

Unboxing Practical Strategies in University Curriculum in the Light of Artificial Intelligence: An Insight into the Effects on Intellectual Awareness, Emotional Intelligence, Motivation, and Creativity

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Abstract

The goal of this inquiry was to scrutinize how Iranian university students' motivation, creativity, emotional intelligence (EI), and intellectual awareness (IA) were affected by artificial intelligence (AI). Sixty Iranian university students in Ahvaz, Iran, were chosen based on a convenience sampling method to reach this objective, and they were separated into two groups: the experimental group (EG) and the control group (CG). Both groups were administered four relevant questionnaires to gauge their proficiency in each dependent variable. Next, utilizing AI-ChatGPT, some modified materials (ten reading texts) were trained to the EG. The CG received traditional instruction using the same materials. Four questionnaires were given to each group as research posttests following the ten-week course of treatment. The results of ANCOVA and independent samples t-tests revealed meaningful differences; the EG did better than the CG on all dependent variables. Based on the gained results, the EG outperformed the CG on the posttests of motivation, creativity, EI, and IA. The research's implications can encourage EFL teachers and learners to acquaint themselves with different AI applications and apply them in their teaching and learning.

Keywords: Artificial intelligence, Intellectual awareness, Emotional intelligence, Motivation, Creativity

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INTRODUCTION

Due to several issues and shortfalls, traditional methods of teaching English have come under fire in recent years. In the 4.0 era, learning English was still considered a tedious process that did not keep up with the trends. Growing interest has been shown in integrating artificial intelligence (AI) into various sectors in this period. Zhu (2017) defines AI as applying computers to simulate intelligent human behavior and mental processes. AI is a broad field that refers to the ability of the computer to carry out cognitive functions, including learning and problem-solving, which are often associated with human brains (Akbarani, 2023; Baker et al., 2019; Chen et al., 2020; Namaziandost & Rezai, 2024).

AI has also gained popularity in many fields, including education. English Language Teaching (ELT) is one field in which AI has demonstrated significant promise. Fitria (2023) asserts that the most helpful strategy for English language teachers is to use AI in ELT. With the developments in natural language processing, machine learning, and data analysis, AI promises to provide personalized and flexible learning experiences for English language learners. Meanwhile, AI can precisely process and analyze data to mimic human cognitive processes, reasoning, and speech. As such, AI plays a unique part in influencing language learning and teaching practices in the ever-changing field of English education (Wang, 2019). How English is taught and learnt has changed due to the quick growth of technology. AI tools and apps are now included in online resources, language learning platforms, and classrooms.

AI develops motivation among English as a Foreign Language (EFL) learners. In general, motivation is described by Guay et al. (2010) as the cause of fundamental behaviors. Similarly, Broussard and Garrison (2004) assert that motivation is the quality that influences an individual's decision to act or not act. Put differently, it is our willingness or good attitude that allows us to carry out a particular task or obligation. Conversely, academic motivation, a little more focused than general motivation, encourages someone to attend school and get their degree (Clark & Schroth, 2010; Namaziandost et al.,

2024). One of the key elements influencing students' performance or accomplishments in English is motivation (Kurt & Kecik, 2017). This indicates that motivation is a significant element contributing to English achievement. Stated differently, pupils' learning styles can be influenced by their passion for learning. When pupils are highly motivated, they will attempt to study using various methods to attain success.

Furthermore, AI can increase EFL students' emotional intelligence (EI). EI is commonly defined as the ability to recognize, comprehend, and control one's emotions and empathize with and control the feelings of others (Mayer, 2006). It includes a variety of abilities and skills that promote effective emotional functioning, such as self-awareness (Kanesan & Fauzan, 2019), empathy (Este'vez et al., 2019), self-regulation (Zhoc et al., 2018), social adeptness (Rani & Yadapadithaya, 2018), and motivation (Arias et al., 2022). Academic performance is highly impacted by EI, which is characterized by the capacity to understand, regulate, and empathize with others (Zhoc et al., 2018). High EI kids are more capable of managing their stress and emotions, which promotes healthy peer connections, resilience, self-awareness, and social skills—all of which help create favorable conditions for learning (Sekaryanti et al., 2023).

Besides, AI helps EFL learners increase their creativity. Almost every facet of education, including learning English, has been impacted by creativity. It is also a cornerstone of the successful intelligence hypothesis proposed by Sternberg and O'Hara (2000), which is defined as generating valuable, creative, and advantageous products or concepts. According to Dickhut (2003), creativity is the act of producing something unique and worthwhile. Al-Alami (2013) defines creativity as giving life to original ideas. Innovation is developing or implementing an idea, whereas thinking and producing are the initial stages of creativity. If educators have opinions but do not act on them, they are creative but not imaginative (Avila, 2015). Notably, the efficacy of any notion should be determined in an educational situation. According to Glover et al. (2013), creativity is often defined as the capacity to generate creativity, regardless of prior job experience. In the realm of educational setting, creativity is referred to as the capability of pupils to create or bring to life anything novel and ingenious, whether it is a fresh method to a subject they are studying or an inventive resolution to a problem they run into in class (Vadipoor et al., 2023; Wang, 2018).

