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Perception and Effects of Learner-Facing AI Tools on Autonomy, Motivation and Self-Regulation Among Iraqi EFL Learners

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ادراك وتأثيرات ادوات الذكاء الاصطناعي الموجهه للمتعلمين على الاستقلالية والتحفيز والتنظيم الذاتي

لدى متعلمي اللغة الانكليزية كلغة اجنبية في العراق

صلاح مهدي يوسف

كلية الادارة والاقتصاد/ الجامعة المستنصرية

المستخلص:

أدى التوسع السريع في دمج أدوات الذكاء الاصطناعي التي تركز على المتعلم في فصول اللغة الإنجليزية كلغة أجنبية إلى تجدد الاهتمام بآثارها النفسية والتربوية، لا سيما في السياقات التعليمية التي تعاني من نقص الخدمات .لذا تستند هذه الدراسة شبه التجريبية إلى نظرية التعلم الاجتماعي المعرفي، وتبحث في تصورات متعلمي اللغة الإنجليزية كلغة أجنبية العراقيين للتعلم المدعوم بالذكاء الاصطناعي، وتدرس تأثير أدوات الذكاء الاصطناعي الموجهة للمتعلم على الاستقلالية والدافعية والتنظيم الذاتي. شملت العينة ١٨٠ طالبًا جامعيًا من متعلمي اللغة الإنجليزية كلغة أجنبية، تم توزيعهم عشوائيًا على مجموعتين: مجموعة تجريبية تلقت تعليمًا معززًا بالذكاء الاصطناعي، ومجموعة ضابطة تلقت تعليمًا تقليديًا، وذلك على مدار ١٢ اسبوعا. كانت الأدوات المستخدمة لجمع البيانات صالحة، وقاست الدافعية المرتبطة بالذكاء الاصطناعي، واستقلالية المتعلم، وسلوك التنظيم الذاتي. وتم تحليل البيانات باستخدام نمذجة التأثيرات المختلطة، وتحليل التغاير (ANCOVA) ، وتحليلات الانحدار مع ضبط نتائج الاختبار القبلي. أظهرت جميع المتغيرات الثلاثة تأثيرات كبيرة ذات دلالة إحصائية من التعليم المُعزز بالذكاء الاصطناعي، وذلك وفقًا لتقييمات المتعلمين في المجموعة التجريبية مقارنةً بالمجموعة الضابطة. وأفاد المتعلمون الذين أتيحت لهم أدوات الذكاء الاصطناعي بمستويات أعلى من الاستقلالية، وتوجهات تحفيزية أكثر إيجابية، وسلوكيات تنظيم ذاتي أكثر تطورًا من أقرانهم في المجموعة الضابطة. تشير النتائج إلى أن أدوات الذكاء الاصطناعي التي يستخدمها المتعلمون تُعزز بنجاح الدافعية والاستقلالية وسلوكيات التنظيم الذاتي في بيئات تعليم اللغة الإنجليزية كلغة أجنبية ذات الموارد المحدودة وفي مرحلة ما بعد النزاعات

الكلمات المفتاحية: ادوات الذكاء الاصطناعي، استقلالية المتعلمين، التحفيز، التنظيم الذاتي

Abstract

The rapid integration of learner-centered artificial intelligence (AI) tools in English as a Foreign Language (EFL) classrooms has renewed interest in their psychological and pedagogical implications, particularly in underserved educational contexts. Grounded in Social Cognitive Theory, this quasi-experimental study investigates Iraqi EFL learners' perceptions of AI-assisted learning and examines the effects of learner-facing AI tools on autonomy, motivation, and self-regulation. The sample comprised 180 university EFL learners randomly assigned to an experimental group receiving AI-enhanced instruction or a control group receiving traditional instruction over a 12-week period. The instruments used to collect data were valid and measured AI-related motivation, learner autonomy and self-regulatory behavior. Data were analyzed using mixed-effects modelling, analysis of covariance (ANCOVA) and regression analyses controlled for pre-test scores. All three constructs had statistically significant large effects from AI-enhanced instruction as measured by the learners

in the treatment group relative to the control group. Learners who had access to AI tools reported higher levels of autonomy, more positive motivational orientations and more advanced self-regulatory behavior than their peers in the control group. The results indicate that learner facing AI tools successfully enhance motivation, autonomy, and self-regulated behaviors in resource-limited and post-conflict EFL settings.
Keywords: AI tools, learners' autonomy, motivation, self-regulation

