners through reading processes using instructions, reading strategies, and guiding questions (Gibbons, 2015; Li & Wilson, 2025). Conceptual scaffolding helps learners connect ideas with graphic organizers, visual representations, and higher-order questions (Tabak, 2004). In addition, affective scaffolding aims to enhance confidence and participation through supportive interactions, positive feedback, and collaborative learning opportunities (Pellas, 2014; Wang et al., 2021).

These forms of scaffolding often complement one another to help learners to overcome linguistic, cognitive, and emotional barriers. These scaffolding interventions promote equitable participation because they enable learners to pursue common learning goals without requiring separate instructional pathways. However, designing effective scaffolds requires considerable pedagogical expertise and preparation. Such demands may be particularly challenging for novice teachers, which has led to increasing interest in the potential of generative artificial intelligence (AI) as a tool for scaffold design.

2.4. AI-Supported Scaffold Design in Language Education

This research draws upon three related lenses including Inclusive Pedagogy (Florian, 2015), Scaffolding Theory grounded in Sociocultural Theory (Gibbons, 2015; Vygotsky, 1978), and the multidimensional model of learner engagement (Fredricks et al., 2004). Together, these perspectives explain how AI-supported scaffold design may facilitate lower-proficiency learners' participation in reading activities in a mixed-ability EFL classroom.

Inclusive Pedagogy serves as the overarching framework, positing that learner diversity should be addressed by extending learning opportunities for all students rather than creating separate instructional pathways (Florian & Black-Hawkins, 2010). Within this study, the idea of inclusive reading instruction is where learners engage with the same curricular content as their peers through appropriate support.

Scaffolding Theory explains how such support can be provided. Based on the concept of the Zone of Proximal Development (Vygotsky, 1978), scaffolding enables learners to perform tasks beyond their independent capabilities through temporary assistance (Wood et al., 1976). Four forms of scaffolding - lexical, procedural, conceptual, and affective - are used as analytical categories in this study.

Learner engagement represents the intended outcome of scaffolded instruction. Following Fredricks et al. (2004), engagement is defined as a multidimensional entity that consists of behavioral, emotional, and cognitive dimensions. In this model, AI functions as a design-support tool that assists pre-service teachers in creating accessibility-promoting scaffolds for reading activities. These scaffolds are expected to foster learner engagement and, ultimately, facilitate inclusive participation in mixed-ability EFL reading classrooms.

Figure 1 presents the conceptual framework guiding the study.

Figure 1. The guiding conceptual framework

Recent empirical studies have emphasized the potential of GenAI to support teachers' instructional planning and materials development. Rather than replacing teachers' pedagogical expertise, GenAI is increasingly viewed as a design-support tool that assists teachers in generating lesson ideas, instructional materials, differentiated learning tasks, and assessment activities while reducing planning time (Moorhouse et al., 2024; Batista et al., 2024). Within language education, emerging evidence suggests that both pre-service and in-service language teachers employ GenAI to develop teaching materials, adapt texts to learners' proficiency levels, generate discussion questions, and design classroom activities. However, effective implementation depends largely on teachers' pedagogical judgment, AI literacy, and their ability to adapt AI-generated outputs to specific instructional contexts (Moorhouse & Kohnke, 2024; Li et al., 2025). At the same time, recent studies caution against over-reliance on AI-generated content because it may contain inaccuracies, lack contextual appropriateness, or fail to align with intended pedagogical objectives (Batista et al., 2024). Collectively, these studies suggest that GenAI should be conceptualized as a teacher-facing design-support tool rather than an autonomous instructional agent. Nevertheless, despite the rapidly expanding body of research on GenAI in education, relatively little empirical research has examined how pre-service teachers employ AI to design scaffolds for inclusive reading instruction during their teaching practicum. The present study addresses this gap.

3. MATERIALS AND METHODS

3.1. Research Design

This study adopted a small-scale qualitative research design to explore how pre-service teachers (PSTs) used AI as a design-support tool for creating scaffolds that facilitate inclusive reading instruction for lower-proficiency learners in mixed-ability EFL classrooms. Rather than measuring effectiveness or establishing causal relationships, the study seeks to develop an in-depth understanding of pedagogical decision-making processes, scaffold design practices, and participants' perceptions within real classroom contexts.