Using AI can also promote EFL learners' intellectual awareness (IA). IA is the capacity to recognize, at least partially, when a function is compromised. At the very least, it is essential to acknowledge when particular tasks are becoming challenging for you to do (Bivona et al., 2020). IA is the broad awareness of one's impairment in a physical, behavioral, or cognitive function, as well as the severity and ramifications of the impairment (Candace et al., 2021). It is believed that pupils' IA may not occur during the cognitive conflict process. Both cognitive conflict and IA do not arise in the early stages when students cannot comprehend a novel situation or experience unpleasant conflict (Djadir et al., 2017). Students experience cognitive conflict as a negative process during the conflict stage when they feel the most substantial feelings of worry, frustration, and threat. As a result, the IA is detained. When students make a poor choice during the resolution stage, that is, they continue to hold onto their preconceived notions, their IA will probably not occur. Thus, the detrimental factors that can prevent cognitive conflict and IA include students' failure to grasp a new concept, which implies that cognitive conflict will not arise; learning's inability to raise students' awareness of the issue, which results in cognitive conflict not occurring; students' discomfort, frustration, or sense of threat, which leads them to ignore conflict situations; and students' defense of incorrect beliefs (Djadir et al., 2017).

LITERATURE REVIEW

Theoretical Background

The only way to refer to what is known as online, virtual, or e-learning is by using technology as a learning tool. According to Tsui and Tavares (2021), technology enables lecturers' pedagogical approaches and generates innovative teaching methods. Consequently, teachers can get the maximum performance out of their pupils by utilizing technological devices with AI. Stated differently, combining technology and pedagogy can alter how lecturers teach and students learn. AI is included in the process to facilitate and expedite learning (Kaharuddin, 2020). Numerous AI apps may be

employed to develop the knowledge and teaching process. For instance, students can use Google Translate to translate text from English into other languages or vice versa to comprehend the instructional materials lecturers provide. According to Caplar et al. (2017), a novel computer model named D-Wave 2X can carry out complicated AI operations. AI is also evident in language processing and automatic translation.

The development of AI technologies has garnered more attention because of its computational inventiveness (Cheng & Day, 2014). Numerous AI methods have been used to increase creativity in computers. As Rahman (2009) stated, AI produces software that filters information and performs independent tasks like computing or student search. AI creates "intelligent" technology like computer systems (online platforms) and computerized machines that function and respond equally to the human brains (Karsenti, 2019). AI is another name for it (Mehrotra, 2019). It is the intelligence that the machine predicts based on the innate intelligence exhibited by people. Put differently, AI is imbuing a machine with human intellect to do tasks. AI is a computer science technique that inspects the study and formation of intelligent tools and applications, according to Mehrotra (2019). It is the science of making a computer think and act like an intelligent human. Intelligence is the cornerstone of AI technology (Wang, 2019). Whitby (2009) claims that AI analyzes intelligent behaviors in people, animals, and machines and looks for solutions.

AI is the replication of human intellect on a computer that has been trained to think and act like a person (Vasiljeva et al., 2021). AI, then, is software designed with a specific purpose in mind. Using this AI program, students may learn spelling, grammar, word matching, and sentence composition. AI gives students feedback on their assignments so they may better them. This may have an impact on how students learn. If students receive corrections for their grammar, diction, or sentence construction errors and are allowed to review them, it will inspire them to study more. The use of AI may also be used to identify writing errors. According to Cotos (2011),

after receiving feedback from AI, students revise, polish, and practice becoming self-sufficient learners (Miller, 2019).

AI is a valuable technique for raising EFL students' motivation levels. One of the psychological concepts studied the most, motivation, is crucial for language learning success and significantly impacts English language instruction's effectiveness and productivity (Jin, 2014). Paying heed to teacher motivation is imperative since a recent study indicates that students' motivation and performance depend on teachers' work satisfaction and motivation (Banerjee et al., 2017; Dicke et al., 2020; Trinidad, 2021).

Intrinsic and extrinsic motivation are the two classifications. According to Harmer (2002), extrinsic motivation is when outside factors inspire people to achieve an aim. Extrinsic considerations, including taking an exam, landing a job, or attending a particular university, might motivate L2 learners. Additionally, reward and punishment catalyze extrinsic motivation in learners. Harmer (2002) asserts that an individual's intrinsic drive originates from the inside. In this type, learning a language itself serves as the learner's motivation rather than the concept of rewards or penalties. Factors influencing intrinsic motivation include instructors, instructional techniques, and the surrounding environment (Harmer, 1991).

Plentiful investigations have demonstrated motivation's importance in performance and accomplishment (Clark & Schroth, 2010; Green et al., 2006). Öz (2015) clarified in recent research that academic motivation helped students by giving them an internal drive to complete assignments. He noted that their sense of personal autonomy derived from their intellectual desire. Similarly, motivated learners, according to Ryan and Deci (2000), had the energy to complete a task rather than abandon it midway through. Similarly, Dörnyei (2005) stated that learners' motivation propelled them to acquire a foreign or second language.