Introduction

The incorporation of technology in language education continues to grow especially with the dominant role of artificial intelligence (AI) nowadays. Scholars are closely observing the worldwide changes in the usage of technology which is really impacting language education in terms of both teaching and learning (Derakhshan & Zhang, 2024; Chen et al., 2022). Both teaching and learning processes in the classroom have since become inseparable from a technology component (Liu et al., 2022; Zou et al., 2023). AI, i.e., artificial intelligence, refers to systems that are programmed to mimic or simulate human language skills in an interactive, dialogue, based environment which can change the way language education is done (Huang et al., 2022; Derakhshan et al., 2025).AI tools comprising chatbots such as ChatGPT and grammar assistants like Grammarly provide instant feedback, customized learning materials, and adaptive learning experiences that help students develop problem, solving skills, improve their language proficiency, and increase their learner autonomy (Qiao & Zhao, 2023). Having the ability to self-direct one's learning is referred to as Autonomy, and is increasingly important in EFL (English as a Foreign Language) environments that have multilingual and cultural diversity (Dendenne & Derakhshan, 2020); because of its impact on how learners develop autonomy, artificial intelligence is enabling autonomous behavior by providing them with the resources to control the course of their own learning, have the ability to establish goals, and take time to develop the skill(s) at Their Own Speed (Yekollu et al., 2024). Technology also enhances the self-regulatory behavior of learners by: (i) enabling them to be active participants; (ii) aiding them in developing plans and/or monitoring progress towards goal; (iii) assisting them in tracking and evaluating progress towards goal; and (iv) offering tools for goal-setting, progress monitoring, metacognitive reflection, and strategy modification (Wei, 2023; Zimmerman & Schunk, 2011).Self-regulation has a positive connection with motivation, goal, setting, academic achievement, and resilience, which is the dispositional capacity to recover, deal effectively with stressors, and adjust to difficulties (Kim et al., 2019; Wang & Liu, 2022).Motivation and engagement still play a major role in effective learning, with studies pointing out that the learning environment, social relationships, the curriculum, and more recently, the use of technology, are all important sources of motivation and engagement among learners (Chiu et al., 2023). The availability of various digital devices including generative AI such as ChatGPT has recently diverted attention toward understanding their influence on learner motivation and engagement (Salikhova et al., 2020).Learners often associate these digital tools with positive effects due to benefits such as interactive tutoring, personalized adaptive learning, and human, like communication which, in turn, offers trust and perceived helpfulness (Baidoo-Anu & Owusu Ansah, 2023). In a collaborative scenario, AI may facilitate group discussions, offer instant feedback, and satisfy the motivational needs of learners; however, there are still issues to be resolved in finding the right balance between learner autonomy and the need for structured guidance, the maintenance of social presence, and the prevention of cognitive overload (Kohnke & Moorhouse, 2025; Liu et al., 2025; Pahi et al., 2024).Autonomy support, which includes behaviors such as acknowledging learners' viewpoints, providing them with options, and promoting self-direction, helps intrinsic motivation, engagement, competence, and the sense of ownership to grow (Reeve & Cheon, 2021). In EFL settings, such support is associated with better achievement, positive emotions, and more lasting feelings (Jiang & Tanaka, 2022). The Social Cognitive Theory (SCT) depicts these interactions as a triadic reciprocal causation between personal factors (e.g., self-efficacy, use of metacognitive strategies, self-monitoring), behaviors, and environmental influences, including the use of AI that is adaptable (Vazquez –Cano et al., 2021; Xia et al., 2022; Wang & Wang, 2024). Self-efficacy is the one that encourages a person to keep on working and to come up with new ideas when doing independent

work supported by AI, whilst metacognitive strategies and self-monitoring provide the means to successfully manage the tools (Ahmed Abdel-Al Ibrahim & Hashemifardnia, 2024; Saint et al., 2022). There is no doubt that AI has great potential to provide interactive, customized learning (Guo et al., 2025). However, a significant part of the existing studies still remain tool, centric, focusing mainly on the short, term linguistic gains and giving very little attention to psychological constructs such as autonomy, motivation, and self-regulation that are involved in the dynamic learner-AI interactions (Nguyena & Habokb, 2021; Hill et al., 2021).In the Iraqi EFL context, the use of learner, facing AI tools is based on a post, 2003 period filled with educational problems such as limited access to basic necessities (for example, power cuts, poor internet connections, and old equipment), overcrowded classes, low digital skills among teachers and students, lack of proper training for teachers on the use of AI and technology in teaching, and moral issues like cheating, over, dependence, and plagiarism (as discussed in reviews of AI in Iraqi English language education and problems encountered by Kurdish EFL teachers) (Ebadi et al., 2023; Alzeebaree & Yavuz, 2016). On the top of those obstacles, which were the result of the continuing problems of war and the economy, there has been a tradition of teacher, centered, memorization, based methods that hardly provide any chance for students to practice on their own and take control of their learning process (Hussain & AlShammari, 2025).Despite some recent empirical research in Iraq showing positive learner perception of the adoption of ChatGPT, Grammarly and other such tools, benefit learners comprehend and develop more efficient writing structures, vocabulary and organization while at the same time reduce grammar errors that result to higher overall scores (Moulavinafchi et al., 2026; Al Lami et al., 2025; Hussain & AlShammari, 2025; Boudjedra, 2024); learners having gained confidence, motivation, self-efficacy as well as engaging through receiving instant feedback and accessing features of the interactive tools, and feeling supported for self-regulated behaviors like faster revision and more autonomy in task management, research which directly examine the effects of the above, mentioned tools on learner autonomy (i.e. being self-directed in a resource, scarce environment), motivation (i.e. the learner's intrinsic drives while executing teacher, centered learning approaches), and self-regulation (i.e. the learner's strategic planning, monitoring, evaluation and revising despite the presence of technological challenges) still remains quite limited and fragmentary (Alzeebaree & Yavuz, 2016).One risk might be that the students end up relying heavily on the AI which causes them to lose critical thinking and creativity (Boudjedra, 2024); the digital gap might be widened due to the unequal availability of the facilities; the students might not be deeply engaged in the learning if there is not enough guidance. This is where the technology is expected to eliminate the traditional problems of learners with a long history but the reality of technology integration is that it is moderated by infrastructural, training and cultural limitations (Al Lami et al., 2025). This contextual specificity, where AI promises to remove the barriers that have been hindering people for a long time but, at the same time, it is constrained by the infrastructural, training and cultural limitations, reveals a crucial lacking in targeted investigation, thus hindering the development of evidence, based intervention strategies for equitable, psychologically supportive AI integration in the Iraqi EFL context.This research investigates the issues by first looking at the perceptions of Iraqi EFL learners regarding learner, facing AI tools and the impact of these tools on their autonomy, motivation, and self-regulation. The research is based on a literature review and SCT and it provides detailed, theory, based insights that are helpful for educators, curriculum developers, and policy makers working in resource, limited settings, thus fostering the development of more autonomous, motivated, and self-regulated English learners in Iraq. Consequently, the following research question were developed:

Q1. Do AI tools have a significant effect on EFL learners' autonomy Among Iraqi EFL Learners?

