Journal Of the Iraqia University (74-8) December(2025)

ISSN(Print): 1813-4521 OnIine ISSN:2663-7502
Journal Of the Iraqia University
available online at: https://www.mabdaa.edu.iq

The Double-Edged Sword of AI in Iraqi EFL Context: A Multidimensional Investigation of its Effects on Learner Engagement and Motivation

علي فريد فرحان

زياد طارق احمد

السيف ذو الحدّين للذكاء الاصطناعي في سياق تعلّم الإنجليزية بالعراق: دراسة متعددة الأبعاد لاستقصاء تأثيراته على تفاعل المتعلمين ودافعيتهم.

a.fareed@ilam.ac.ir
z.tareqahmed@ilam.ac.ir

الملخص

يُعد استخدام الذكاء الاصطناعي في تدريس اللغة الإنجليزية كلغة أجنبية واعدًا للغاية ولكنه يواجه بعض الصعوبات، لا سيما في الثقافات عالية السياق مثل العراق. كان الهدف الرئيسي من هذه الدراسة هو تقصّي مدى مساهمة استخدام الذكاء الاصطناعي في تعزيز أو تثبيط دافعية المتعلمين ومشاركتهم، مع الأخذ بالاعتبار مستويات الكفاءة المختلفة والجنس في سياق تعلم اللغة الإنجليزية كلغة أجنبية في العراق. تم استخدام منهج كمّي، مع استبيان مكوَّن من أداتي شيبمان ورودواي (٢٠٢٠) ونوردهاوغ (١٩٨٩)، وتمت ترجمته إلى العربية واختباره مبدئيًا (معامل كرونباخ ألفا: ٠.٩٠ للمشاركة، ٠.٩٢ للدافعية). تم جمع البيانات من ٢٨٥ متعلمًا عراقيًا للغة الإنجليزية كلغة أجنبية (١٥٢ أنثى، ١٣٣ ذكرًا؛ ٨٥ مبتدئًا، ١٤٠ متوسط المستوى، ٦٠ متقدمًا) من معاهد اللغة الإنجليزية عبر تطبيقي تيليجرام وواتساب، وتم قياس مستوى الكفاءة باستخدام اختبار أكسفورد السريع للتحديد المستوى. أظهرت النتائج أن الذكاء الاصطناعي عزَّز بشكل ملحوظ المشاركة ($r = 0.585, p < 0.001$) والدافعية ($r = 0.622, p < 0.001$)، خاصة لدى المتعلمين الأعلى مستوى (المشاركة: $M = 40.65$؛ الدافعية: $M = 41.48$)، بينما كان له تأثيرات مثبطة أكثر على المبتدئين (المشاركة: $M = 32.56$؛ الدافعية: $M = 23.09$). لم تكن هناك فروق بين الجنسين. تشير هذه النتائج إلى أن فوائد الذكاء الاصطناعي مرهونة بمستوى الكفاءة، مما يحمل بعض الآثار المترتبة على تصميم أدوات ذكاء اصطناعي ملائمة ثقافيًا ومرتكزة على المستخدم لدعم تعلم اللغة الإنجليزية كلغة أجنبية في العراق

Abstract

The use of artificial intelligence (AI) in English as a Foreign Language (EFL) has been of great promise yet problematic, particularly in high-context cultures like Iraq. The main aim of this study was to investigate the extent to which the employment of AI promoted or discouraged learner motivation and engagement with diverse proficiency levels and genders in the Iraqi EFL context. A quantitative approach was employed, with an integrated questionnaire from Schepman and Rodway (2020) and Nordhaug (1989) translated into Arabic and pilot-tested (Cronbach's alpha: 0.90 for engagement, 0.92 for motivation). Data were collected from 285 Iraqi EFL learners (152 females, 133 males; 85 beginners, 140 intermediates, 60 advanced) from English institutes via Telegram and WhatsApp, and proficiency was measured using the Oxford Quick Placement Test. Outcomes identified that AI significantly enhanced engagement ($r = 0.585$, $p < 0.001$) and motivation ($r = 0.622$, $p < 0.001$), particularly from higher learners (engagement: $M = 40.65$; motivation: $M = 41.48$), while novices had more inhibiting effects (engagement: $M = 32.56$; motivation: $M = 23.09$). There were no gender differences. These findings suggest that the benefits of AI are contingent on proficiency, with some implications for creating culturally appropriate, user-oriented AI tools to support EFL learning in Iraq**Keywords**: Artificial Intelligence, learner engagement, motivation, proficiency levels, gender.

Introduction

The integration of artificial intelligence (AI) in the English as a Foreign Language (EFL) teaching context has transformed teaching practice, introducing new technology in the form of chatbots, intelligent tutoring systems, and adaptive platforms like Duolingo and Elsa SpeakOne-on-one feedback, real-time interaction, and personalized content are offered by these technologies, addressing individual learners' needs within different contexts (Derakhshan et al., 2025; Derakhshan, 2025). In the Iraqi EFL setting, with learners facing challenges in the form of linguistic and cultural variations, restricted exposure to native speakers, and differences in technological access, AI may help enhance learning outcomes (Padmanabhanunni & Pretorius, 2024; Qi & Derakhshan, 2024). However, the impact of AI is not always beneficial and can both enhance and impede critical learning processes, particularly engagement and motivation, with its impact also possibly varying regarding proficiency levels and gender in such a high-context culture. Learner engagement in EFL encompasses behavioral (e.g., participation), emotional (e.g., interest), and cognitive (e.g., effort) dimensions, which are crucial for second language learning (Kandiko Howson & Buckley, 2017; Ma & Chen, 2024).AI technologies can improve engagement through instant feedback, modeled interactive dialogues, and responding to learners' emotional and cognitive needs, thereby alleviating anxiety and promoting persistence (Derakhshan & Fathi, 2024a; Yang & Rui, 2025). More advanced learners, with greater proficiency, will be assisted more by the autonomy support features of AI, while novices can suffer from technical complexity and engage in disengagement (Zhai et al., 2025). Engagement could also be affected by gender because cultural expectations in Iraq can determine how male and female users engage with technology (Alam et al., 2024). Nevertheless, the possible downsides of AI, e.g., over-reliance on technology, technical frustrations, or less interaction with people, could discourage engagement, especially in a collectivist society where teacher-student relationships are important (Klimova & Pikhart, 2025; Padmanabhanunni & Pretorius, 2024). Intrinsic (e.g., enjoyment) and extrinsic motivation (e.g., grades, job opportunities) facilitates persistence and success among EFL learners (Mohamed et al., 2025; Wang et al., 2024).Motivation can be enhanced by AI through gamification, personalized learning routes, and autonomy support, aligning with Self-Determination Theory (Derakhshan, 2025; Fan et al., 2024). Advanced students are able to experience stronger motivational boosts through heightened self-efficacy, while beginners may face barriers like algorithmic biases or depersonalization, reducing intrinsic motivation (Zhai et al., 2024). Gender differences can be observed, with females in some settings reflecting greater technology anxiety, potentially having an impact on motivation (Wang et al., 2024). In Iraq, where high-stakes exams and socioeconomic pressures shape EFL learning, AI's ethical concerns or cultural mismatches may further inhibit motivation (Klimova & Pikhart, 2025). Despite growing research on AI in EFL, a significant gap remains in examining its dual effects across diverse learner profiles, particularly in high-context cultures like Iraq.All research centers on overall advantages or single variables, ignoring how levels of proficiency and gender mediate the effect of AI in environments with specific cultural and technology-related problems (Ma'amor et al., 2024; Yang & Rui, 2025). The Iraqi situation, given the digital divides and the cultural precedence for social learning, requires a balanced examination of the promoting and hindering effects of AI (Alam et al., 2024; Qi & Derakhshan, 2024). This study addresses this gap using a quantitative approach, employing questionnaires to explore AI's role across proficiency levels (beginner, intermediate, advanced) and genders. To guide this inquiry, the following research questions were posed:

1) To what extent does AI usage enhance or inhibit learner engagement across diverse proficiency levels and genders in the Iraqi EFL context?
2) To what extent does AI usage enhance or inhibit learner motivation across diverse proficiency levels and genders in the Iraqi EFL context?

This research will contribute to the understanding of AI's dual effects on learner engagement and motivation in the Iraqi EFL context, particularly by examining how proficiency levels and gender moderate these outcomes. By addressing the gap in culturally sensitive AI applications in high-context settings, the study offers insights for educators and policymakers to optimize AI integration, balancing its enhancing benefits with strategies to mitigate inhibiting factors, thus informing effective EFL pedagogies.

Literature Review

The integration of AI into EFL learning has revolutionized learning processes, offering technologies like chatbots, intelligent tutoring systems, and adaptive systems that personalize instruction and offer real-time feedback (Derakhshan et al., 2025; Derakhshan & Fathi, 2024a). These tools can enhance learner motivation and engagement but have varying impacts across proficiency levels and genders, particularly in high-context cultures like Iraq, where effects are mediated by cultural and technological factors (Padmanabhanunni &

Pretorius, 2024; Qi & Derakhshan, 2024). AI's dual nature—enhancing through personalization but inhibiting through over-reliance, technical issues, or cultural mismatches—requires nuanced exploration, especially in contexts with digital divides and strong social learning traditions (Klimova & Pikhart, 2025; Zhai et al., 2025). Proficiency levels may moderate AI's effects, with advanced learners potentially benefiting more from autonomy-supporting features, while beginners face barriers like technostress. Gender could also play a role, as cultural norms may shape technology adoption differently for males and females (Alam et al., 2024; Wang et al., 2024).Theoretical frameworks provide insight into AI's impact on engagement and motivation across diverse learner profiles. SDT posits that autonomy, competence, and relatedness drive motivation and engagement, with AI's personalized feedback fostering these for advanced learners, though inhibiting relatedness for beginners due to reduced human interaction (Derakhshan, 2025; Kaźmierczak et al., 2025). Engagement Theory (ET) emphasizes technology's role in promoting interactive learning, but its effectiveness may depend on learners' proficiency and comfort with AI tools (Guo & Wang, 2025). The Technology Acceptance Model (TAM) suggests that the adoption of AI is determined by perceived ease of use and usefulness, and gender and proficiency may have moderating effects on perceptions, particularly in high-context settings where usability issues can disproportionately affect novices or females (Alam et al., 2024). Cognitive Behavioral Theory (CBT) highlights AI's potential to reduce anxiety, enhancing emotional engagement, but poorly designed tools may exacerbate stress, especially for less proficient learners (Krifa et al., 2022; Qi & Wang, 2024). These theories underscore the need to examine AI's effects across proficiency and gender in culturally specific contexts.Empirical studies have explored AI's dual effects, though few address proficiency and gender explicitly. Yang and Rui (2025) investigated AI's impact on engagement and emotional health among 673 Chinese university EFL students (aged 17-26), using questionnaires like the AI-Enhanced Learning Environment Assessments Questionnaire (r=0.89) and Engagement Survey (r=0.91). Findings showed AI personalization enhanced engagement, particularly for higher-proficiency learners, but technical issues inhibited engagement for others, with no significant gender differences reported. Ma and Chen (2024) conducted a quasi-experiment on 350 Chinese EFL learners, using engagement and procrastination inventories. AI-supported tools indicated a significant boost of affective, cognitive, and behavioral engagement, with stronger effects for intermediate and advanced learners, suggesting proficiency as a moderator, without examining gender, however.With respect to motivation, Mohamed et al. (2025) surveyed 455 students in Egypt, Saudi Arabia, Spain, and Poland using a 10-item Likert-scale questionnaire (r=0.88). AI facilitated intrinsic motivation through autonomy, with older students and education technology majors contributing to the largest impacts, and ethical concerns stifling motivation for others. Gender differences were small, consistent with Iraq's vision of gender-blind AI effects (Qi & Derakhshan, 2024). Fan et al. (2024) compared 117 university students' writing motivation in AI-supported, human-supported, and control conditions and found that AI improved performance but might cause metacognitive laziness, particularly for less capable learners. Ma'amor et al. (2024) analyzed 110 Malaysian undergraduates' questionnaire data, reporting AI-enhanced motivation and engagement but limited personalization benefits, with no gender effects noted.Negative effects are also documented. Klimova and Pikhart (2025) synthesized literature on AI's impact on student well-being, noting personalization benefits but risks like digital fatigue and isolation, particularly for beginners. Zhai et al. (2024) consolidated 14 papers to establish that excessive reliance on AI negatively affects critical thinking with consequences for lower-proficient learners. Wang et al. (2024) used PLS-SEM on Taiwanese data to discover AI-triggered anxiety stifled motivation, where female students experienced more anxiety, suggesting gender as a potential moderator in some environments. These studies, largely conducted in Asian or European settings, highlight proficiency as a key factor but rarely explore gender or high-context cultural dynamics.Despite these insights, a significant gap persists in measuring AI's enhancing and inhibiting effects on engagement and motivation in high-context cultures like Iraq, particularly across diverse proficiency levels and genders. Current literature tends to concentrate on general or low-context environments, paying less attention to how the cultural dimensions of a country like Iraq, with its strong focus on social relationships, or learner variables of proficiency and gender, moderate the effects of AI (Alam et al., 2024; Padmanabhanunni & Pretorius, 2024). Research in Iraq is scarce, seldom tackling digital divides or mismatches in culture that may exacerbate inhibition among beginners or affect gender roles (Qi & Derakhshan, 2024). This study fills this gap by examining quantitatively the dual impacts of AI in the Iraqi EFL context, considering proficiency and gender as moderators to ensure culturally responsive teaching practice.

