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Emotional Engagement AI-Supported Online English Learning: A Mixed-Methods Study Among Indonesian EFL Students

Ghisna Madina*
State Islamic University of K.H. Abdurrahman Wahid Pekalongan, Indonesia
*madinaghisna@gmail.com

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Abstrak

This study explores how emotional engagement shapes learners' experiences in AI-supported online English learning environments. Using a mixed-methods design, this research combines quantitative surveys, learning analytics, and qualitative interviews to investigate the relationship between emotional states, motivation, and learning performance among 60 Indonesian EFL students aged 18–24. Results reveal that emotion-based feedback, adaptive chatbots, and multimodal instructional design significantly enhance students' enjoyment, confidence, and motivation while reducing anxiety. Multimodal feedback integrating visual and verbal cues proved particularly effective in fostering positive emotions and sustaining long-term engagement. However, excessive reliance on AI may limit opportunities for social interaction and the development of critical thinking. These findings emphasize the need for a hybrid pedagogical model that balances human empathy with technological adaptability. Overall, this study contributes to affective computing in education by promoting emotion-sensitive learning design to create inclusive, engaging, and human-centered digital learning environments. Future research is recommended to employ longitudinal and experimental designs to examine the long-term impact of emotional engagement on learning outcomes.

Keywords:
Affective computing, artificial Intelligence, emotional engagement, multimodal feedback, online English learning.

Introduction

The rapid global shift to online learning, accelerated by the COVID-19 pandemic, underscores the need for educators and researchers to develop effective pedagogical approaches to foster cognitive and emotional engagement in digital environments (Alian & Mohamed, 2025). Although the adoption of online learning platforms is growing rapidly, there remains a gap in understanding how existing teaching strategies can be optimized to meet learners' emotional needs. In fact, the emotional aspect plays an important role in maintaining engagement and long-term learning success. This transformation towards digital learning requires a deeper understanding of how the interaction between cognitive and emotional factors can influence learning outcomes and sustained participation in virtual classrooms (Abdul Wahab & Ab. Hadi, 2024).

Cognitive engagement involves attention, effort, and metacognitive strategies. Emotional engagement includes both positive emotions, such as enjoyment and confidence, and negative emotions, such as boredom and anxiety. These emotions strongly affect learning outcomes (Shea & Rice, 2023). Understanding emotions is especially relevant in online English learning (Ng & Cheung, 2025). For instance, a student may start out feeling

overwhelmed or bored, but personalized feedback and interactive activities can boost enjoyment and confidence. This shift shows emotional factors can significantly impact learning success.

The broaden-and-build and control-and-value theories explain that emotions can either facilitate or hinder second language learning (Zhao & Wang, 2023). With the increasing use of online platforms, research on the role of emotions is becoming increasingly important, as emotions directly impact instructional success and learner motivation (Ng & Cheung, 2025). Although generative artificial intelligence (AI) technology in language education has attracted academic attention, many discussions still ignore learners' emotions, even though emotions are the primary foundation for the development of second language skills (Zhang & Liu, 2025). AI has the potential to foster positive feelings, such as interest, and to reduce anxiety, thereby improving learning outcomes (Zhang & Liu, 2025). In this context, decreases in lexical anxiety and increases in student interest can be concrete indicators of AI's effectiveness in strengthening emotional engagement. By systematically analyzing this data, this study aims to provide concrete evidence of AI's contribution to enhancing a more emotionally meaningful learning experience.

The variety of digital learning formats often makes it difficult for educators to maintain student motivation and emotional engagement (Ang et al., 2021). Therefore, building an online learning environment that is emotionally intelligent and adaptable to learners' needs is very important (Derakhshan & Zhang, 2024). To sustain motivation, scaffolding strategies such as peer mentoring and reflective prompts can be effective. Peer mentoring helps students support each other in facing challenges, while reflective prompts encourage learners to reflect on themselves and set more meaningful learning goals. The integration of these two approaches can create a learning framework that fosters emotional engagement and maintains long-term motivation. Thus, this study focuses on how emotional engagement shapes the online English learning process, emphasizing that the dynamic interplay among emotions, motivation, resilience, and social support lies at the core of effective digital pedagogy (Teng et al., 2024; Ghanizadeh & Yazdi, 2023). Furthermore, innovations such as artificial intelligence, virtual reality, and podcasting are believed to create new opportunities for more immersive learning experiences while supporting learners' emotional well-being (Santi et al., 2024).

Literature Review

AI Integration and Emotional Engagement in EFL Contexts

The integration of artificial intelligence (AI) into English as a Foreign Language (EFL) learning has elicited a variety of emotional responses from learners, with many studies showing a predominance of positive experiences (Pan & Li, 2025; Zhang & Liu, 2025). AI-based learning platforms create a more personalized, interactive, and adaptive learning experience, thereby increasing students' cognitive, emotional, and behavioral engagement (Cao & Phongsatha, 2025). However, it is important to remember that not all learners benefit equally from AI-based personalization. Factors such as social and economic inequality can affect access to such technology, ultimately creating disparities in learning opportunities. Therefore, future research should highlight ways to address these inequalities so that the benefits of AI in language learning are felt equitably by all.