Q2. Do AI tools have a significant effect on EFL learners' Motivation Among Iraqi EFL Learners?

Q3. Do AI tools have a significant effect on EFL learners' Self-Regulation Among Iraqi EFL Learners?

Review of Literature

2.1 Artificial Intelligence in Education

Artificial intelligence (AI) progression has considerably changed various sectors. Education is one of these industries which is witnessing a revolution in teaching and learning methods due to the direct influence of AI (Derakhshan, 2025). The science of computer, AI, deals with the ability of machines to replicate human intelligence, learn from the experience, and perform cognition tasks at a human level (Xia et al., 2023). AI in education, among other advantages, allows students to have learning experiences that are tailored specifically to their needs, interests, and pace thus moving the focus from the one, size, fits, all traditional methods (Zhi & Wang, 2024). AI, generally speaking, refers to smart software that can make human, like decisions and carry out tasks similar to those of humans.According to Xia et al., (2023) AI is increasingly recognized for its potential use in enhancing the language acquisition process through adaptive, interactive, data driven learning support made available to learners. Some of the ways that AI-supported learning applications have begun to fundamentally reshape the education landscape include through use of intelligent tutoring systems (ITS), adaptive learning platforms, conversational agents/chatbots such as ChatGPT, automated assessment tools, content recommendation engines, and gamified platforms (Duolingo). By providing students immediate feedback, customized learning journeys, scaffolding, and continuous access to support, these tools have created experiences where students develop their critical thinking skills, experience personal growth and independence, have high levels of motivation and inclusion, and receive a wealth of data used for forecasting future instructional interventions (Chen et al., 2020). In order for those using these tools to maximize their effectiveness, both human agency and technological capacity must be balanced so as not to experience either an overreliance on or inequity of usage.

2.2 Learner-Facing AI Tools and Autonomy

Learning independence refers to an individual's ability to take charge of their learning process—specifically, defining goals, selecting resources, utilizing strategies, and monitoring and assessing oneself within differing contexts (Agustini 2023). Both technology (as it pertains to education) in general and AI (more specifically), are critical components for moving from a teacher focused model to a student focused model (a model emphasizing individual experiences/learning paths) (Liu et al 2022). There are numerous ways that AI-enabled learning systems can enhance student independence including: providing immediate, tailored feedback, providing a pressure-free setting in which to gain new knowledge (without the fear of judgment), and providing flexible learning materials, all of which enable students to assume control over their individual learning path (Sehlaoui 2024).Studies have found that students who use artificial intelligence (AI) tools such as Chatbots and Virtual Tutors report increased levels of independence, motivation, and engagement as well as improved academic performance than students who do not use AI technologies. In addition, the research indicates that ChatGPT assists users in developing self-directed behaviors, receiving personalized support, and increasing the degree of independence in language learners in English as a Foreign Language (EFL), writing, and acquiring the English language. Moreover, it is important to note that the enhancement of learner autonomy appears only to occur when AI-based tools are purposefully designed to facilitate learners' initiatives rather than to disrupt them.

2.3 Learner-Facing AI Tools and Self-Regulation

Self, regulation requires students to handle their objectives, employ metacognitive strategies (such as planning, monitoring, evaluation, elaboration, critical thinking), regulate their motivational/affective aspects (self-efficacy, anxiety control, task, value), and have behavioral regulation for (time management, effort, help, seeking, environment structuring) in order to be successful learners (Tinajero et al., 2024). AI devices, through the provision of functionalities such as performance tracking, identification of strengths and weaknesses, personalized scaffolding, reflection prompts, and adaptive hints, assist students in these phases, thus, promoting metacognition and efficient resource management (Qiao & Zhao, 2023)Each helps a student's self-regulating skills (SRL) in foreign language learning through instant feedback, setting goals, monitoring the progress, and changing the strategies tactics, (Laak & Aru, 2024; Holmes & Littlejohn, 2024). Self-directed learning (SDL)

is the learner, led initiation, target setting, and resource choosing going beyond the classroom context, with AI scaffolds facilitating planning, monitoring, motivation, and interpersonal help, seeking (Aljafari, 2021). The negative aspects are lessened independent regulation caused by over, dependence, the habit of passivity being learned, unequal access, violation of privacy, and lack of adequate long, term transfer (Lee et al., 2025). The best use of AI is when tools are facilitators and not replacements for learner agency.