The other important variable in this survey is EI. When academics realized the importance of EI in people's social and intellectual lives in the late 20th century, they became interested in the idea (Schutte et al., 1998). According to Bar-On (2010), EI may be seen as an assortment of consistent

social and emotional abilities that determine how people perceive and communicate their emotions, interpret the feelings of others, form social bonds, and manage everyday demands, stressors, and obstacles. According to Bar-On (2007), individuals' intrapersonal capacity to recognize their strengths and flaws and articulate their feelings and thoughts is the primary basis of EI. On an interpersonal level, therefore, it refers to the ability to build and sustain a cooperative and comfortable connection and the capacity to understand the opinions of others. The capacity to adapt and reason in the face of changes in one's environment, society, and self is another aspect of EI. EI is a wide range of essential characteristics for effective interpersonal communications and emotional understanding (Caballero Domínguez et al., 2015; Mahmoodi et al., 2019). Numerous EI features and their applicability in a range of social circumstances have been examined in earlier research. The literature puts an abundant deal of prominence on the function of EI and the characteristics associated with it in language learning. Self-awareness is essential to EI because it lets people see how their emotions affect their speech (Baleghizadeh & Shakouri, 2019; Kanesan & Fauzan, 2019).

One more crucial variable in this research is creativity. According to Albert and Kormos (2011), "creativity" refers to various pertinent but distinct phenomena, including the creative process, circumstance, individual, performance or output, and potential. Creativity is a multifaceted concept that may be assessed as a personality characteristic or a creative style (Matsouka et al., 2003). According to Abutalebi and Costa (2008), it is the brain's mystery and a unique talent that an individual possesses. Hadley (2003) highlights the prominence of the creative influence in learning a language as well as the creative usage of language. In his opinion, learners must know how to utilize language creatively to get past the primary stages. Innovative and creative thinking should be given top importance in communicative and task-based learning approaches, as students must use their imaginations to perform the activities. In this sense, students develop their creativity and generate higher-quality work, which results in a successful second language acquisition (SLA). In the case of foreign languages, when output is mainly

created in the classroom, it may even be more crucial (Albert & Kormos, 2011). Otto (1998), who conducted small-scale research using communicative approaches to train Hungarian secondary school students, lends credence to this theory. According to the data, the learners' final English grades and inventiveness were shown to have strong positive relationships.

Empirical Background

Hayashi and Sato (2020) claimed that mobile apps with AI integration can benefit English language students. Incorporating AI applications has improved English learning in previous empirical mobile-assisted language learning (MALL) research (Kim et al., 2020; 2018; Kim et al., 2021). Based on Huang et al. (2022), AI apps support L2 learning by enhancing speaking, reading, writing, and listening abilities. Such applications can also help the pupils with their grammar and vocabulary.

Chung and Bong (2022) conducted a study to exhibit the possible effects of AI apps in pronunciation practice and the intelligibility of Korean-accented English. The results showed that natural speakers found Korean-accented English more understandable than AI apps. The intelligibility scores for native speakers were somewhat acceptable. Native speakers would do better than AI systems in identifying consonant clusters at the beginning and midway emphases of a word, consonant sounds, and vowel length factors. Thus, Chung and Bong (2022) suggested that while studying English, students practice communicating using accessible AI tools and try to have meaningful discussions with people who have varied accents.

Banaeian and Gilanlioglu's (2021) study focused on how students may improve their vocabulary in other languages by employing the NAO robot. Given that the experimental group (EG) and the control group (CG) did not differ expressively from one another, both groups expanded their vocabulary in a foreign language. Furthermore, they discovered that the students' subjective perception—which lacked scientific validation—was that using the NAO robot helped them learn new words. Furthermore, Dizon

(2020) investigated how listening and speaking skills may be developed using the chatbot Alexa. The findings indicated that speaking abilities were the only ones that had improved. Consistent with prior research, Dizon (2020) found that these technologies were enjoyable and motivating for learning English.

Han (2020) examined how Korean EFL voice-based AI chatbots impacted students' emotional characteristics and speaking abilities. Forty-four Korean students took part and were separated into an EG and a CG group. The learners engaged in 10 voice-based AI dialogue sessions with "Echodot." According to the results, the AI Chatbot effectively enhances EFL students' speaking abilities. The results demonstrated that the emotional aspects of AI Chatbot-based English learning got better over time.

By contrasting AI-integrated MALL with AI-integrated computer-assisted language learning (CALL), Kim (2022) investigated the influences of AI on Korean students' TOEIC preparation. In all, 496 first-year students took part in the research. They were divided into three groups at random: the control group ($n = 132$), AI MALL ($n = 164$), and AI CALL ($n = 190$). The two experimental groups used AI-enabled PCs or mobile phones to study TOEIC throughout the 2021 academic semester. The control group received instruction from a human teacher in a conventional classroom. The TOEIC reading and listening assessments were given before and after the treatment. The results demonstrated a considerable rise in reading and hearing exam scores for all groups. According to group comparison data, the AI CALL group did better on both exams than the CG. This group also fared better in the reading exam than the AI MALL group.

Lee et al. (2023) also looked at the effect of AI technologies on EFL learners' reading interests. One set of EFL students was involved in traditional reading skill tasks, whereas the other group had access to an AI tool that produced reading material according to the students' choices. The findings revealed that the AI technologies considerably increased the pupils' interest in reading. In another study, Utami et al. (2023) examined the effects of AI tools on the writing of Indonesian EFL students. The results showed how the students' writing was enhanced by AI technologies, which gave them

the appropriate feedback, comments, and sentence substitutions. Additionally, it was demonstrated that AI technologies promoted the engagement of EFL learners in writing.