Methodology

The study employed a quantitative design to investigate the dual-edged impact of AI on learner motivation and engagement within the Iraqi EFL context. A survey strategy was employed, which focused on self-reported data collected using questionnaires to capture the reinforcing and inhibiting effects of AI use. This method aligns with earlier EFL and AI integration quantitative studies allowing for statistical analysis of variable relationships (Ma & Chen, 2024; Yang & Rui, 2025). Descriptive statistics, reliability tests, and inferential analysis were employed in analyzing data and answering the research questions.

Participants

A total of 285 Iraqi EFL learners participated in the research, who were taken from different English language centers in major Iraqi cities like Baghdad, Erbil, and Basra. The subjects were adult learners between 18 and 35 years of age, with the gender distribution being 152 female (53.3%) and 133 male (46.7%). For methodological soundness and maximum generalizability of findings, English proficiency levels were assessed with the Oxford Quick Placement Test (OQPT), a conventional placement test for placing learners at beginner (A1-A2), intermediate (B1-B2), and advanced (C1-C2) levels based on CEFR standards. The sample comprised 85 beginners (29.8%), 140 intermediates (49.1%), and 60 advanced learners (21.1%). This stratification allowed subgroup analysis to be conducted to control for proficiency as a confounding variable, enhancing the results (Mohamed et al., 2025). Recruitment was effectively conducted via Telegram and WhatsApp supergroups linked with the institutes, offering a diverse but targeted sample without being confined to a few physical locations. This approach balanced instrumentality—using web sites to efficiently collect data—with academic rigor, as large samples (N>200) allow for reasonable statistical analysis. Informed consent was offered, and the answers were resilient, with 312 preliminary responses yielding 285 credible cases after excluding incomplete or outlier responses.

Instruments

Two questionnaires were devised to measure the study's variables: the Engagement Enhancement/Hindrance Scale and the Motivation Enhancement/Hindrance Scale. These were derived from standardized tools for administration in the Iraqi EFL context with emphasis on AI's double effect.The Engagement Enhancement/Hindrance Scale was adapted from Schepman and Rodway (2020), originally developed to assess attitudes towards AI having positive and negative aspects (original reliability: Cronbach's alpha = 0.88 for positive subscale, 0.85 for negative). The adapted version contains 20 items (10 enhancing, 10 inhibiting) on a 5-point Likert scale (1=Strongly Disagree to 5=Strongly Agree), expressly tailored to EFL situations such as language practice, feedback, and cultural adaptation. Items that enhance capture strengths like behavioral, emotional, and cognitive gains (e.g., "AI tools make EFL learning more interactive, encouraging me to complete tasks"), and items that hinder tackle weaknesses like isolation or frustration (e.g., "Over-relying on AI reduces my cognitive effort in EFL").The Motivation Enhancement/Hindrance Scale drew on Nordhaug (1989), which measures intrinsic and extrinsic motivation (initial reliability: Cronbach's alpha = 0.89 for intrinsic, 0.87 for extrinsic). The adapted scale includes 20 items (10 positive, 10 negative) on the same 5-point Likert scale, where EFL factors like autonomy in studying EFL and ethical concerns (e.g., positive: "AI's flexibility arouses my motivation for EFL working opportunities"; negative: "Overreliance on AI brings about metacognitive laziness in EFL, decreasing motivation") are incorporated. The context-specific English variants were translated into Arabic by two bilingual experts in EFL education to ensure linguistic and cultural equivalence.Back-translation was conducted to test for accuracy, pilot-tested afterwards with 30 Iraqi EFL learners who were not part of the main sample. Pilot feedback led to minor wording adjustments to ensure meaning. Internal consistency of the translated scales was assessed using Cronbach's alpha and was 0.90 for Engagement Scale (0.91 enhancing subscale, 0.89 inhibiting) and 0.92 for Motivation Scale (0.93 enhancing, 0.91 inhibiting), indicating high internal consistency. Validity was established by the view of experts: three experts (psychology, EFL pedagogy, and educational technology) reviewed the items for content meaningfulness and concurred entirely on face and construct validity with unanimous agreement on correspondence of the items to theoretical frameworks like SDT and ET. The two questionnaires were merged into a single tool for efficient administration, 40 items plus demographic items and the OQPT (as a front-end section).

Procedure

Measures were taken over four weeks during September 2025. Participants responded to the fused questionnaire using Google Forms links sent via Telegram and WhatsApp supergroups. They responded to the OQPT initially (approximately 10-15 minutes) to test levels of proficiency, followed by the primary scales (15-20 minutes). Ethical requirements included anonymity, data confidentiality, and the right to withdraw, as outlined in a first

consent document. Responses were automatically aggregated, reminders sent via groups to optimize response rates.

Data Analysis

Data analysis was conducted using SPSS software (Version 27) to examine the enhancing and inhibiting effects of AI on student engagement and motivation. A combination of descriptive and inferential statistics was employed to address the research questions. Descriptive statistics, including means (M) and standard deviations (SD), were calculated for engagement and motivation subscale scores. The 10 to 50 per subscale scores were computed as totals for the enhancing and inhibiting factors and used to mark higher effects by higher scores. This first analysis provided a little insight into general levels and variation across proficiency levels (beginner, intermediate, advanced) and gender, showing initial patterns like more enhancing scores in more proficient learners.Inferential statistics were used to examine significant differences and relationships, with proficiency and gender used as moderator variables. A one-way Analysis of Variance (ANOVA) was used to compare enhancing and inhibiting scores at the three proficiency levels, and post-hoc tests to determine specific pairwise differences. Independent samples t-tests were used to examine gender differences in scores. Furthermore, Pearson correlation coefficients were calculated to investigate the correlations between AI use and the subscale scores and hypothesized positive correlations for enhancing effects and negative correlations for inhibiting effects.The parametric assumptions of homoscedasticity, linearity, and normality (verified using Shapiro-Wilk tests) were met. Because the sample size was large (N=285) and parametric tests were insensitive to minor deviations, their use was acceptable in this educational research context. The significance level was $p < .05$. Comparisons between subgroups based on gender and proficiency added depth to the results, facilitating culturally sensitive interpretations within the Iraqi EFL context.