2.4 Learner-Facing AI Tools, Motivation, and Engagement

Motivation according to Self-Determination Theory (SDT) includes both intrinsic (enjoyment of the activity itself, internal aspect of control) and extrinsic types, with basics needs (autonomy, competence, relatedness) acting as a foundation for engagement (Reeve, 2013). Engagement is a reflection of behavioral, emotional, and cognitive involvement which is a result of influences from the environment, instructor, peers, and the use of technology (Luo et al., 2021)AI tools such as ChatGPT working on the basis of highly advanced language processing, contextual understanding, keeping track of conversations, and customizable responses improve motivation by means of features like interactive tutoring, responsive help, human, like trust creation, instant feedback, and lowering stress levels (Ali, 2023). The light side of the perceptions is increased productivity, confidence, engagement, and more autonomy support, while on the dark side are anxieties about over, dependence, less attention to detail, and moral dilemmas (Abdullahi, 2023). In collaborative EFL environments, AI can provide real, time emotional/motivational tracking and deliver personalized scaffolds, which are in line with autonomy, supportive techniques that enhance intrinsic motivation and perseverance (Bastian, 2023).

2.5 Theoretical Frameworks

SDT mini, theories (basic needs, organismic integration, etc.) describe how AI environments provide autonomy, competence, and relatedness that result in intrinsic motivation and engagement (Reeve, 2013). Alongside this, Social Cognitive Theory (SCT) adds to this explanation through triadic reciprocal causation of personal factors (such as self-efficacy, metacognition), behavior, and environment (including AI features that are adaptive). Metacognitive strategies, self, monitoring, and self-efficacy are the mechanisms through which AI impacts autonomy as well as SRL outcomes. Hybrid models show the dynamic evolution of these constructs through AI scaffolds; however, fragmented studies usually ignore interconnections or long, term mediation. In EFL, AI is used for enhancing personalized conversational practice, error correction, vocabulary/grammar learning, idea generation, and self-paced learning which in turn lead to improvements in proficiency, confidence, and affective factors. On the other hand, drawbacks are that over, dependence may lead to a loss of critical thinking/creativity, digital divides, privacy/ethical risks, teacher preparedness, and lack of enough longitudinal studies on the transfer to unaided performance.

2.6 Related Empirical Research

Empirical studies reveal that learner, facing AI tools (ChatGPT, Grammarly, chatbots) have a positive impact on EFL students' writing proficiency, organization, vocabulary, grammar accuracy, revision speed, confidence/self-efficacy, engagement, and perceived autonomy through immediate, personalized feedback (e.g., quasi, experimental gains with large effect sizes; mixed, methods reports of increased motivation, reduced anxiety, and self-directed behaviors). Researchers point to the advantages of EFL higher education settings where adaptive scaffolds not only assist the development of SRL phases but also bolster intrinsic motivation as per SDT Alqurni (2026) explored the integration of TAM, SCT, and SDT in explaining the psychological drivers behind an AI, enabled learning process. Conducting SEM on survey data of 280 Saudi students, the research revealed that AI's perceived agency encouraged usability and autonomy support, which in turn improved self-efficacy and self- learning motivation, resulting in positive self, learning behavior. An important finding is that perceived usefulness and trust had no direct impact on self, efficacy, thereby emphasizing the influence of cultural context. According to Balouch and others (2025), the research they conducted with 300 university students confirmed that the use of AI has a significant effect on how people regulate their own learning (i.e., self-regulated learning). Self-regulated learning is one of the most important aspects of academic

success. The benefits to self-regulated learning from the use of AI were vast; however, there is a caution that excessive reliance on AI can lead to continued issues of equitable access to educational resources, which further highlights how transformative the role of AI in education will be as we start to implement it in a thoughtful manner.In a different research, Zhang (2025) studied a missing area of literature by exploring how AI influences the psychological factors of self-regulation, resilience, and autonomy among Chinese EFL learners. The study showed that learners with AI significantly outperformed in Self, Regulation, Resilience, and Autonomy those who received traditional instruction due to the fact that an ANCOVA was performed in a quasi, experiment with a control and experimental group. Also, He (2025) based on Social Cognitive Theory, found that the use of AI tools to a great extent determines learner autonomy not only directly but also indirectly when the mediation of self, efficacy, metacognitive strategies, and self-monitoring is taken into account. The research results reveal the two, sided nature of AI, thus, its proper usage should first and foremost give technological support and at the same time develop student's self-regulatory psychological capacities.Wierz (2024) investigated whether ChatGPT could meet the psychological needs of Self, Determination Theory and he found that its ability to hold a conversation indirectly facilitates student engagement through the enhancement of the senses of autonomy and competence. Byers (2024) looked at how an AI feedback tool affected high school students' motivation in online courses through the lens of Self-Determination Theory. Results showed that, although the AI tool was very effective in raising the level of the perceived competence through personalized feedback, the extent to which it was effective depended heavily upon the level of teacher communication.Melvina and colleagues (2023) found a significant positive correlation between motivation and learner autonomy in 40 Indonesian EFL college students. Additionally, they performed independent samples t-tests, revealing that motivation and learner autonomy were not significantly correlated by gender or degree level (undergraduate or postgraduate). Therefore, they emphasized the importance of motivation and learner autonomy in the EFL classroom, as well as the need for education to continue focusing on these two aspects of education in order to foster successful and independent language learners. In addition, all literature reviewed agrees that the application of AI tools by learners can improve psychological or educational constructs, such as learner autonomy, self-regulation and motivation, through the provision of tailored instructional support and feedback. Nevertheless, the current studies are predominantly conducted in Western and East Asian environments and focus on these constructs separately. There is a considerable gap in knowledge about how the integrated perceptions and effects of these tools are realized in specific, less, explored cultural and educational contexts. Hence, this research aims to explore the perceptions of and changes in the use of AI tools by Iraqi EFL learners, thereby filling the evident contextual and integrative research gap. This emphasis will yield a culturally, informed understanding that is indispensable for the successful deployment.