Qiao and Zhao (2023) looked into the usefulness of AI-based training in improving second-speaking self-regulation and speaking skills in a realistic situation. The study project involved ninety-three Chinese EFL learners. The AI-based training included natural language processing, personalized feedback, interactive exercises, and speech recognition through the Duolingo app. The findings confirmed that the EG, which received AI-based training, meaningfully outgrew the control group regarding L2 speaking proficiency. The EG participants also said that their levels of self-regulation were higher.

Kaharuddin (2021) combined AI with reading instruction and feedback-giving to enhance students' writing abilities. The intervening variable was the attitude of the students toward such instruction. The study was carried out in Makassar City's higher education institutions. A questionnaire was used as a research tool and was given to 100 Higher School students; however, only 83 responses were collected. Path analysis was utilized to examine the data. The results demonstrated that: 1) Using AI applications to teach reading has no direct influence on students' writing, but it does have an indirect effect through the mediation of attitude. 2) Students' writing is virtually affected by the lecturer's direct and indirect criticism through attitude. 3) Reading aloud and providing constructive criticism boosts pupils' writing abilities by 34.8% through the mediation of students' attitude.

Hsu et al. (2023) examined the effects of self-regulation learning (SRL) and AI image recognition technologies on students' learning behaviors during class as well as their ability to acquire vocabulary, self-control, and learning anxiety. Forty-seven kids in Grade 3 participated in the experiment, and those in the EG learned vocabulary from realia using AI-IR with SRL. Pupils in the CG used AI-supported optical character recognition (AI-OCR) with SRL to acquire vocabulary from printed texts. The findings showed that while there were no significant differences between the two groups' levels of self-regulation or learning concerns, the EG considerably surpassed the CG

in terms of vocabulary acquisition. A behavioral examination showed that the levels of learning anxiety were lower in the EG, and their self-regulation was better developed.

Meniado (2023) scrutinized the impacts of ChatGPT, an AI tool, on English language instruction, learning, and evaluation. The study's findings indicate that ChatGPT can help users learn English by providing meaning-focused inputs, encouraging them to produce meaning-focused outputs, supplying feedback on the accuracy of their outputs, and encouraging intensive language use to boost fluency. This research also discovered that ChatGPT can improve English instruction by helping instructors create unique lesson plans, promoting language learning outside and inside the classrooms, creating specialized teaching materials, evaluating the acquisition of second languages, and providing prompt as well as tailored feedback.

Wei (2023) investigated the role of AI-based training in self-regulated learning, L2 motivation, and English learning achievement among EFL learners. Sixty university students from two complete courses took part in the study. The EG received instruction via AI, whereas the CG received traditional language training. Students' progress in learning English in various areas, including grammar, writing, vocabulary, and reading comprehension, was evaluated using pre- and post-assessments. Quantitative analyses indicated that the EG outperformed the CG across all measured categories of English learning outcomes. The results further suggested that AI-based training positively affected self-regulated learning, L2 motivation, and English learning achievement.

PURPOSE OF THE STUDY

The purpose of this study was to examine the effects of AI on Iranian university students' IA, EI, motivation, and creativity. Accordingly, the researchers decided to pose the following question:

RQ1. Does AI significantly affect Iranian university students' IA, EI, motivation, and creativity?

METHOD

Participants

For this study, sixty University students from Ahvaz, Iran, were selected and divided into the EG and the CG. They ranged in age from 24 to 29 years old, male and female. Their degree of English language competency was intermediate. This study included 60 students studying general psychology at the Islamic Azad University of Ahvaz Branch. The participants were selected based on a convenience sampling method among 85 bachelor students.

Instrumentation

The participants' creativity was assessed using the Torrance Test of Creative Thinking (TTCT) (Torrance, 1990). This test has been used extensively in educational research, and Fasko (2001) reported a reliability coefficient of .80. The scale consisted of 60 items, each with three response options for students to choose from. According to the test's scale, the total scores are classified as "low = up to 75; mid = 76-85; high = 86-120." Creative levels were coded as 0 for low, 1 for medium, and 2 for high. The scale reliability was assessed using Cronbach Alpha ($r = .85$).

This study employed the Emotional Quotient Inventory (Bar-On EQ-I) (2007) scale. Stress, adaptability, overall mood, interpersonal, and intrapersonal components comprise the questionnaire's abbreviated form. The Bar-On EQ-I is a self-assessment tool for emotional intelligence abilities. It consists of five composite scales measuring emotions, each with fifteen associated subscales and one hundred and thirty-three items, some overlapping other subscales. The items were rated on a 5-point Likert scale, ranging from "very rarely or not correct to me" (1) to "very often correct to

me or correct to me" (5), is used in this scale which each sentence required the responders to choose one choice from.

The third instrument in this investigation was the English Learning Motivation Questionnaire (ELMQ), which included 21 items that were assessed on a six-point Likert scale. This questionnaire was adapted from Taguchi et al. (2009) to pinpoint significant motivating factors relevant to the present study. These factors include the students' intended learning effort, language preference, integrativeness, instrumentality, attitudes towards L2 speakers and their community, and two criterion measures. Some of the original items were omitted as they were redundant and unrelated to the present investigation's purposes. Cronbach's alpha showed the original questionnaire's reliability as .78, according to Taguchi et al. (2009). In addition, Cronbach's alpha was applied to calculate the modified questionnaire's reliability ($r = .89$) based on the data gathered for this research.