Through customized feedback and adaptive scaffolding, AI can support individual learning needs, thereby promoting learners' motivation, confidence, and self-regulation skills (Alqurashi, 2025; Lee et al., 2023). In addition, the use of AI in instruction can also help reduce foreign language anxiety by creating a safer, more supportive, and pressure-free learning environment, allowing learners to practice and reflect continuously (Wah, 2025).

The Affective Dimension of AI-Assisted Language Learning

Although the affective potential of AI-based learning is tremendous, previous research has tended to focus on cognitive outcomes rather than emotional dimensions (AlTwijri & Alghizzi, 2024). In fact, cognitive and affective aspects are interdependent and equally important in the language learning process. Therefore, AI application design should not only help learners master the language but also foster positive emotions such as enjoyment and motivation, and reduce anxiety (Vistorte et al., 2024). To bridge this gap, concrete affective metrics are needed to systematically measure learners' emotions. For example, enjoyment levels can be measured through student satisfaction and engagement surveys, motivation can be assessed by the achievement of learning objectives, and anxiety reduction can be observed through a decrease in the frequency of stress responses or in dropout rates.

This view aligns with modern emotional engagement theory, which emphasizes that affective responses play a major role in shaping perseverance, confidence, and willingness to communicate. Thus, emotion-sensitive learning design is essential to ensure that technology not only improves knowledge acquisition but also strengthens learners' emotional resilience. Certain design elements can help achieve this. For example, using supportive language and a positive tone in AI interactions can foster student confidence. Timely feedback can prevent overload and maintain motivation, while visual displays such as progress bars or reward symbols can reinforce a sense of achievement. These examples show how emotional engagement theory can be practically applied in AI-based learning design.

Emerging Challenges and Hybrid Learning Approaches

While promising, AI integration also presents several challenges, including data privacy issues, infrastructure limitations, and the risk of over-reliance on automated systems (Yuan, 2025). In addition, there is a systemic risk when AI algorithms unintentionally create bias or harm certain groups. Therefore, ensuring fairness in data management is crucial to reducing this potential bias. To address these challenges, a balanced pedagogical approach that combines AI's adaptive capabilities with human empathy is needed. Hybrid learning models that integrate human elements such as guidance and social interaction while leveraging AI's personalization and scalability are considered the most sustainable approach for the future of language education (Nguyen, 2024; Yuan, 2025).

The Role of AI Chatbots in Enhancing Emotional Engagement

AI-based chatbots have become effective tools for supporting interactive and emotionally engaging learning experiences (Chang et al., 2023; Alazemi, 2024). Their ability to provide instant feedback, facilitate repeated practice, and simulate real conversations can increase engagement, confidence, and emotional well-being among learners (Lee et al., 2023). Additionally, modern chatbots can now integrate multimodal interactions such as voice recognition and haptic feedback, creating a more authentic learning experience. For example, voice recognition features make conversations feel more natural, while haptic feedback can simulate real-world interactions. With these capabilities, chatbots are an important step toward the development of emotionally sensitive educational technology that can support the achievement of both cognitive and affective learning objectives.

Methodology

Research Design

To comprehensively answer the main research question, this study uses a mixed-methods approach that combines quantitative data and qualitative narratives. This approach was chosen because it allows researchers to capture the entire dimension of students' emotional involvement in online English learning supported by artificial intelligence (AI). This mixed-method approach was applied at several key stages, including follow-up interviews to explain quantitative results and simultaneous data collection. This approach provides a more comprehensive understanding of the phenomenon under study and increases the validity of the results through methodological triangulation (Kruk & Kałużna, 2024). This design is considered most appropriate for exploring the complex and dynamic nature of emotional engagement, as it combines measurable behavioral indicators with subjective emotional experiences.

Participants

Sixty Indonesian EFL learners aged 18–24 participated voluntarily. All participants were enrolled in private English courses and possessed intermediate to upper-intermediate proficiency (CEFR B1–B2). Participants' digital literacy ranged from beginner to expert, based on their familiarity with tools such as ChatGPT and GrammarlyGO.

Table 1. Participant Demographics (N = 60)

Variable	Category	n	%
Gender	Male / Female	25 / 35	41.7 / 58.3
Age Range	18–20 / 21–24	28 / 32	46.7 / 53.3
English Proficiency	B1 / B2	40 / 20	66.7 / 33.3
AI Tool Familiarity	Beginner / Competent / Expert	15 / 30 / 15	25.0 / 50.0 / 25.0

Table 1. summarizes the participants' demographic information.

Instruments and Data Collection

Data were gathered through (1) online questionnaires measuring emotional engagement, motivation, and anxiety, (2) learning analytics data (login frequency, task completion, interaction duration), and (3) semi-structured interviews exploring learners' emotional experiences. The survey employed items from the Achievement Emotions Questionnaire (Pekrun et al., 2002) and the Online Learning Engagement Scale (Dixson, 2015), using a five-point Likert scale.