Results

Preliminary Analyses

OQPT scores were first investigated to confirm the distribution among proficiency levels (Beginner: 0-20, Intermediate: 21-40, Advanced: 41-60) and genders to verify the sample aligning with CEFR categories. Table 1 shows the OQPT scores by proficiency with the expected means to justify the grouping: Beginners (M = 15.34, SD = 3.17), Intermediates (M = 30.68, SD = 4.96), and Advanced (M = 49.14, SD = 4.95). Table 2 indicates gender scores, which were marginally higher in males (M = 31.77, SD = 12.87) compared to females (M = 28.37, SD = 12.42), but this was not statistically tested here as it is a descriptive analysis.

Table **1**

OQPT Scores by Proficiency Level

Proficiency	Mean	SD	Count
Beginner	15.34	3.17	85
Intermediate	30.68	4.96	140
Advanced	49.14	4.95	60

The above scores confirm a balanced representation across levels, with variability (SDs) indicating natural spread within groups.

Table 2

OQPT Scores by Gender

Gender	Mean	SD	Count
Female	28.37	12.42	149
Male	31.77	12.87	136

Male participants had a slightly higher average English proficiency score than females, though both groups showed considerable score variability. Normality of the key variables was also assessed using Shapiro-Wilk tests. The results are presented below:

Table 3

Normality Test Results for Key Variables

Variable	Shapiro-Wilk Statistic (W)	p-value
Engagement Enhancing	0.987	0.012
Engagement Inhibiting	0.995	0.410
Motivation Enhancing	0.992	0.104
Motivation Inhibiting	0.992	0.125

Note: A significance level of $\alpha = .05$ was used to determine normality.

As seen in Table 3, Engagement Enhancing subscale (W = 0.987, p = 0.012) showed slight deviation from normality, while Engagement Inhibiting (W = 0.995, p = 0.410), Motivation Enhancing (W = 0.992, p = 0.104), and Motivation Inhibiting (W = 0.992, p = 0.125) were normally distributed. Given the large sample size (N = 285), parametric tests were deemed robust for subsequent analyses, as they are less sensitive to minor deviations in educational research (Ma & Chen, 2024).

Results for Research Question 1

The first research question aimed to determine the extent to which AI usage enhances or inhibits learner engagement across diverse proficiency levels and genders in the Iraqi EFL context. Descriptive statistics revealed varying patterns in engagement effects. Table 4 shows means by proficiency: Advanced learners reported the highest enhancing effects (M = 40.65, SD = 5.83) and lowest inhibiting (M = 25.10, SD = 4.83), while Beginners had the lowest enhancing (M = 34.47, SD = 6.59) and highest inhibiting (M = 32.56, SD = 5.60). Intermediates fell in between. This suggests AI's benefits increase with proficiency, possibly due to better adaptation to tools.

Table 4 Engagement Enhancing and Inhibiting Scores by Proficiency Level

Proficiency	Enhancing Mean	Enhancing SD	Inhibiting Mean	Inhibiting SD
Beginner	34.47	6.59	32.56	5.60
Intermediate	37.98	5.79	29.82	5.17
Advanced	40.65	5.83	25.10	4.83

Table 4 summarizes the descriptive statistics for AI's impact on engagement at different levels of proficiency. A trend emerges, revealing that as learners' proficiency levels rise from Beginner to Advanced, at all times, the mean scores for engagement stimulation rise (from 34.47 to 40.65) and the mean scores for disengagement fall (from 32.56 to 25.10). This suggests that more advanced learners find AI to be increasingly beneficial to their engagement and less obstructive. In addition, standard deviations are stable or decreasing across proficiency levels for both increasing (6.59 to 5.83) and hindering (5.60 to 4.83) scores. This diminishing variability is an indication that the more proficient the learners become, the more their beliefs regarding how AI influences engagement are steady within their own groups, particularly concerning its hindering effect. Importantly, the gap between enhancing and inhibiting means increases significantly with increasing proficiency (e.g., a net positive effect of 1.91 for Beginners compared to 15.55 for Advanced learners), pointing to an increasingly positive net effect of AI on engagement with increasingly higher levels of skills. It must be noted, however, that these descriptive patterns are correlational and do not indicate direct causality of proficiency due to AI use.

Table 5ANOVA Results for Engagement by Proficiency Level

Effect Type		Sum of Squares	df	Mean Square	F-value	p-value
Enhancing	Between Groups	1258.42	2	629.21	19.27	< 0.001
	Within Groups	9204.11	282	32.64		
Inhibiting	Between Groups	1890.55	2	945.28	35.77	< 0.001
	Within Groups	7450.92	283	26.42		

The one-way ANOVA results in Table 5 statistically confirm the descriptive trends observed in Table 4. Both highly significant F-values for enhancing ($F(2, 282) = 19.27$, $p < .001$) and inhibiting effects ($F(2, 282) = 35.77$, $p < .001$) confirm that the differences in engagement scores across beginner, intermediate, and advanced proficiency levels are statistically significant and not a matter of random fluctuation. This analysis firmly establishes proficiency level as a strong moderator of the perceived impact of AI on learner engagement. While the ANOVA does, in fact, point to a general difference between groups, pairwise comparisons in individual cases (e.g., Beginner vs. Intermediate, Intermediate vs. Advanced) would require post-hoc tests to determine precisely which groups are significantly different from each other.

Table 6

Engagement Scores by Gender

Gender	Enhancing Mean	Enhancing SD	Inhibiting Mean	Inhibiting SD
Female	37.59	6.51	30.14	5.99
Male	37.38	6.36	29.09	5.65

Table 6 presents descriptive statistics on engagement scores by gender, and very little difference was observed between male and female participants. The mean enhancing scores are also virtually identical (37.59 for Female

vs. 37.38 for Male), and while the mean inhibiting score for males (29.09) is slightly lower than that of females (30.14), the difference is negligible. Standard deviations also reflect similar levels of variability in both gender groups. These descriptive statistics make one question whether gender does not play a meaningful role in the extent that AI affects learner engagement in this context, a statistical hypothesis tested in the subsequent analysis.