The researchers adopted the questionnaire by Candace et al. (2021) to assess students' IA. It included ten items with "yes" or "no" options. A panel of English teachers confirmed the scale's validity, and its reliability was .81 based on the results of Cronbach alpha. It is imperative to mention that the four questionnaires mentioned above were administered as both pretests and posttests in this study.

Data Collection Procedure

After administering the above instruments to the participants, the treatment commenced. Next, using AL-ChatGPT, modified materials were delivered to the EG. In this study, the EG received AI-enhanced instruction using ChatGPT as a central tool, which was integrated into their language learning activities to provide personalized, adaptive, and interactive experiences. The modified learning materials for this group were designed to facilitate real-time feedback, adapt to each student's learning pace, and offer contextualized language practice. Specific AI-enhanced materials included AI-generated

writing prompts, where students practiced writing essays, reports, and summaries. ChatGPT provided instant feedback on grammar, vocabulary, and structure, allowing students to refine their work immediately. Similarly, reading comprehension exercises were interactive, with ChatGPT generating personalized questions and offering real-time feedback on responses. For speaking and listening practice, ChatGPT simulated real-life conversations, enabling students to practice fluency, pronunciation, and conversational skills in a low-pressure environment with immediate feedback and correction.

AI-ChatGPT played a crucial role in providing personalized tutoring. It adjusted the complexity of tasks based on student performance, delivered instant feedback on writing and speaking exercises, and engaged students in dynamic conversations to mimic real-world scenarios. ChatGPT also fostered autonomy by allowing students to practice independently outside of class hours, promoting self-paced learning and increasing motivation. Additionally, it supported creative language exercises, helping students generate ideas for writing and vocabulary-building games. The treatment for the EG lasted eight weeks, with classes conducted three times a week, each lasting 90 minutes. In these sessions, students alternated between AI-ChatGPT-driven tasks and collaborative group activities that encouraged reflection on the feedback provided by the AI. Students were also encouraged to engage with AI tools outside of class for self-directed practice.

In contrast, the CG received traditional instruction that relied on conventional EFL teaching methods without integrating AI. The learning materials for this group consisted of standard EFL textbooks, worksheets, and teacher-prepared handouts. Writing exercises were textbook-based, with essays and paragraphs assigned from set topics, and the teacher provided manual feedback after a delay. Reading comprehension tasks were also derived from the textbooks, with responses evaluated without the benefit of real-time feedback. Speaking and listening drills involved scripted dialogues and pair work, with the teacher correcting errors manually during class. Feedback in the CG was generally delayed, as it depended on the teacher's

availability, and the instruction followed a more passive, teacher-centered approach.

Both the EG and CG followed the same schedule, with instruction taking place three times a week for 90 minutes over eight weeks. However, the CG's traditional teacher-led methods contrasted sharply with the AI-driven, interactive, and autonomous learning environment provided to the EG. The lack of real-time feedback and self-paced learning in the CG limited opportunities for immediate correction and autonomous improvement, emphasizing the significant contrast between the two instructional approaches. This clear distinction allowed the study to assess the impact of AI tools, such as ChatGPT, on EFL learning outcomes. After teaching all the materials, four questionnaires mentioned above were given to each group as research posttests following the ten-week course of treatment.

Data Analysis

The collected data were analyzed by using ANCOVA and independent samples t-tests. The assumptions of ANCOVA include linearity between the covariate and the dependent variable, homogeneity of regression slopes, normality of residuals, homogeneity of variances, and independence of observations. To ensure these assumptions were met in our data, we first tested for linearity by examining scatterplots to confirm a linear relationship between the pretest scores (covariate) and the posttest scores (dependent variable). The homogeneity of regression slopes was checked using an interaction term between the covariate and the group factor, confirming no significant interaction. We assessed the normality of residuals through visual inspection of Q-Q plots and Shapiro-Wilk tests. Homogeneity of variances was tested using Levene's test, ensuring no significant differences between groups. Finally, the independence of observations was maintained through the study's design, where participants in both the experimental and control groups were treated separately.

RESULTS

After analyzing the data, the gained results were presented in the following tables:

Table 1: Descriptive Statistics for Pretest Measures

	Groups	N	Mean	Std. Deviation	Std. Error Mean
Motivation	CG	30	45.00	2.71	.49
	EG	30	43.63	3.18	.58
EI	CG	30	69.16	4.92	.89
	EG	30	67.73	4.22	.77
IA	CG	30	13.40	1.61	.29
	EG	30	14.26	3.96	.72
Creativity	CG	30	91.06	3.40	.62
	EG	30	87.50	8.00	1.46

Table 1 shows the two groups' standard deviations and mean scores for the four pretests. The groups' mean scores on the pretests for creativity, EI, IA, and motivation are similar. The researchers may determine whether or not the differences in the pretest results between the two groups are significant by utilizing the independent samples t-test depicted in the following table.

The researchers did analyses in Table 2 to understand if there were substantial differences between the four pretest findings for the two groups. The sig values for each of the pretests are higher than .05. This proposes that the two groups' levels of creativity, EI, IA, and motivation were similar.