The qualitative approach is considered appropriate because the study focuses on understanding how instructional support is designed, implemented, and experienced by both teachers and learners. The study emphasizes process, context, and meaning-making rather than achievement outcomes or test scores, consistent with sociocultural perspectives on learning (Vygotsky, 1978) and principles of inclusive pedagogy (Florian, 2015). Furthermore, considering the relatively short time frame of the teaching practicum and the exploratory focus of the investigation, qualitative methods provided opportunities to capture insights into participants' experiences and reflections.

3.2. Context of the Study

The study was conducted during an eight-week teaching practicum undertaken by final-year English Language Teaching majors at four upper-secondary schools located in Central Vietnam during the second semester of the academic year. These schools represent typical mainstream educational settings where English is taught as a compulsory subject. Class sizes generally ranged from approximately 40 to 45 students, reflecting the realities of mixed-ability EFL classrooms commonly found in Vietnamese secondary schools.

Most participating schools used the *Global Success* textbook series, which is apparently aligned with approximately B1-level language demands under the Common European Framework of Reference for Languages (CEFR). One participating class used *Insight Pre-Intermediate*. As all learners were expected to work with the same curriculum materials regardless of proficiency level, reading lessons were especially challenging for students whose language proficiency fell below the expected level of the class.

In this context, reading comprehension served as the primary instructional focus of the practicum. Reading lessons were selected because they frequently require learners to engage with grade-level texts that contain substantial linguistic and conceptual demands. As a result, reading provides a particularly suitable context for examining how instructional scaffolds can enhance accessibility and participation for lower-proficiency learners in mixed-ability classrooms. Consistent with the principles of inclusive pedagogy (Florian, 2015), all students engaged with the same core reading texts and curricular objectives. Rather than providing separate materials for lower-proficiency learners, accessibility was enhanced through the use of shared scaffolding resources embedded within classroom instruction.

3.3. Participants

Participants comprise of two groups: pre-service teachers and lower-proficiency learners.

Pre-service Teachers

This study used a purposive sampling technique to select seven pre-service English teachers. Selection criteria include enrollment in the final teaching practicum; willingness to incorporate technology into instructional planning; and consent to participate in the study. At the time of data collection, all PSTs were completing their compulsory teaching practicum under the supervision of experienced in-service English teachers. The PSTs were aged between approximately 21-23 years and had previously completed coursework in language teaching methodology, curriculum design, and educational technology. All participants had experience using generative AI tools for academic or instructional purposes, although none had formal training specifically related to AI-supported scaffold design.

Lower-Proficiency Learners

To gain insight into learners' experiences of scaffolded reading instruction, lower-proficiency learners from each PST's assigned class were invited to participate. Approximately two to four learners were identified in each class, resulting in a total of 22 student participants. These learners were enrolled in Grades 10, 11, or 12 and ranged from 16 to 18 years of age. To minimize researcher bias, identification was conducted by the in-service teachers responsible for the classes. Selection was based on long-term classroom observations and previous assessment records accumulated over at least one semester. The learners were not considered beginners; rather, they represented students whose English proficiency was noticeably lower than that of the majority of their classmates and who

frequently experienced difficulty accessing grade-level reading texts. These learners consistently performed below the class average in English and required additional support to participate successfully in reading activities.

The sample size was considered appropriate for the purposes of this qualitative study because participants were selected purposively as information-rich cases having direct experience of designing and implementing AI-supported scaffolds during their teaching practicum. Rather than aiming for statistical representativeness, the study sought to obtain in-depth insights into pre-service teachers' pedagogical decision-making within authentic classroom contexts. Based on the principle of information power (Malterud et al., 2016), the narrowly defined research aim, the specificity of the participant group, and the use of multiple complementary data sources - including lesson plans, scaffold artifacts, reflective journals, learner reflection forms, and semi-structured interviews - provided sufficient depth and breadth of information to address the research questions.

3.4. AI-Supported Scaffold Design during Practicum

Prior to designing each reading lesson, pre-service teachers (PSTs) identified possible challenges that lower-proficient learners might encounter, based on classroom observations, discussions with mentor teachers, and learners' previous performance. Particular attention was given to challenges such as unfamiliar vocabulary, complex sentence structures, abstract concepts, and demanding comprehension tasks.