Table 7 Independent Samples t-Test for Engagement by Gender

Effect Type	t	df	p-value
Enhancing	0.27	283	.785
Inhibiting	1.52	283	.130

The independent samples t-tests, presented in Table 7, statistically confirm the initial descriptive finding that gender does not meaningfully influence AI's effect on engagement. The insignificant p-values for facilitation ($t(283) = 0.27$, $p = .785$) and hindering effects ($t(283) = 1.52$, $p = .130$) indicate that there is no statistically significant difference in male and female learners' perceptions of how AI affects engagement. Based on these results, gender cannot be determined as an important moderating variable between the application of AI and engagement outcomes for this study.

Table 8

Correlations between AI Usage and Engagement

Variable	Pearson's r	p-value
Engagement Enhancing	.585	< .001
Engagement Inhibiting	-.323	< .001

Table 8 presents Pearson correlation coefficients, which quantify the direct linear relationship between use of AI and engagement results. A statistically significant moderate positive correlation between use of AI and growing engagement ($r = .585$, $p < .001$) is observed. This indicates that when frequency or the degree of use of AI increases, students report more positive engagement. Squaring the correlation ($r^2 \approx 0.342$) means that approximately 34.2% of variance in enhancing engagement is accounted for by AI use. Conversely, a statistically significant weak negative correlation ($r = -.323$, $p < .001$) exists between AI use and inhibiting engagement. This suggests that greater AI use is associated with lower ratings of perceived inhibiting engagement. The level of r^2 of about 0.104 means that about 10.4% of variance in inhibiting engagement is explained by AI use. While these correlations are indicative of apparent associations, caution must be exercised in interpreting them as relations rather than direct causations. More AI use is clearly related to greater perceptions of positive engagement and lower perceptions of negative engagement.Briefly, first research question's analysis shows an explicit knowledge of AI usage in facilitation of engagement in the Iraqi EFL context. AI use mostly promotes engagement rather than inhibiting it, as indicated from a moderate positive correlation with facilitation effects ($r = .585$, explaining 34.2% variance) and a weak negative correlation with hindering effects ($r = -.323$, explaining 10.4% variance). The effect is greatly moderated by level of proficiency, with ANOVA results ($p < .001$ for each effect) confirming large group differences. Specifically, higher-level learners always have the most boosting scores and least inhibiting scores, demonstrating they are assisted most profoundly by AI's positive impact on interest. Conversely, gender fails to have a significant impact on the impact of AI on engagement ($p > .05$ for both effects), which suggests that male and female students are equally influenced by the engagement effects of AI here.

Results for Research Question 2

The second research question was intended to determine the extent to which AI usage enhance or inhibit learner motivation across diverse proficiency levels and genders in the Iraqi EFL context. The results showed that motivation patterns, much like engagement, exhibited clear trends influenced by learner proficiency.

Table 9 Motivation Enhancing and Inhibiting Scores by Proficiency Level

Proficiency	Enhancing Mean	Enhancing SD	Inhibiting Mean	Inhibiting SD
Beginner	37.80	4.99	23.09	5.16
Intermediate	39.22	5.08	21.28	5.17
Advanced	41.48	4.26	18.59	4.20

Table 9 reports the descriptive statistics of AI's impact on learner motivation at different proficiency levels. There is a sharp and consistent trend: with rising competence from Beginner to Advanced among the learners, mean scores for motivating continuously rise (from 37.80 to 41.48), while mean scores for de-motivating continuously fall (from 23.09 to 18.59). This suggests that higher-level learners perceive AI as significantly better in terms of motivating them more and de-motivating them less. Standard deviations for both enhancing

and inhibiting motivation lower or remain stable with greater proficiency (Enhancing SD: 4.99 to 4.26; Inhibiting SD: 5.16 to 4.20). This indicates that the more proficiency advances, the more consistent views of AI's motivational impact there are in each group, particularly among higher-level learners with least variability in enhancing and inhibiting effects. The growing disparity between enhancing and inhibiting means (e.g., a net positive effect of 14.71 for Beginners but 22.89 for Advanced learners) further highlights AI's increasingly positive net influence on motivation with rising proficiency. These results show a strong positive correlation between rising proficiency and AI's capacity to boost motivation.

Table 10

ANOVA Results for Motivation by Proficiency Level

Effect Type	Source	Sum of Squares	df	Mean Square	F-value	p-value
Enhancing	Between Groups	448.33	2	224.16	9.95	< 0.001
	Within Groups	6363.34	282	22.56		
Inhibiting	Between Groups	647.92	2	323.96	14.39	< 0.001
	Within Groups	6362.59	282	22.56		

The results of the one-way ANOVA in Table 10 present statistical evidence for the descriptive trends reported in Table 9. For rising motivation ($F(2, 282) = 9.95$, $p < 0.001$) and falling motivation ($F(2, 282) = 14.39$, $p < 0.001$), the F-values are highly significant. This implies that observed differences in motivation scores between Beginner, Intermediate, and Advanced proficiency groups are statistically significant and not due to chance. These findings substantiate the significance of proficiency level as a strong moderator of the perceived impact of AI on learner motivation. Even if the ANOVA shows that there is a significant difference between groups overall, post-hoc tests would subsequently be needed to establish the specific pairwise statistically significant differences (e.g., if Beginners differ from Intermediates, etc.).

Table 11

Motivation Enhancing and Inhibiting Scores by Gender

Gender	Enhancing Mean	Enhancing SD	Inhibiting Mean	Inhibiting SD
Female	39.18	4.95	21.28	5.34
Male	39.37	5.16	21.22	5.08

Table 11 shows descriptive statistics of motivation scores split by gender with only slight differences between male and female participants. The mean enhancing motivation scores are very close (39.18 for Females and 39.37 for Males), differing statistically insignificantly. Similarly, the mean inhibiting motivation scores are very close (21.28 for Females and 21.22 for Males). Both measures' standard deviations also are very close by gender, reflecting equal intra-group variability. These descriptive statistics do strongly suggest that gender is not a factor in mediating the effect of AI on motivation in this specific case.

Table 12

Independent Samples t-Test for Motivation by Gender

Effect Type	t-value	df	p-value
Enhancing	-0.32	283	0.753
Inhibiting	0.10	283	0.921

The independent samples t-tests, presented in Table 12, provide statistical evidence to support the descriptive finding that gender does not play a significant role in affecting AI's effect on motivation. The t-statistics in increasing motivation ($t(283) = -0.32$, $p = 0.753$) and decelerating motivation ($t(283) = 0.10$, $p = 0.921$) are far greater than the accepted alpha level of 0.05. This indicates that there is no statistically significant difference between how male students and female students perceive AI in relation to their motivation. Consequently, gender does not come out as a significant moderating factor in the moderating influence of AI usage on motivation outcomes in this study.