Table 2: Inferential Statistics for Pretest Measures (Independent Samples *t*-Test)

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		<i>F</i>	Sig. .	<i>t</i>	<i>df</i>	Sig. (2- tailed)	Mean Differenc e	Std. Error Differenc e
Motivation Pre	Equal variances assumed	2.11	.15	1.78	58	.07	1.36	.76
	Equal variances not assumed			1.78	56.61	.07	1.36	.76
EI Pre	Equal variances assumed	.53	.46	1.21	58	.23	1.43	1.18
	Equal variances not assumed			1.21	56.70	.23	1.43	1.18
IA Pre	Equal variances assumed	1.28	.26	-1.10	58	.27	-.86	.78
	Equal variances not assumed			-1.10	38.31	.27	-.86	.78
Creativity Pre	Equal variances assumed	2.71	.10	2.24	58	.06	3.56	1.58
	Equal variances not assumed			2.24	39.15	.06	3.56	1.58

The researchers did analyses in Table 2 to understand if there were substantial differences between the four pretest findings for the two groups. The sig values for each of the pretests are higher than .05. This proposes that the two groups' levels of creativity, EI, IA, and motivation were similar.

Table 3: Descriptive Statistics for Creativity

Groups	Mean	Std. Deviation	<i>N</i>
CG	95.23	18.94	30
EG	100.30	50.42	30
Total	97.73	37.84	60

The descriptive statistics from the creativity posttests for the two groups are demonstrated in Table 3. The CG has a mean score of 95.23, while the EG has a mean score of 100.30. This suggests that the pupils in the EG achieved better results than those in the CG.

Table 4: Inferential Statistics for Creativity

Source	Type III Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	Sig.	Partial Eta Squared
Corrected Model	375.00	1	375.00	.25	.00	.62
Intercept	573108.26	1	573108.26	395.03	.00	.50
Groups	375.00	1	375.00	.25	.00	.48
Error	84144.73	58	1450.77			
Total	657628.00	60				
Corrected Total	84519.73	59				

Once the covariate component has been removed, the ANCOVA analyzes the impacts of the independent variable on the dependent variable. The results in Table 4 indicate a substantial difference in the creativity posttests amongst the two groups, with the EG benefiting more. The effect size value equaled .48, which means that the treatment accounted for 48% of the difference between the EG and CG learners.

Table 5: Descriptive Statistics for IA

Groups	Mean	Std. Deviation	<i>N</i>
CG	15.50	4.12	30
EG	17.16	11.25	30
Total	16.33	8.44	60

Table 5 illustrates the descriptive statistics of both EG and CG on the IA posttest. The EG and CG mean scores on the AI posttest are 17.16 and 15.50, respectively. The ANCOVA results must be consulted to see if the variance between the two groups is statistically meaningful.

Table 6: Inferential Statistics for IA

Source	Type III Sum of Squares	<i>Df</i>	Mean Square	<i>F</i>	Sig.	Partial Eta Squared
Corrected Model	41.66	1	41.66	.58	.00	.51
Intercept	16006.66	1	16006.66	222.65	.00	.40
Groups	41.66	1	41.66	.58	.00	.51
Error	4169.66	58	71.89			
Total	20218.00	60				
Corrected Total	4211.33	59				

The *p* value under the *Sig.* column in Table 6 was smaller than the alpha level of significance ($.00 < .05$), indicating that the difference between the two groups' means on the IA posttest reached statistical significance. The treatment given to the EG might be the reason for its better performance. It is also worth noting that the effect size value equaled .51, which means that the treatment accounted for 51% of the difference between the posttest IA scores of the EG and CG learners.

Table 7: Descriptive Statistics for EI

Groups	Mean	Std. Deviation	<i>N</i>
CG	75.80	4.92	30
EG	83.93	17.67	30
Total	79.86	13.50	60

The descriptive data for EG and CG on the EI posttest are depicted in Table 7. The aforementioned groups' mean scores differ from one another. The mean score for the EG is 83.93, and the mean score for the CG is 75.80.

Table 8: *Inferential Statistics for EI*

Source	Type III Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	Sig.	Partial Eta Squared
Corrected Model	992.26	1	992.26	5.89	.01	.26
Intercept	382721.06	1	382721.06	2274.21	.00	.11
Groups	992.26	1	992.26	5.89	.01	.26
Error	9760.66	58	168.28			
Total	393474.00	60				
Corrected Total	10752.93	59				

As shown in Table 8, the *p value* is lower than the alpha level of significance ($.01 < .05$), which indicates that the difference between the two groups on the EI posttest was statistically significant.

Table 9: Descriptive Statistics for Motivation

Groups	Mean	Std. Deviation	<i>N</i>
CG	51.33	7.130	30
EG	58.33	15.16	30
Total	54.83	12.26	60

Table 9 displays the motivation posttest findings for the two groups. The EG's mean score ($M = 58.33$) is higher than the CG's ($M = 51.33$), indicating that the experimental group exhibited greater motivation.

Table 10: Inferential Statistics for Motivation

Source	Type III Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	Sig.	Partial Eta Squared
Corrected Model	735.00	1	735.00	5.23	.02	.083
Intercept	180401.66	1	180401.66	1284.89	.00	.957
Groups	735.00	1	735.00	5.23	.02	.083
Error	8143.33	58	140.40			
Total	189280.00	60				
Corrected Total	8878.33	59				

In the provided table (Table 10), the significance value is lower than .05. The results demonstrate the differences between the two groups. Indeed, the EG outperformed the CG on the motivation posttest.