PSTs then used generative AI tools, mostly ChatGPT and similar large language model-based platforms, to assist in developing instructional scaffolds. These AI-generated materials included vocabulary glossaries, simplified task instructions, guiding questions, visual prompts, graphic organizers, and comprehension activities. Instead of adopting these outputs directly, PSTs reviewed and adapted them to ensure alignment with lesson objectives, learner needs, and classroom contexts. AI therefore functioned as a design-support tool, while pedagogical decisions remained under teacher control.

The resulting scaffolds were then integrated into the reading lessons. Pre-reading activities included vocabulary support, visual prompts, and prediction tasks; while-reading activities incorporated guiding questions and reading strategy prompts; and post-reading activities involved graphic organizers, discussions, and summary tasks. In alignment with inclusive pedagogy (Florian, 2015), scaffolds were made available to all learners rather than targeted towards those with lower-proficiency levels. Higher-proficiency learners often used them selectively whereas lower-proficiency learners tended to use them more frequently. Throughout the practicum, PSTs continuously refined the scaffolds using what they learned and observed in the classroom to guide the process. Therefore, scaffold design is an iterative process informed by AI-generated suggestions, teacher judgment, and learner responses.

3.5. Data Collection

Multiple qualitative data sources were collected to facilitate triangulation and provide insights from both teacher and learner perspectives.

Lesson Plans and Scaffold Artifacts

First, lesson plans and AI-supported scaffolding materials developed throughout the practicum were collected. These documents provided evidence of instructional planning and scaffold design practices.

Reflective Journals

Prior to implementation, PSTs received a set of structured reflection prompts. Throughout the practicum, they documented their experiences designing and implementing scaffolds, including perceived benefits, challenges, and modifications made to AI-generated materials.

Learner Reflection Forms

Following reading lessons, learner reflection forms were collected from 22 learners. To facilitate accurate expression of experiences, all reflection prompts were written in Vietnamese, the learners' first language. The reflection form was informed by Fredricks et al.'s (2004) multidimensional engagement framework and focused on learners' participation, emotional responses, and use of instructional support.

Semi-Structured Interviews

At the conclusion of the practicum, semi-structured interviews were conducted with all seven PSTs. Interviews were conducted either face-to-face or online, depending on participant preference. Interview questions were informed by scaffolding theory (Hammond & Gibbons, 2005; van de Pol et al., 2010); Cognitive Load Theory (Sweller, 2020);

and Fredricks et al.'s (2004) engagement framework. The interviews explored PSTs' experiences using AI to support scaffold design, perceptions of learner participation, and reflections on inclusive reading instruction.

3.6. Data Analysis

Different forms of qualitative analysis were employed according to the nature of the data.

First, lesson plans and scaffold artifacts were analyzed using qualitative content analysis to identify patterns in scaffold design and classify scaffolds into lexical, procedural, conceptual, and affective categories (Gibbons, 2015; Tabak, 2004).

Second, PST reflective journals and interview transcripts were analyzed thematically following an inductive-deductive approach. Initial coding was guided by the conceptual framework of the study, while additional themes were allowed to emerge from the data. Particular attention was given to perceived affordances and constraints of AI-supported scaffold design as well as PSTs' evolving pedagogical thinking.

Third, learner reflections were analyzed thematically with reference to Fredricks et al.'s (2004) dimensions of engagement. Responses were coded according to evidence of behavioral engagement (participation, effort, persistence); emotional engagement (confidence, enjoyment, anxiety); and cognitive engagement (strategy use, comprehension processes, use of scaffolds).

Patterns across data sources were subsequently compared to identify convergences and divergences in teacher and learner perspectives.

3.7. Trustworthiness and Ethical Considerations

Several strategies were employed to enhance the trustworthiness of the study. First, methodological triangulation was achieved through the use of multiple data sources, including lesson plans, scaffold artifacts, learner reflections, PST journals, and interviews. Second, member checking was conducted by inviting PST participants to review summaries of interview interpretations and reflective accounts to ensure that researchers' interpretations accurately represented their intended meanings. Third, detailed descriptions of the instructional context and participant characteristics were provided to facilitate transferability and allow readers to determine the applicability of findings to similar contexts. Pseudonyms were used throughout the study to protect participant confidentiality.