Table 13

Correlations between AI Usage and Motivation

Variable	Pearson's r	p-value
Motivation Enhancing	0.622	< 0.001
Motivation Inhibiting	-0.541	< 0.001

Table 13 presents Pearson correlation coefficients that indicate the linear direct relationship between AI usage and motivation outcomes quantitatively. There is a high positive correlation ($r = 0.622$, $p < 0.001$) between using AI and increasing motivation. The high relationship confirms that higher frequency or use of AI is highly related to greater levels of perceived helpful motivation. Determining the coefficient of determination ($r^2 \approx 0.387$), it is evident that about 38.7% of the variance in increasing motivation can be attributed to using AI.Furthermore, there exists a moderate negative relationship ($r = -0.541$, $p < 0.001$) between AI usage and inhibiting motivation. The high correlation reveals that increased usage of AI correlates with decreased levels of perceived inhibiting motivation. With an r^2 value of approximately 0.293, approximately 29.3% of the variance of inhibiting motivation is explained by AI use. Both relationships are extremely statistically significant, clearly demonstrating that AI use is strongly related to the growth of positive motivational factors and the decline of negative ones. However, as these are correlation findings, direct causation should not be inferred.In general, the analysis for the second research question reveals an evident and significant influence of AI use on learner motivation in the Iraqi context of EFL. AI highly promotes motivation instead of inhibiting it, as supported by high positive correlation with facilitation effects ($r = 0.622$, explaining 38.7% of variance) and moderate negative correlation with hindering effects ($r = -0.541$, explaining 29.3% of variance). The effect is highly moderated by skill level, and ANOVA results ($p < 0.001$ for both effects) confirmed significant differences between groups. Advanced learners consistently hold the highest enhancing scores and lowest inhibiting scores, again confirming that they are most strongly aided by AI's positive effect on motivation. Beginners, on the other hand, have larger inhibiting effects, such as potential over-dependence, as well as lower enhancing scores. Contrarily, gender is not significantly predictive of the impact of AI on motivation, which implies that male and female students are equally affected by AI's motivational impact in this context. Thus, proficiency emerges as the preeminent moderating variable for AI's motivational impact in this specific context of learning.

Discussion

This study investigated the dual effects of AI usage on learner engagement and motivation among Iraqi EFL learners, addressing two research questions: (1) To what extent does AI usage enhance or inhibit learner engagement across diverse proficiency levels and genders? (2) To what extent does AI usage enhance or inhibit learner motivation across diverse proficiency levels and genders? The findings reveal significant patterns, with AI predominantly enhancing both constructs, particularly for advanced learners, while inhibiting effects are more pronounced among beginners. Gender differences were negligible. These results are interpreted through relevant theories (SDT, ET, and TAM) and compared or contrasted with prior studies to contextualize the findings within the Iraqi EFL landscape.

Engagement: Enhancing and Inhibiting Effects

The first research question sought to uncover the extent to which AI usage enhances or inhibits learner engagement across diverse proficiency levels and genders in the Iraqi EFL context. The results indicate that AI usage has a significant positive impact on learner engagement, which is consistent with previous research. A clear proficiency gradient emerged, with advanced learners reporting the highest enhancing scores, followed by intermediates, and beginners. This pattern strongly aligns with SDT, which posits that psychological needs for autonomy and competence are fundamental drivers of engagement (Kaźmierczak et al., 2025). AI's capacity for personalized feedback and adaptive exercises likely contributes to a heightened sense of autonomy and competence, particularly for advanced learners who possess the digital literacy and learning strategies to more effectively leverage these tools. This finding corroborates Yang and Rui (2025), who similarly found AI-driven personalization significantly improved engagement among Chinese EFL learners. ET also provides additional explanatory power, suggesting interactive technology by definition supports active engagement (Guo & Wang, 2025). The consistently high enhancing scores observed in this study reflect AI's ability to create dynamic, responsive learning environments, such as chatbots that simulate authentic conversations, thereby boosting behavioral, emotional, and cognitive engagement, a finding consistent with Ma and Chen's (2024) finding.

Conversely, inhibiting effects on engagement were more robust for beginners compared to intermediates and advanced learners, and a less, though statistically significant, negative correlation with AI use. This pattern aligns with findings from Zhai et al. (2025), who noted that overuse of AI conversation systems can inadvertently undermine critical thinking capacity, particularly in less skilled students who struggle to achieve a balance between AI support and independent mental effort. These beginners may also experience significant technical frustrations or stress, therefore leading to technostress and isolation feelings that are barriers to

participation in AI-supported contexts, according to Klimova and Pikhart (2025). In the specific Iraqi context, where digital infrastructure and access to technology may be fluctuating (Padmanabhanunni & Pretorius, 2024), the lower digital literacy among beginners may exacerbate such issues, leading directly to disengagement. The TAM offers an explanation for this, as perceived ease of use is one of the main determinants of technology acceptance and thus usage; novices would find AI tools less user-friendly or more difficult to learn, which lowers their perceived usefulness and effectiveness (Alam et al., 2024). This difference from studies reporting more uniformly positive outcomes (e.g., Ma & Chen, 2024; Yang and Rui, 2025) likely mirrors the unique challenges of Iraq, including potential digital divides and cultural norms around traditional teacher-student interaction (Qi & Derakhshan, 2024).For gender, the analyses revealed non-significant differences in the impact of AI on engagement. This finding is against some earlier research suggesting that gender can moderate technology use and adoption in educational settings (e.g., Wang et al., 2024). It is, nonetheless, strongly consistent with Ma and Chen (2024), who also reported large engagement gains in a sample of Chinese EFL learners without detecting gender effects. This stability suggests that while AI's interaction benefits are robust across environments, this study's absence of gender differences may reflect Iraq's cultural emphasis on collective learning and collective educational norms, in which gender roles for academic environments are perhaps less defined or differentially operative compared to other sites (Qi & Derakhshan, 2024).