3. Methodology

3.1 Research Design

This study adopts quasi-experimental design pretest, posttest to investigate the perceptions and influences of a student, who uses AI tools for the development of autonomy, motivation, and self, regulation among EFL learners. The study participants were divided into two groups: the experimental group that was exposed to AI, enhanced instruction and the control group that received only traditional instruction. Both groups completed pretest and posttest activities based on the validated questionnaires, which allowed the changes to be precisely related to the AI, based interventions. The study's duration was 6 weeks, thus providing a controlled yet still ecologically valid exposure to AI, assisted learning in a university context.

3.2 Participants

The selection of the participants was via convenience sampling among Iraqi EFL students attending higher education programs at the University of Baghdad, Iraq. The experimental group consisted of 92 learners (48 males and 44 females), aged 18 to 29 years, who were provided with instruction supplemented by learner, facing AI tools. The control group comprised 88 learners (45 males and 43 females), likewise aged participants, who

were taught in the traditional language education setting without the use of AI. The entire sample were natives of Arabic and had intermediate English skills (as determined by the institutional placement tests). They also had no previous formal encounter with AI tools in language learning. The research ethics committee of the university approved the study, and all participants gave informed consent.

3.3 Instruments

3.3.1 Motivation Questionnaire

In order to evaluate motivation, the researchers employed the AI Use Motives Questionnaire (QAIUM) by Yurt and Kasarci (2024). The tool is capable of gauging various aspects of a person's motivation when they interact with AI for educational purposes. There are 17 items in the questionnaire and respondents can rate them on a scale of 1 to 5, where 1 represents strong disagreement and 5 strong agreement. Five major factors, namely expectancy, utility value, attainment, intrinsic/interest value, and cost, are measured by this instrument. The scale accounts for 82.85% of total variance, thus it is highly valid in terms of the construct being measured. As for its use in this research, it yielded a consistency index (Cronbach's alpha) of 0.85. The questionnaire has been chosen as it is centered around AI, motivation and thus can accurately measure how the use of AI tools changes the motivational components of learners in EFL environments, whereas more general motivation scales cannot do that.

3.3.2 Self-Regulation Questionnaire

To use the self-regulation scale by Carey et al. (2004) more practical and flexible across different research contexts, a short version was used. It consists of 31 items that were intended to create seven subscales, which were derived based on the reasoning behind the concept of self-regulatory behaviors. The participants were asked to answer the items using a Likert, type scale ranging from 1 (strongly disagree) to 5 (strongly agree). According to this study, the scale yielded a reliability coefficient (Cronbach's alpha) of 0.82. The decision to use this tool was based on its elaboration and flexibility, which gave a detailed picture of the learners' self-regulatory processes in AI, enhanced environments and thus differentiated it from the broader or less subdivided scales.

3.3.3 Autonomy Questionnaire

The Beliefs about Teacher's Role (BTR) Scale, which was part of the Learner Autonomy Perception Questionnaire by Nguyen and Habk (2019), was one of the instruments used to measure learner autonomy. The scale has eight items that were rated on a 5, point Likert scale, with 1 (strongly disagree) and 5 (strongly agree) as the extremes, and the main focus was on perceptions of autonomy in language learning. It was reported by Nguyen and Habk (2019) that the internal consistency (Cronbachs alpha) was 0.767 and Rho_A reliability was 0.798, while composite reliability was 0.821, thus confirming the reliability of the scale (Cohen et al., 2007). In the current research, the scale produced a Cronbach's alpha value of 0.79. The BTR Scale was selected to highlight the perceptual elements of autonomy, especially the teacher's role in encouraging independent learning, thus making it a good fit for exploring the influence of AI on EFL learners' autonomy perceptions.

3.4 Procedure

The two groups of participants, which were randomly assigned, received six weeks of English instruction that addressed the four essential skills of reading, writing, speaking, and listening. Combined with the three different tools used by the experimental group, whom used a combination of transcendental and traditional methods to help them learn these four skills, the experimental group combined the use of three AI tools. The three AI tools used by the experimental group consisted of ChatGPT, which provided chatbot responses to participants' questions, made presentations, and received immediate feedback on their work; Grammarly, which provided text analysis, text summaries, and text error correction; and Duolingo, which provided students with oral training (practice of pronunciation), interactive exercises, and self-study opportunities. Students in this group completed class activities using these three AI tools to enable personalized learning. As a result, the experimental group was able to regulate their own learning progress, receive individualized feedback on their

learning, and engage in self-directed practice. Alternatively, the students in the control group received the same instruction but with only traditional instructional formats (i.e., lecture, textbook exercises and group discussion) without using any of the AI tools. This design made it possible to have a clear, cut comparison between the two teaching methods with and without AI. The intervention started in November 2025. Pretests were given at the beginning and posttests at the end to assess the changes in autonomy, motivation, and self-regulation.