4. RESULTS AND DISCUSSIONS

4.1. AI-Supported Scaffold Design for Inclusive Reading Instruction

Analysis of the 21 lesson plans, scaffold artifacts, reflective journals, and interviews revealed that the PSTs used AI primarily as a design-support tool to create four interconnected forms of scaffolding: lexical, procedural, conceptual, and affective scaffolding. These scaffold types were often combined within the same lesson to address different barriers experienced by lower-proficiency learners.

Lexical scaffolding emerged as the most frequently employed form of support. The PSTs used AI to generate vocabulary glossaries, simplified definitions, bilingual explanations, and pre-reading vocabulary activities. Many participants perceived vocabulary as the most immediate barrier preventing lower-proficiency learners from accessing grade-level texts. As one PST explained:

"*I mainly designed vocabulary handouts to help students better understand the text and reduce potential comprehension barriers.*" (PST3).

Another participant highlighted the efficiency of AI in producing lexical support:

"*Using ChatGPT helped me save time when creating vocabulary lists and comprehension questions for the lesson.*" (PST5).

It can be suggested that AI functions not only as a time-saving resource but also as a pedagogical design partner, enabling the pre-service teacher to devote greater attention to adapting scaffolds to learners' needs rather than creating instructional materials from scratch. These patterns were also evident across lesson plans, where vocabulary support consistently appeared during the pre-reading stage.

Procedural scaffolding was another common form of support. AI-generated guiding questions, reading prompts, and step-by-step instruction were incorporated to help learners navigate texts more systematically. One participant noted:

"*I used Gemini to suggest ideas for pre-reading activities and guiding questions because I didn't know how to start designing them effectively.*" (PST2).

Rather than directing learners toward predetermined answers, these supports encouraged strategic engagement with reading tasks.

Conceptual scaffolding frequently took the form of graphic organizers, visual prompts, and discussion questions designed to help learners organize information and construct meaning. Several PSTs reported using AI-generated visual representations and idea maps as starting points, which they subsequently adapted to suit the lesson objectives and learners' proficiency levels. One PST reflected:

"*The visual prompts made it easier for students to see the connections between ideas before discussing the text.*" (PST6).

Affective scaffolding was also evident through the use of supportive prompts, collaborative activities, and visually engaging materials intended to reduce anxiety and increase willingness to participate. According to one PST:

"*When students had guiding questions and pictures to support them, they seemed less afraid of making mistakes and were more willing to share their ideas*." (PST1).

This observation indicates that the scaffolds served not only cognitive functions but also affective ones by reducing learners' anxiety and encouraging more active participation in reading activities, which is consistent with the principles of inclusive pedagogy. These findings support Gibbons' (2015) argument that scaffolding functions as a bridge between learners' current capabilities and the demands of academic tasks. Consistent with inclusive pedagogy (Florian, 2015), scaffolds were not reserved exclusively for lower-proficiency learners but were made available to the entire class. As one PST explained:

"*The support was there for everyone. Stronger students did not always need them, but weaker students could use them whenever necessary*." (PST4).

Higher-proficiency learners often used the support selectively, whereas lower-proficiency learners relied on them more extensively. This suggests that AI-supported scaffold design enabled PSTs to operationalize inclusion through shared learning resources rather than separate instructional pathways. The findings suggest that AI-supported scaffold design may serve as a practical mechanism for enacting inclusive reading instruction in mixed-ability classrooms. Rather than transforming instruction through technology alone, AI supported PSTs in designing learning environments that increased accessibility while maintaining common curricular expectations. The value of AI therefore lies not simply in generating materials but in enhancing teachers' capacity to respond to learner diversity in pedagogically meaningful ways.

4.2. Learners' Perceptions of AI-Supported Scaffolds and Engagement

Analysis of learner reflection forms reveals that AI-supported scaffolds enhance lower-proficiency learners' behavioral, emotional, and cognitive engagement during reading activities.

Regarding the behavioral aspect, the learners reported greater participation in reading tasks, discussions, and group work. Many indicated that guiding questions and structured activities encouraged them to contribute more actively rather than remaining passive observers. As one learner explained:

"*The questions helped me know what to focus on when reading, so I could participate in the discussion instead of just listening to my classmates.*" (L7).

Similarly, another learner noted:

"*Before, I often waited for others to answer. With the support sheets, I felt more confident trying by myself.*" (L12).