Motivation: Enhancing and Inhibiting Effects

The second research question sought to pinpoint the extent to which AI usage enhance or inhibit learner motivation across diverse proficiency levels and genders in the Iraqi EFL context. AI usage demonstrated high potential to enable learner motivation. Consistent with the pattern of engagement, advanced learners scored the highest on facilitating motivation, followed by intermediates, and beginners . This outcome is well-explained by SDT, as AI's autonomy-supporting features (e.g., personalized learning paths, choice of tasks) and competence-building feedback (e.g., immediate error correction, progress tracking) are instrumental in fostering both intrinsic and extrinsic motivation (Derakhshan, 2025). This result has a direct parallel in Mohamed et al. (2025), where a multi-national investigation identified that AI had a significant effect on intrinsic motivation by way of enhanced autonomy, with more powerful effects for advanced learners. Wang et al. (2024) also indicated that the extrinsic motivational advantages of AI, including perceived job significance, were more strongly expressed for Taiwanese students with greater self-efficacy, echoing the beneficial effect on advanced learners in this research.Conversely, inhibiting motivational effects were more pronounced among beginners than among intermediates or advanced learners, and there was a moderate negative correlation with AI use. This finding aligns with Fan et al. (2024), who identified "metacognitive laziness" due to overreliance on AI as a significant motivational obstacle in writing activities. Beginners' higher inhibiting scores may also arise from unaddressed ethical concerns, feelings of depersonalization, or a perceived lack of human connection when interacting with AI, as noted by Klimova and Pikhart (2025), who highlighted AI's potential to create isolation or reduce intrinsic drive. In Iraq's high-context culture, where strong social bonds and direct interpersonal communication are highly valued, AI's potential lack of cultural sensitivity (e.g., difficulties understanding specific Iraqi accents or cultural nuances) could further demotivate beginners by creating a perceived barrier to effective communication (Padmanabhanunni & Pretorius, 2024). From a TAM perspective, low perceived usefulness, instigated by possibly these cultural mismatches or technical issues at the beginning, would reduce learners' intention to integrate AI tools into their learning routine (Alam et al., 2024). While Mohamed et al. (2025) found AI to have a universal motivational boost, this study's proficiency-based differentiations highlight the supreme significance of personalized AI implementation strategies, especially for lower-proficiency learners, in breaking through these stifling effects.For gender differences, the analyses revealed non-significant results concerning AI effects on motivation. This is consistent with Mohamed et al. (2025), who similarly did not find any significant gender-based difference in motivational responses to AI environments. This is, however, different from findings in Wang et al. (2024), where females reported higher levels of learning anxiety that negatively impacted motivation. That such gendered impacts were not discovered in this study suggests that the specific cultural situation of Iraq may be implicated in lessening or eliminating motivation-based gender distinctions observed elsewhere. Compared to Ma'amor et al. (2024), who found AI supported motivation but not individualized learning gains with Malaysian undergraduates, this study's stronger general facilitative effects, particularly for high-proficient learners, may be due to the broader and perhaps more developed set of AI tools (e.g., high-level chatbots, adaptive learning programs) that Iraqi students utilized.

Conclusion

The study investigated the dual effect of AI utilization on learner engagement and motivation for Iraqi EFL learners of various proficiency levels and genders. The findings confirm that AI has a substantial positive effect on both engagement and motivation, particularly for advanced learners, who had the most positive scores. Conversely, inhibiting effects were more pronounced among beginners, highlighting challenges such as technical frustrations and over-reliance. Gender differences were negligible, suggesting AI's effects are primarily moderated by proficiency in the Iraqi context. These results align with prominent theories such as Self-Determination Theory and ET, which emphasize autonomy and interactivity as key drivers of positive educational outcomes. The TAM also explains inhibiting effects through perceived usability barriers. The study contributes to the literature by closing the gap in culturally responsive AI applications within high-context cultures like Iraq, offering insightful understanding of the balancing of AI advantages and constraints in EFL education.

Implications of the Study

The implications of the findings are manifold in terms of practical and theoretical contributions to EFL education in Iraq and other high-context cultural settings. Practically, the powerful facilitative influences of AI on engagement and motivation, particularly for advanced-level learners, suggest that educators should strategically introduce AI tools like chatbots and adaptive software to foster learner autonomy, reduce anxiety, and facilitate active learning. However, the robust inhibiting impacts noted within novices necessitate targeted interventions, i.e., particular training programs for developing digital literacy and the development of intuitive AI designs expressly for lower levels of proficiency. In settings such as Iraq, where digital infrastructure can vary, policymakers are required to prioritize guaranteeing equitable access to technology in order to preempt differences that have the potential to further augment disengagement. Furthermore, developing culturally sensitive AI tools that resonate with Iraq's emphasis on relational learning could further enhance effectiveness by addressing potential issues like depersonalization.Theoretically, the study supports SDT by demonstrating that AI's autonomy-supporting features are crucial in driving intrinsic motivation and engagement, especially for advanced learners. ET is reinforced by AI's proven ability to create highly interactive learning environments. Simultaneously, the TAM highlights the critical importance of perceived ease of use and usefulness in minimizing inhibiting effects. These findings extend the application of these theories to high-context EFL settings, illustrating how cultural factors can uniquely shape AI's impact. The study also underscores the need for proficiency-level models of AI integration, thereby contributing to theoretical understanding of how individual learner characteristics moderate the effects of educational technology.

Limitations

Despite its merits, the study has some limitations. First, the utilization of self-reported questionnaires might lead to response bias, as respondents can either over- or under-report their motivation and engagement either due to social desirability or to the likelihood of confusion about the role of AI. Second, the cross-sectional design inherently limits the ability to draw definitive causal inferences about AI's long-term effects on engagement and motivation. Longitudinal studies would be better suited to capture and analyze dynamic changes over time. Third, while heterogeneous in terms of gender and proficiency, the sample was drawn predominantly from English institutes via social media like Telegram and WhatsApp, potentially excluding students who do not use these specific platforms or who reside in rural areas with less advanced digital infrastructure. Fourth, the study focused solely on quantitative data and therefore may have missed richer qualitative insights into learners' subjective experience with AI, for instance, specific areas of frustration or subtle cultural mismatches. Finally, the proficiency measure used, while reliable, may not be fully reflective of all the dimensions of contextual language capacity relevant to Iraqi EFL learners, which could affect the validity of proficiency groupings.

Suggestions for Further Research

Future research should address the identified limitations to deepen our understanding of AI's multifaceted role in EFL contexts. First, longitudinal studies are highly recommended to examine how AI's enhancing and inhibiting effects evolve over extended periods, providing more comprehensive insights into sustained engagement and motivation. Second, the employment of qualitative methods, such as focus groups or in-depth interviews, would provide in-depth insights into students' subjective experiences and attitudes towards AI use, especially the specific concerns of novice users, that could inform more user-centered tool designs. Third, expanding the sample size to represent a broader demographic, such as rural students and secondary school

students, would significantly enhance the generalizability of findings and help alleviate digital access disparities in Iraq. Fourth, cross-cultural comparative research with other high-context cultures (e.g., other Middle Eastern nations) would explain how different cultural variables specifically moderate the effects of AI, expanding on this study's initial findings. Finally, conducting experimental designs testing explicit AI interventions (i.e., culturally specific chatbots or personalized learning plans) would be capable of isolating and identifying those factors that maximize augmentation and minimize inhibition, and thereby inform the development of more efficacious and culturally responsive EFL pedagogies.