3.5 Data Analysis

First, the gathered data were screened for outliers. One way of identifying outliers is by using Mahalanobis distances. Cases that exceeded the critical value (20.52 for a degree of freedom of 5) were removed. The researcher also looked at boxplots and eliminated extreme values. Mixed, effects models were then used to explore whether gender had a moderating effect and to take into account potential random effects of gender. Finally, Analyses of Covariance (ANCOVAs) were used to more rigorously test the hypotheses by including pretest scores as control variables to rule out initial group differences. Before the ANCOVA, the researcher made sure that certain assumptions were met which included normality of scores (tested by the Shapiro, Wilk tests), linearity of relationships (assessed by scatterplots), homogeneity of regression slopes (determined by interaction models), and equality of error variances (checked by Levene's test). In case the equality of error variances assumption was not fulfilled, a conservative alpha level of 0.01 was used. The whole set of analyses was performed using IBM SPSS (version 26).

3.6 Results

This study's primary aim was to investigate learner-facing AI tools' perceptions and impacts on changes in learner autonomy, motivation, and self-regulation of Iraqi EFL learners. Pretest and posttest were the instruments used to collect data from 180 learners (92 in the experimental group and 88 in the control group). The researchers made a pre-analysis data screening to identify if there were any outliers. They did that by calculating Mahalanobis distances for the six variables (pretest and posttest scores for autonomy, motivation, and self-regulation). No multivariate outliers were found from analysis using Mahalanobis distance, as the maximum Mahalanobis distance (19.23) of the extremes was less than the critical value (22.458; df=6, α=0.001). Results of the box plot analysis of the variables that showed no extreme univariate outliers, thus, after checking the dataset for outliers, a total of 180 subjects remained in the dataset.

3.6.1 Demographic Characteristics

Demographic characteristics for the subjects by group are provided in Table 1. The control group had 88 subjects (45 men and 43 women; Mean Age = 20.14; SD = 1.42; Range = 18 – 22) and the experimental had 92 subjects (48 men and 44 women; Mean Age = 19.91; SD = 1.42; Range = 18 – 22) and both the control and experimental groups were found to be similar on demographic characteristics (i.e. Sex, Age).

TABLE 1. Demographic characteristics of the participants.

Group	Females (n)	Males (n)	Age Mean	SD	Age Min	Age Max
Control (N=88)	43	45	20.14	1.42	18	22
Experimental (N=92)	44	48	19.91	1.39	18	22

3.6.2 Descriptive Statistics

As shown in Table 2, descriptive statistics tables for both pre-test and post-test are provided. All pre-test mean scores across all three outcome measures were similar for both groups with only small differences between them (e.g., autonomy/pre-test control group M=24.96; experimental group M=25.38). All three outcome measures had a greater increase in mean post-test scores from pre-test scores among the experimental group compared to the control group (e.g.: autonomy/post-test control M=26.05; experimental M=32.47). Skewness values for most of the means were all within acceptable limits (0.17 to 0.43), which indicates they were generally normally distributed and there was not a substantial violation of the normality assumption.

TABLE 2. Descriptive statistics of the participants

Group	Variable	Test	N	Minimum	Maximum	Mean	Std. Deviation	Skewness
Control (N=88)	Autonomy	Pretest	88	13.48	33.69	24.96	3.86	-0.01
		Posttest	88	12.60	35.59	26.05	3.94	-0.22
	Motivation	Pretest	88	31.98	67.42	49.83	8.76	0.04
		Posttest	88	32.76	71.19	51.97	9.25	-0.17
	Self-Regulation	Pretest	88	65.01	134.44	100.24	14.90	0.12
		Posttest	88	66.08	138.55	103.34	15.29	0.43
Experimental (N=92)	Autonomy	Pretest	92	17.54	35.90	25.38	3.98	0.16
		Posttest	92	23.60	39.86	32.47	3.71	-0.06
	Motivation	Pretest	92	29.40	69.30	48.93	8.49	-0.04
		Posttest	92	44.22	84.30	63.93	9.16	-0.00
	Self-Regulation	Pretest	92	70.91	136.55	102.14	15.03	0.03
		Posttest	92	88.95	156.55	122.14	15.58	0.04

3.6.3 Preliminary Analyses and Assumption Checks

In order to check whether gender had an impact on the results, gender ANOVAs were performed on posttest scores. Results indicated the mean difference for motivation (MD = 0.668; t = 0.404; p = 0.687), self-regulation (MD = 1.153; t = 0.402; p = 0.688), and autonomy (MD = 0.475; t = 0.561; p = 0.576) was greater than 0.05 for each variable, indicating no significant effect due to gender. As a result, gender was not included in the analyses as a covariate. All variables analyzed were measured on interval scales and met the assumption of independence among observations. Normality was assessed with the Shapiro-Wilk test (see Table 3). Most of the p- values were >0.05, which indicates that the assumption of normality was met at least to a reasonable degree, despite a few minor deviations from it for the self-regulation pretest of the control group (p=0.033) and the autonomy posttest of the experimental group (p=0.013). The decision was that these violations were acceptable in view of the fact that parametric tests are quite robust to slight violations when the sample size is large.TABLE 3. Shapiro-Wilk normality test results.

Group	Variable	Test	W	p
Control	Autonomy	Pretest	0.977	0.123
	Autonomy	Posttest	0.994	0.962
	Motivation	Pretest	0.986	0.437
	Motivation	Posttest	0.986	0.479
	Self-Regulation	Pretest	0.969	0.033

	Self-Regulation	Posttest	0.976	0.094
Experimental	Autonomy	Pretest	0.978	0.123
	Autonomy	Posttest	0.964	0.013
	Motivation	Pretest	0.996	0.993
	Motivation	Posttest	0.988	0.535
	Self-Regulation	Pretest	0.988	0.585
	Self-Regulation	Posttest	0.982	0.221

Test-specific assumptions for ANCOVA were evaluated in accordance with Tabachnick and Fidell (2019). Linearity between dependent variables and covariates was verified through scatterplots (Figures 3), which displayed linear relationships without any curvilinear patterns. In order to determine if the slopes of regression lines were homogeneous, pretest group interactions were added to the regression models and tested (Table 4). For both motivation (p=0.867) and self-regulation (p=0.570), the interaction was nonsignificant; however, borderline significance emerged for autonomy (p=0.019). The potential infringement on autonomy was considered and results interpreted with caution.