DISCUSSION

These research findings indicated that the EG and CG performed differently on their posttests. The EG outdid the CG on all posttests of the study. AI improved the IA, EI, motivation, and creativity of Iranian EFL students. The current study's findings also support those of Utami et al. (2023) and Hsu et al. (2023), who found that AI tools had a significant impact on EFL students' word knowledge and writing ability. Furthermore, the results of the present study are consistent with the findings of Hayashi and Huang et al. (2022), who reported that AI apps help L2 learners improve their speaking, listening, writing, and reading skills. Additionally, the present outcomes are in line with Han (2020), who showed that the AI Chatbot effectively enhanced the speaking abilities of EFL students. Moreover, Kim (2022) verified the influences of AI tools on Korean students' TOEIC preparation.

The outcomes of this examination also advocate the results of Lee et al. (2023), who found that AI-based learning tools significantly increased the learners' enjoyment of reading. Similar to Wei (2023), our findings support that AI-mediated language teaching improved EFL learners' self-regulated learning, L2 motivation, and English learning achievement. The advantages of AI in English language learning include exposure to different cultures, personalized learning experiences, and faster learning. AI tools can improve communication skills in speaking, listening, writing, and reading. One limitation of traditional language learning is that it often lacks immediate feedback, which is critical for improvement. AI addresses this issue by supplying real-time feedback on pronunciation, grammar, and vocabulary usage.

Our findings are supported by social constructivist learning theory. According to Long (1996), social interaction enhances the meaning

negotiation and, in turn, the L2 input's comprehensibility, which is an essential component of L2 acquisition. For language learners, social connection is crucial because language is primarily utilized for communication. Students who are able to connect with others in a dynamic way are more likely to learn well. In particular, meaningful interaction can enhance learners' L2 acquisition by assisting them in identifying and incorporating new vocabulary into discussions.

Fear of making mistakes is a common reason language learner are reluctant to speak in front of others. AI dispels this anxiety by offering a learning environment free from judgment. Without fear of criticism, students may practice writing and speaking, which will eventually help them become more confident and fluent. Experimentation and active engagement in the learning process are encouraged in this fearless atmosphere. Some students are reluctant to raise questions or accept criticism in front of others since they are introverts. Such learners benefit greatly from objective, judgment-free one-on-one feedback AI-infused language learning provides.

With AI, students can study at their own speed and from any location. Thanks to cutting-edge elements like games, puzzles, or other exploring activities, they will be more involved in the learning process than traditional learning. Learners are encouraged to participate more deeply through personalized learning paths. Offering learners relevant and contextualized language input is one of virtual reality's primary benefits for second language acquisition (Lan & Grant, 2021). Learners can experience a range of scenarios using virtual reality simulations, like placing an order at a restaurant, going shopping, or conversing with a native speaker. They may practice speaking and listening, engage with virtual characters, and get instant feedback on how they are using language.

With the help of these engaging, realistic experiences, language learners may improve their vocabulary, pronunciation, and fluency more dynamically and efficiently. Additionally, virtual reality allows students to explore various cultural aspects related to the language of instruction (Yeh et al., 2022). Learners can better comprehend cultural norms, customs, and

legacy by submerging themselves in virtual worlds replicating the cultural context. This all-encompassing cultural immersion program fosters cultural awareness and helps students develop intercultural competency, an essential skill for effectively communicating in a foreign language.

Additionally, virtual reality can help students overcome their fear and anxiety of speaking in a language other than their native tongue (Satake et al., 2024). Learners may be reluctant or self-conscious in a typical classroom setting, which reduces their willingness to practice speaking. On the other hand, virtual reality offers a safe and accepting environment where students may freely experiment without worrying about making errors or receiving negative feedback. As a result, students feel more confident and are motivated to engage fully and speak the target language. By leveraging virtual reality, students may easily overcome geographical limitations and have access to authentic materials and language learning tools from anywhere in the globe. Participating in online language exchanges with native speakers or other language learners worldwide improves language proficiency and promotes cross-cultural communication.

The usage of AI techniques can transform the educational field entirely. Their extraordinary capacity to carry out duties involving knowledge and creative intelligence, including assigning grades and counseling students, can fundamentally alter how education is delivered. Using virtual assistants with AI capabilities to provide students with individualized and flexible learning experiences successfully integrates AI into education (Tai, 2022). Virtual assistants can evaluate each learner's distinct learning requirements, inclinations, and advancement and customize educational materials appropriately. As a result, students may participate actively in the learning process, study at their own speed, and get quick feedback (Tai, 2024).

AI systems may also help teachers by automating administrative duties like creating tailored learning plans, grading assignments, and keeping track of student involvement. This frees teachers to concentrate more on creating engaging lessons and giving students tailored help. Using intelligent tutoring systems is another way to incorporate AI technologies into

instructional activities (Demir, 2020). These systems use AI algorithms to give students real-time, customized, expert-level assistance. By examining their replies, these systems can identify misunderstandings or comprehension gaps in students. They can then offer targeted interventions, clarifications, and examples.