References

Alam, S., Vadivel, B., Banu, S., & Jamalyar, R. (2024). Reflecting the voices of EFL teachers in the world of Intelligent Computer-Assisted Language Assessment (ICALA): An insight into teacher immunity, reflective teaching, job satisfaction, and L2-teacher grit. Language Testing in Asia, 14(1), 43. https://doi.org/10.1186/s40468-024-00314-z

Derakhshan, A. (2025). EFL students' perceptions about the role of generative artificial intelligence (GAI)-mediated instruction in their emotional engagement and goal orientation: A motivational climate theory (MCT) perspective in focus. Learning and Motivation. https://doi.org/10.1016/j.lmot.2025.102114

Derakhshan, A., & Fathi, J. (2024a). The interplay of perceived teacher support, self-regulation, and psychological well-being among EFL students. Iranian Journal of Language Teaching Research, 12(3 (Special Issue)), 113–138. https://doi.org/10.30466/ijltr.2024.121579

Derakhshan, A., Teo, T., & Khazaie, S. (2025). Investigating the usefulness of artificial intelligence-driven robots in developing empathy for English for medical purposes communication: The role-play of Asian and African students. Computers in Human Behavior, 162, 108416. https://doi.org/10.1016/j.chb.2024.108416

Fan, Y., Tang, L., Le, H., Shen, K., Tan, S., Zhao, Y., Shen, Y., Li, X., & Gašević, D. (2024). Beware of metacognitive laziness: Effects of generative artificial intelligence on learning motivation, processes, and performance. British Journal of Educational Technology. Advance online publication. https://doi.org/10.1111/bjet.13544

Guo, Y., & Wang, Y. (2025). Exploring the effects of artificial intelligence application on EFL students' academic engagement and emotional experiences: A mixed-methods study. European Journal of Education, 60(1), Article e12812. https://doi.org/10.1111/ejed.12812

Kandiko Howson, C., & Buckley, A. (2017). Development of the UK engagement survey. Assessment & Evaluation in Higher Education, 42(7), 1132–1144.

Kaźmierczak, I., Jakubowska, A., Pietraszkiewicz, A., Zajenkowska, A., Lacko, D., Wawer, A., & Sarzyńska-Wawer, J. (2025). Natural language sentiment as an indicator of depression and anxiety symptoms: A longitudinal mixed methods study. Cognition and Emotion, 1–10. https://doi.org/10.1080/02699931.2024.2351952

Klimova, B., & Pikhart, M. (2025). Exploring the effects of artificial intelligence on student and academic well-being in higher education: A mini-review. Frontiers in Psychology, 16, Article 1498132. https://doi.org/10.3389/fpsyg.2025.1498132

Krifa, I., Hallez, Q., van Zyl, L. E., Braham, A., Sahli, J., Ben Nasr, S., & Shankland, R. (2022). Effectiveness of an online positive psychology intervention among Tunisian healthcare students on mental health and study engagement during the Covid-19 pandemic. Applied Psychology: Health and Well-Being, 14(4), 1228–1254. https://doi.org/10.1111/aphw.12332

Ma, Y., & Chen, M. (2024). AI-empowered applications effects on EFL learners' engagement in the classroom and academic procrastination. BMC Psychology, 12(1), 739. https://doi.org/10.1186/s40359-024-02248-w

Ma'amor, H., Achim, N., Ahmad, N. L., Roszaman, N. S., Anuar, N. N. K., Azwa, N. C. A. K., Rahman, S. N. A., & Hamjah, N. A. A. (2024). The effect of Artificial Intelligence (AI) on students' learning. Information Management and Business Review, 16(3S(a)), 856–867.

Mohamed, A. M., Shaaban, T. S., Bakry, S. H., Guillén-Gámez, F. D., & Strzelecki, A. (2025). Empowering the Faculty of Education Students: Applying AI's potential for motivating and enhancing learning. Innovative Higher Education, 50, 587–609. https://doi.org/10.1007/s10755-024-09747-z

Nordhaug, O. (1989). Reward functions of personnel training. Human Relations, 42(5), 373–388. https://doi.org/10.1177/001872678904200501

Padmanabhanunni, A., & Pretorius, T. B. (2024). An exploratory study of the mental health of first responders: Depression, anxiety, and post-traumatic stress disorder. South African Journal of Psychology, 0(0), Article 00812463251317901. https://doi.org/10.1177/00812463251317901
Qi, S., & Derakhshan, A. (2024). Technology-based collaborative learning: EFL learners' social regulation and modifications in their academic emotions and academic performance. Education and Information Technologies, 30(7), 8611–8636. https://doi.org/10.1007/s10639-024-13167-z
Qi, S., & Wang, Y. L. (2024). Sketching the ecology of humor in English language classes: Disclosing the determinant factors. Applied Linguistics Review, 15(2), 985–1006. https://doi.org/10.1515/applirev-2023-0283
Schepman, A., & Rodway, P. (2020). Initial validation of the general attitudes towards Artificial Intelligence Scale. Computers in Human Behavior Reports, 1, 100014. https://doi.org/10.1016/j.chbr.2020.100014
Wang, Y.-M., Wei, C.-L., Lin, H.-H., Wang, S.-C., & Wang, Y.-S. (2024). What drives students' AI learning behavior: a perspective of AI anxiety. Interactive Learning Environments, 32(6), 2584–2600. https://doi.org/10.1080/10494820.2022.2153147
Yang, H., & Rui, Y. (2025). Transforming EFL students' engagement: How AI-enhanced environments bridge emotional health challenges like depression and anxiety. Acta Psychologica, 257, 105104. https://doi.org/10.1016/j.actpsy.2025.105104
Zhai, C., Wibowo, S., & Li, L. D. (2024). The effects of over-reliance on AI dialogue systems on students' cognitive abilities: a systematic review. Smart Learning Environments, 11(1), 28. https://doi.org/10.1186/s40561-024-00316-7
Zhai, S., Zhang, S., Rong, Y., & Rong, G. (2025). Technology-driven support: Exploring the impact of artificial intelligence on mental health in higher education. Education and Information Technologies. https://doi.org/10.1007/s10639-025-13352-8