TABLE 4. Tests of homogeneity of regression slopes (interaction models).

Dependent Variable	**Source**	**df**	**F**	**p**
Autonomy Posttest	Aut_Pre × Group	1	5.621	0.019
Motivation Posttest	Mot_Pre × Group	1	0.028	0.867
Self-Regulation Posttest	SR_Pre × Group	1	0.324	0.570

A test to check if the error variance was the same across groups was conducted using Levene's test on the post-test score (see Table 5). All p-values were >0.05, meeting the assumption. Due to the marginal slope's violation for autonomy, the alpha for the ANCOVA for this variable was conservatively set at 0.01.

TABLE 5. Levene's test for equality of error variances.

Dependent Variable	**F**	**df1**	**df2**	**p**
Autonomy Posttest	0.064	1	178	0.801
Motivation Posttest	0.177	1	178	0.675
Self-Regulation Posttest	0.655	1	178	0.420

3.6.4 Main Analyses: ANCOVA and Regression

To address the research questions, ANCOVAs were conducted with pretest scores as covariates (Table 6). To further analyze coefficients, linear regressions were carried out as well (Tables 7, 9). The impact that Group (pre-test controlled for) had on Autonomy (Q1) was very strong (F=342.29, p<0.001, partial =0.659). The Experimental Group performed at a higher level than the Control Group. The impact Group had on Motivation (Q2) was significant (F=743.21, p<0.001, partial =0.808) and also in favor of the Experimental Group. The effect Group had on Self-Regulation (Q3) remained significant (F=631.24, p<0.001, partial =0.781; large effect), and the Experimental Group performed much better.TABLE 6. ANCOVA results.

Dependent Variable	**Source**	**df**	**Sum of Squares**	**F**	**p**	**Partial η^2**
Autonomy Posttest	Aut_Pre	1	3232.42	681.89	<0.001	0.794
	Group	1	1622.58	342.29	<0.001	0.659

	Residual	177	839.05	-	-	-
Motivation Posttest	Mot_Pre	1	13077.52	1204.27	<0.001	0.872
	Group	1	8070.67	743.21	<0.001	0.808
	Residual	177	1922.09	-	-	-
Self-Regulation Posttest	SR_Pre	1	39058.31	2056.87	<0.001	0.921
	Group	1	11986.80	631.24	<0.001	0.781
	Residual	177	3361.10	-	-	-

These results were confirmed through the regression analysis results. For the autonomy results (Table 7), group membership (β=6.01, $p<0.001$) had a significant positive effect on posttest scores after controlling for pretest scores. The same pattern of prediction was found for motivation (β=13.42, $p<0.001$; Table 8) and self-regulation (β=16.67, $p<0.001$; Table 9). The models explained a significant amount of variance (R^2= 0.854 – 0.949).

TABLE 7. Regression coefficients for autonomy posttest.

Predictor	**β**	**SE**	**t**	**p**	**95% CI**
Intercept	0.679	1.001	0.679	0.498	-1.296, 2.655
Aut_Pre	1.005	0.038	26.113	<0.001	0.929, 1.081
Group	6.007	0.325	18.501	<0.001	5.366, 6.647

(R^2=0.854, Adj. R^2=0.852, F=517.9, $p<0.001$)TABLE 8. Regression coefficients for motivation posttest.

Predictor	**β**	**SE**	**t**	**p**	**95% CI**
Intercept	1.124	1.482	0.759	0.449	-1.796, 4.044
Mot_Pre	0.978	0.031	31.548	<0.001	0.917, 1.039
Group	13.420	0.512	26.211	<0.001	12.411, 14.429

(R^2=0.912, Adj. R^2=0.911, F=1124.6, $p<0.001$)TABLE 9. Regression coefficients for self-regulation posttest.

Predictor	**β**	**SE**	**t**	**p**	**95% CI**
Intercept	-0.235	2.327	-0.101	0.920	-4.826, 4.356
SR_Pre	1.036	0.023	45.353	<0.001	0.991, 1.081
Group	16.672	0.664	25.125	<0.001	15.363, 17.982

(R^2=0.949, Adj. R^2=0.948, F=1643, $p<0.001$)

Discussion

Using a quasi-experimental pre-test/post-test design, this study examined the impact of learner-facing AI tools (ChatGPT, Grammarly, and Duolingo) on Iraqi EFL learners' autonomy, motivation, and self-regulation. The results showed statistically significant and large effect sizes for the experimental group when compared to the control group across the three constructs, with partial eta squared effect sizes ranging from .659 (autonomy) to .808 (motivation). Thus, these results support the conclusion that strategically incorporating AI tools into HE EFL contexts has the potential to significantly enhance important psychological and regulatory dimensions of learning.