Furthermore, Jeon (2022) notes that intelligent tutoring systems can adjust to every student's distinct learning requirements, providing extra assistance or difficulties as needed. This encourages highly customized and productive learning experiences that lead to a better understanding and conceptual mastery. Additionally, teachers may make well-informed judgments on curriculum development, instructional design, and assessment procedures by using AI technologies to examine large datasets of educational material and student performance (Teng et al., 2023).

Although there is great promise for developing the efficacy of teaching and learning experiences by integrating AI technologies into pedagogical practices, several obstacles are involved. At the outset, students may get discouraged from actively participating in critical thinking if they depend too much on automated language learning aids, such as chatbots powered by AI and translation apps (Mohamed, 2023). These resources provide prompt responses and corrections, lessening the need for students to assess and resolve language-related problems independently. This reliance on AI technologies might hinder students' ability to think critically and independently, modify their learning approaches, autonomously evaluate language, and develop a deeper comprehension of language learning (Darwin et al., 2024).

Moreover, worries about data privacy pose a substantial obstacle to language acquisition (Wang, 2022). Many AI technology platforms collect large amounts of user data, including learning patterns, performance metrics, and personal information. Although this data may be used to tailor the educational experience, concerns are raised about the security and privacy of student data. Another issue is that AI platforms usually offer standardized activities and materials that do not consider the variety of cultural settings and

nuances that come with language usage (Jeon, 2021). The absence of cultural significance might limit students' understanding and ability to use language in everyday situations (Kim, 2017).

Teachers and educators must be trained to properly use AI technology in second-language learning classes to improve pupils' overall learning experiences (Pokrivcakova, 2019). AI has enormous potential to support language acquisition. However, proficient educators who know how to use AI devices to advocate educational objectives and modify them for different learning environments are necessary to successfully incorporate these technologies (Du & Gao, 2022). To ensure they can supply their students with dynamic and exciting language learning experiences, instructors must receive training that gives them the know-how to navigate and utilize AI technology effectively.

To enable them to make knowledgeable judgments about the adoption and usage of new technology in the classroom, educators should also get training on the ethical implications and potential biases connected with AI systems (Wang, 2022). To effectively transfer knowledge, the education sector must strike a careful balance between utilizing AI to enhance instructional experiences and keeping the human element and interpersonal communications, as stated by Pradana et al. (2023).

CONCLUSION AND IMPLICATIONS

This study concludes that using AI has developed Iranian university students' motivation, creativity, EI, and IA. In conclusion, AI has several revolutionary advantages for language acquisition. AI provides fast feedback, individualized learning experiences, and a secure environment for students to make errors. It can completely transform education in the future and rethink the role of instructors. The researchers can anticipate AI playing an ever-bigger part in language acquisition as technology develops, improving language learning efficiency and accessibility for students everywhere. In the

dynamic field of education, incorporating AI into language acquisition is not only a matter of preference but also a must.

In brief, there are benefits and drawbacks to AI in language acquisition, but there is no denying that it has the power to change how humans acquire foreign languages thoroughly. To address the global language learning problem and encourage linguistic variety, AI-powered language learning platforms can provide learners with individualized, effective, and exciting language learning experiences anywhere globally. However, AI can't take the roles of human contact in language learning, and it might not be able to impart critical thinking, creativity, context, or culture. As a result, it's vital to apply AI in language acquisition to complement traditional language learning techniques and human contact.

This investigation has some ramifications for EFL instructors and students. AI integration enhances pedagogical language learning environments by promoting student autonomy and customizing instruction. Individualized feedback, practice sessions, and personalized learning routes are provided via chatbots and adaptive learning systems to enhance language proficiency and interest. Learner autonomy is promoted by AI integration in language learning environments since it allows students to practice independently, access resources, and receive feedback. Based on its users' interests, development, and learning preferences, AI-powered systems offer personalized learning routes and tailored exams. Learners can improve their language skills with AI-powered virtual language tutors who can provide timely and targeted feedback while under customized supervision.

EFL educators can benefit from incorporating AI-based materials into their lesson plans. These platforms can provide educators with helpful data on the growth and development of individual students, allowing them to modify their lesson plans more efficiently. By classifying each student's language learning problems, instructors may recommend customized assistance and guidance to lead to more effective and successful learning outcomes. By utilizing AI-supported education, teachers can change their teaching strategies to meet their students' needs and ability levels.

AI-based training might provide pupils with more customized and adaptable learning opportunities. They can more readily assess their performance and pinpoint areas for improvement. They can also get personalized comments and practice resources (Yan, 2023). This individualized approach fosters better language growth by allowing children to focus on their language progress and needs at their own pace (Yang et al., 2021). Also, language tutors or AI-powered chatbots, virtual environments, interactive simulations, and virtual environments provide learners with abundant immersive and interactive language input (Jia et al., 2022). These findings corroborate Vygotsky's (1984) social constructivism, which demonstrates how AI might aid language acquisition for pupils.

Subsequent studies need to persist in investigating the enduring influences of AI on English language instruction, scrutinize the efficacy of diverse AI instruments and frameworks, and seek avenues for augmenting instructor readiness and assistance. The researchers can realize AI's full potential and build engaging and productive learning milieus for EFL learners by continuously evaluating and improving its integration into language instruction.

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