These perceptions were consistent with PSTs' observations that lower-proficiency learners demonstrated greater willingness to attempt reading tasks and respond to questions during lessons.

Emotional engagement emerged as another prominent theme. The learners frequently described feeling more confident and less anxious when vocabulary support, visual prompts, and structured guidance were provided. One learner reflected:

"*The vocabulary list made me feel less nervous because I could understand the text better before reading.*" (L3).

Another commented:

"*The pictures and guiding questions helped me understand the lesson, so I was not afraid of giving the wrong answer.*" (L15).

These findings align with affective scaffolding literature, which suggests that appropriate support can reduce anxiety and foster participation (Pellas, 2014; Wang et al., 2021). Importantly, the findings suggest that accessibility is not solely a cognitive issue but also an emotional one. When learners felt more capable of tackling the text, they appeared more willing to participate in classroom activities.

Also, cognitive engagement was reflected in the EFL learners' descriptions of how scaffolds supported comprehension and strategy use. Rather than relying solely on teacher explanations, learners reported using glossaries, guiding questions, and visual organizers to construct meaning independently. As one learner explained:

"*The questions helped me think about the text step by step instead of translating every word.*" (L5).

Another learner noted:

"*The diagram helped me connect the ideas and understand the text more easily.*" (L19).

These comments suggest that the scaffolds encouraged the learners to engage more actively with meaning-making processes rather than focusing exclusively on linguistic decoding. This finding supports Fredricks et al.'s (2004) multidimensional view of engagement and highlights the importance of scaffolded support in promoting deeper participation in reading activities.

Importantly, engagement was not uniform across all learners. Some lower-proficiency students remained heavily dependent on scaffolds and peer assistance, suggesting that support alone does not immediately lead to learner autonomy. However, from an inclusive pedagogy perspective, complete independence may not be the primary goal. Rather, meaningful participation in shared classroom activities represents an important outcome in itself (Florian, 2015). The findings indicate that AI-supported scaffolds enabled learners to engage with the same texts, tasks, and learning objectives as their peers while accessing varying levels of support according to their needs.

Beyond improving participation, the findings also suggest that scaffolding may help transform learners' perceptions of themselves as readers. Several learners mentioned moving from a position of uncertainty and avoidance toward greater confidence and willingness to engage with challenging texts. This shift is significant because lower-proficiency learners are often at risk of becoming what Tomlinson & Imbeau (2010) describe as "mental dropouts" - students being physically present but cognitively disengaged from learning. By increasing accessibility and reducing barriers to participation, the scaffolds appeared to create conditions under which learners could remain actively involved in classroom reading activities.

In short, the findings suggest that AI-supported scaffold design contributed not only to reading comprehension but also to learners' opportunities for behavioral, emotional, and cognitive engagement. This reinforces the argument that inclusive reading instruction should be evaluated not solely in terms of achievement outcomes but also in terms of learners' capacity to participate meaningfully in shared learning experiences.

4.3. Affordances and Constraints of AI-Supported Scaffold Design

The PSTs identified several affordances associated with the use of AI as a design-support tool. The most frequently reported benefit was efficiency. Participants emphasized that AI enabled them to generate instructional ideas, vocabulary supports, comprehension questions, and reading activities more quickly compared to traditional planning methods. For novice teachers managing heavy practicum workloads, this reduction in preparation time was particularly valuable. As one PST explained:

"*AI helped me generate ideas much faster. When I was unsure how to start a reading lesson, it suggested activities and questions that I could adapt for my students.*" (PST2).

Similarly, another participant commented:

"*Preparing materials for lower-proficiency students usually takes a lot of time, but AI gave me a useful starting point that I could modify.*" (PST5).

A second affordance involves pedagogical support. AI functioned as a cognitive partner that helped the PSTs explore alternative instructional approaches and create a wider range of scaffolds than they believed they could have developed independently. One PST reflected:

"*Sometimes I only thought about vocabulary support, but AI suggested graphic organizers and guiding questions that I had not considered.*" (PST6).

This finding is consistent with recent research suggesting that AI can enhance teachers' creativity and instructional decision-making. Beyond improving efficiency, AI appeared to expand PSTs' pedagogical repertoires by exposing them to different forms of instructional support.