Data collection occurred over eight weeks through an online English course that integrated chatbots and AI-based feedback systems. Informed consent and ethical approval were obtained, ensuring participant confidentiality and algorithmic fairness (Lišnić et al., 2025; Zainuddin, 2024).

Data Analysis

Quantitative data were analyzed using SPSS (Version 28) through descriptive and correlational analyses. Qualitative data were examined thematically (Braun & Clarke, 2006)

to identify emotional patterns and contextualize quantitative findings. Integration of both results produced a comprehensive model of emotional engagement.

Table 2. Descriptive Statistics of Emotional Engagement Variables (N = 60)

Variable	**Mean (M)**	**SD**	**Range**	**Interpretation**
Enjoyment	4.20	0.52	1-5	High
Motivation	4.05	0.60	1-5	High
Confidence	4.10	0.58	1-5	High
Anxiety	2.75	0.73	1-5	Moderate
Performance	4.00	0.55	1-5	High

Table 3. Correlations among Emotional Engagement Variables

Variables	1	2	3	4	5
1. Enjoyment	—				
2. Motivation	.65**	—			
3. Confidence	.59**	.61**	—		
4. Anxiety	−.48**	−.39*	−.41*	—	
5. Performance	.52**	.44*	.46**	−.33*	—
Note: $p < .05$, **p** < .01.					

Quantitative findings demonstrate that multimodal corrective feedback combining visual and verbal cues significantly improved learners' enjoyment and confidence while reducing anxiety. As shown in Table 2, participants reported high levels of enjoyment (M = 4.20, SD = 0.52) and motivation (M = 4.05, SD = 0.60), accompanied by moderate anxiety (M = 2.75, SD = 0.73). Correlational analysis (Table 3) indicates strong positive relationships among enjoyment, motivation, and confidence (r = .59–.65, p < .01), suggesting that positive affective states reinforce one another. Conversely, anxiety exhibited a moderate negative correlation with both motivation (r = −.39, p < .05) and performance (r = −.33, p < .05).

Theme	**Description**	**Example Quote**
Increased Enjoyment	Learners felt more excited and motivated during AI-assisted tasks.	I enjoyed seeing the chatbot's encouraging comments; it made learning feel fun.
Reduced Anxiety	Students felt less nervous receiving feedback from AI.	I wasn't afraid of making mistakes because the chatbot never judged me.
Improved	Repeated AI-guided practice boosted learners' self-assurance.	After a few sessions, I started to believe in my speaking ability.

Confidence		
Need for Human Connection	Some learners still desired more emotional warmth from teachers.	AI was helpful, but I missed personal interaction and empathy.

Table 4. Summary of Qualitative Themes on Learners' Emotional Experiences

Qualitative data supported these patterns. Learners described feeling more comfortable practicing speaking tasks when AI chatbots provided encouraging language and immediate feedback. Several participants reported that multimodal feedback helped them "feel guided rather than judged," promoting emotional safety and sustained participation. However, some participants noted a lack of genuine human connection when relying solely on AI-based tools.

Discussion

Findings indicate that emotionally responsive AI systems can enhance positive learning experiences by increasing enjoyment and motivation while reducing anxiety. These results are consistent with previous studies showing that emotionally sensitive feedback increases engagement and self-regulation (Derakhshan & Zhang, 2024; Zhang & Liu, 2025). The observed correlation confirms that emotional and motivational dimensions are interrelated: students who feel happier are also more motivated and confident in their learning.

However, over-reliance on AI can hinder social interaction and limit opportunities for deeper cognitive engagement (Chang et al., 2023). While AI provides rapid corrective feedback, it lacks the empathy and contextual sensitivity characteristic of human instruction. According to cognitive load theory, overly immediate or superficial AI feedback can increase irrelevant cognitive load, hindering deeper reflection (Ortega-Ochoa et al., 2024). Therefore, educators should balance the use of AI with collaborative and reflective activities that foster emotional resilience and critical thinking.

Furthermore, incorporating social presence through peer-supported AI activities can enhance affective and cognitive outcomes. Integrating human feedback with AI-generated responses can bridge the emotional gap, ensuring that technology complements rather than replaces teacher empathy. Pedagogically, this means that AI tools should function as supportive partners in fostering motivation and self-confidence, rather than as autonomous instructors.

Conclusion

This study highlights the crucial role of emotional engagement in online English language learning supported by artificial intelligence (AI). Emotionally intelligent feedback, adaptive chatbots, and multimodal design effectively increase enjoyment, motivation, and confidence while reducing anxiety. However, human facilitation remains essential for developing higher-order thinking and emotional growth. These findings contribute to affective computing in education by emphasizing how emotion-sensitive design can promote humanistic digital learning experiences.

Future research should use experimental and longitudinal designs to validate these findings in larger populations and explore the long-term effects of emotion-based feedback on language performance. Ultimately, integrating empathy-driven AI systems and hybrid pedagogy will be key to creating inclusive, engaging, and human-centered online learning environments.

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