Gains in the second language acquisition of learner autonomy are reflective of findings from the overall literature on AI technology and language education. For instance, Zhang (2025) demonstrated that there was an increased level of learner autonomy among Chinese EFL learners who used AI technology in their studies. Data gathered in the current investigation supports Zhang's (2025) conclusion by showing how learners can exercise more control over their own learning paths by utilizing AI scaffolds, including real-time feedback from tools such as ChatGPT and Grammarly, as well as other technologies. He (2025) also provides support for the model through his social cognitive theory, whereby he states that the use of technology has been shown to impact learner autonomy both directly and indirectly, through self-efficacy, metacognitive strategies, and self-monitoring. In the present context, this indicates that immediate and personalized feedback from AI technology likely serves as a metacognitive cue for learners to evaluate their product and revise independently and to internalize their use of self-regulatory processes. This conclusion is also supported by the fact that the implementation of traditional teacher-centered instruction may have limited independent practice among learners in the context of the Iraqi EFL.

In a similar fashion, the new finding on motivation fits into and gives context to previous research. Alqurni (2026), for instance, using structural equation modeling, found that perceived agency in AI tools leads to autonomy support, which then positively impacts self-efficacy and motivation to self-learn for Saudi students. The current findings confirm this process and suggest that learners' needs for autonomy and competence were met through ChatGPT and Duolingo's conversational and adaptive capabilities, resulting in the elevation of intrinsic and identified motivation. This interpretation is supported by Wierz (2024), who demonstrated that the conversational features of ChatGPT indirectly support engagement by meeting the autonomy and competence needs of SDT. Finally, the present research replicates Melvina et al. (2023), who found a strong positive correlation between motivation and learner autonomy for Indonesian EFL learners with no gender differences—which is in line with the non-significant gender moderating effect found here.

The evidence supports the use of AI to facilitate Zimmerman's cycle of self-regulated learning (SRL) through forethought, execution, and feedback. Balouch et al. (2025) further corroborate the premise that AI significantly improves SRL and predicts academic success. Tools such as Grammarly (for proofreading and revision) and ChatGPT (for brainstorming and creating a project plan) facilitated improved goal-setting, tracking progress, and modifying strategy. However, the findings substantiate the cautions found in the literature. Balouch et al. (2025) said that while AI promoted SRL, excessive reliance on AI could inhibit the development of self-regulation. Therefore, Byers (2024) emphasized the importance of pedagogical integration; teacher feedback affected students' perceptions of their competence based on Self Determination Theory (SDT). In this study, the instructor's direction of the students' use of AI likely maximized the utility of the tools while minimizing the development of passive dependency.

Implication of the Study

The results of these studies provide evidence of a significant advancement in the development of the Self-Determination Theory (SDT) when applied to AI-supported environments for Teaching English as a Foreign Language (EFL). This study has demonstrated that AI-supported EFL instruction can promote autonomy, motivation, and self-regulation at the same time by enhancing the learner's autonomy and competence (i.e., the two psychological needs). Therefore, this supports Zhang's (2025) results, which also mentioned resilience, by placing motivation as a critical mediating variable in EFL settings. This means that since almost all of the disability measurements reviewed showed a large effect size, the advantages could be even greater for learners who are living in under-resourced/war-torn countries (e.g., Iraq), because of the additional psychological support offered through the non-judgmental use of AI.

Results offer evidence in support of including learner-facing AI tools into EFL curricula at the higher education level in Iraq. AI should not be used to replace teachers but rather should be viewed as a cognitive partner that supports the development of self-regulated learning competencies. Teacher professional development should

include prompt engineering, critical evaluation of generated output, and maintaining relational relatedness between teachers and learners in order to maximize the motivational benefits of using AI. The study has a number of limitations that should be acknowledged. Specifically, the study relied solely on self-report measures, which may be affected by social desirability bias. While six weeks was a sufficient timeline for determining if an effect exists, it was not a long enough window in which to evaluate retention of skills or transfer to other contexts. Additionally, the study's sample size comes from one university and may limit generalizability.

Conclusion and Further Studies

This quasi-experimental research reveals that the use of learner facing Aritificial Intelligence tools including ChatGPT, Grammarly, and Duolingo have significantly improved the autonomy, motivation, and self-regulatory abilities of Iraqi EFL learners in a higher education context. After controlling for pre-test differences, all three dependent variables demonstrated large effect sizes indicative of the ability of these technologies to provide individualized, immediate, and non-judgmental feedback to assist learners with their self-direction, strengthen their intrinsic and identified motivations, and scaffold their self-regulatory processes. Results also support and extend recent empirical evidence that AI positively impacts psychological and metacognitive constructs of EFL students demonstrating that integrating AI into education in a thoughtful manner can be a substantial addition to traditional instruction which can assist with addressing some of the motivational and self-regulatory issues often reported in resource limited or teacher dependent language learning classrooms.

Longitudinal research should be conducted in the future to explore how long-lasting the psychological benefits created by AI tools will be and whether these benefits transfer to measurable language outcomes (i.e., speaking, writing, listening). In addition, mixed-methods designs which combine quantitative data from participant surveys and interaction logs using AI tools with qualitative data from individual interviews would also provide a more comprehensive understanding of learner perspectives on the effective use of an AI tool, including the potential for over-reliance on it. Comparative studies should also be conducted across different cultures and types of educational institutions, and through research that uses systematic variations in teacher scaffolding and the combination of AI tools utilized to identify optimal conditions for maximizing benefits and minimizing inequity and dependency issues. Such studies will help to provide the empirical basis for the creation of evidence-based recommendations for the sustainable and pedagogically sound use of AI in EFL education.

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