However, several constraints were also identified. First, the PSTs tended to rely heavily on lexical scaffolding, particularly vocabulary glossaries, sometimes at the expense of procedural or conceptual support. This suggests that novice teachers may perceive vocabulary as the primary barrier to reading comprehension while paying less attention to higher-order reading processes. Such a pattern may reflect the developmental nature of teacher learning, whereby beginning teachers initially focus on visible linguistic difficulties before developing a deeper understanding of reading as a strategic and meaning-making process (Gibbons, 2015).

Second, AI-generated materials often required substantial adaptation because they did not always align with classroom realities or learners' specific needs. The participants consistently emphasized the importance of reviewing and modifying AI outputs before classroom implementation. As one PST noted:

"*The AI-generated questions were useful, but some were too difficult or not suitable for my students, so I had to revise them.*" (PST4).

Another participant similarly observed:

"*AI does not know my learners. I still needed to adjust the materials based on their level and the lesson objectives.*" (PST1).

These comments highlight that AI-generated outputs were not automatically pedagogically appropriate and required contextualization by teachers. This finding reinforces the view that teacher expertise remains essential in evaluating the quality, relevance, and accessibility of instructional materials.

A further challenge related to contextual constraints such as large class sizes, limited lesson time, and the pressure to complete textbook content. These factors reduced opportunities for extensive differentiation and individualized support. One PST explained:

"*Even when I had prepared different supports, there was not always enough time to work closely with students who needed more help.*" (PST7).

This suggests that inclusive instruction is influenced not only by the availability of instructional resources but also by broader classroom and institutional conditions.

The findings further indicate that AI alone cannot guarantee inclusive instruction. Rather, its effectiveness depends on how teachers integrate AI-generated resources into pedagogically meaningful practices. Consistent with the conceptual framework, AI supported inclusion indirectly by assisting PSTs in designing scaffolds that enhanced accessibility to reading tasks. However, the quality of these scaffolds ultimately depended on teachers' professional judgment, knowledge of learners, and ability to adapt materials to specific classroom contexts.

To conclude, the findings suggest that AI should be viewed not as a substitute for teacher expertise but as a supportive resource that enhances teachers' capacity to respond to learner diversity. For pre-service teachers in particular, AI appeared to function as a form of pedagogical and cognitive support that reduced planning workload while encouraging experimentation with inclusive instructional practices. These findings extend recent research on generative AI in language teacher education (e.g., Moorhouse et al., 2024) by demonstrating how AI can support pre-service teachers in designing pedagogical scaffolds for inclusive reading instruction during authentic teaching practicum. These findings therefore contribute to emerging discussions on how teacher education programs can prepare future teachers to use AI critically, creatively, and responsibly in support of inclusive language teaching.

5. CONCLUSION

This study investigates the use of AI as a design-support tool to support pre-service teachers to create scaffolding resources for lower-proficiency learners in mixed-ability EFL reading classrooms. The findings reveal that AI facilitates the construction of lexical, procedural, conceptual, and affective scaffolds that enhance learners' access to reading activities while maintaining common curricular goals. The findings further suggest that AI-supported scaffolds contributed to learners' behavioral, emotional, and cognitive engagement by increasing participation,

confidence, and comprehension. At the same time, the effectiveness of AI-generated materials depends largely on teachers' pedagogical judgment and their ability to adapt resources to learners' needs and classroom contexts.

Beyond its practical implications, this study contributes to the emerging literature on generative AI in language education in three ways. First, it conceptualizes AI as a teacher-facing design-support tool that assists pre-service teachers in designing pedagogical scaffolds rather than replacing their professional judgment. Second, it extends the application of inclusive pedagogy by illustrating how AI-supported scaffold design can facilitate equitable access to shared reading tasks for lower-proficiency learners. Finally, by drawing on multiple qualitative data sources collected during an authentic teaching practicum, the study provides contextualized evidence of how pre-service teachers integrate AI into instructional design within real classroom settings.

The study highlights the promising potential of AI as a teacher-facing tool to support inclusive reading instruction. The findings have implications for teacher education programs in that they highlight the need to prepare pre-service teachers to critically and purposefully use AI in their scaffold design. However, given the small-scale and context-specific nature of the study, further research involving larger samples and diverse educational settings is needed.

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