Applied Research on English Language

V. 15 N. 4 2026
pp: 1-38
http://are.ui.ac.ir

DOI: 10.22108/are.2026.148805.2743
Document Type: Research Article

AI Literacy in L2 Learners' Motivation and Emotions: The Parallel Mediating Role of Autonomy

Hanieh Shafiee Rad, Mina Naderi, Ali Roohani *

English Department, Faculty of Letters & Humanities, Shahrekord University, Shahrekord, Iran

Received: 2026/05/09 **Accepted: 2026/08/23**

Abstract: The integration of artificial intelligence (AI) into language education has prompted interest in how AI literacy relates to learners' autonomy, motivation, and emotions. However, limited research has examined the interrelationships and mechanisms underlying the associations among these variables. Accordingly, this study examined the direct and indirect relationships between AI literacy and L2 motivation and emotions, with L2 autonomy specified as a mediating variable using structural equation modeling (SEM). Participants were 221 volunteer Iranian EFL undergraduates at Shahrekord University, selected via convenience sampling in 2024-2025. Data were collected using Carolus et al.'s (2023) AI literacy questionnaire and Csizér et al.'s (2024) scales of L2 motivation, autonomy, and emotions. The data were analyzed using descriptive statistics, Pearson correlations, and SEM with SPSS version 26 and AMOS version 24. The hypothesized model demonstrated an acceptable fit to the data based on multiple fit indices. Results indicated that AI literacy was positively associated with L2 autonomy, which in turn significantly mediated the increase in motivation and positive emotions and the decrease in negative emotions. Although the cross-sectional design and convenience sampling limit generalizability, the findings highlight autonomy as a significant mechanism underlying the associations between AI literacy and learners' motivational and emotional outcomes. Theoretically, the study extends technology-enhanced learning research by positioning AI literacy within an integrated motivational-affective framework. Pedagogically, the findings underscore the importance of AI literacy alongside learner autonomy to support more engagement in AI-mediated L2 learning. L2 curricula should therefore integrate AI literacy development with activities that foster learner autonomy.

Keywords: AI Literacy, Autonomy, Cross-Sectional Design, Emotions, Iranian EFL Context, Mediating Variable, Motivation.

* **Corresponding Author.**

Authors' Email Address:
[1] **Hanieh Shafiee Rad** (haniyeshafieerad@gmail.com), [2] **Mina Naderi** (mina.naderi9018@gmail.com), [3] **Ali Roohani** (roohani.ali@gmail.com)

Introduction

The rapid advancement of generative artificial intelligence (AI) has transformed educational practices by providing learners with intelligent technologies that support personalized learning, adaptive instruction, immediate feedback, and self-directed knowledge construction. In second/foreign (L2) education, AI-powered applications, including intelligent tutoring systems, large language models, automated writing assistants, and conversational chatbots, are increasingly integrated into language learning to enhance learners' L2 skills, performance, and learning experiences (Tzirides, 2026; Wu, 2025). Recent evidence indicates that AI-assisted language learning can improve language achievement while strengthening learner engagement and motivation and reducing anxiety (Wang, 2025). For example, AI-supported reading and comprehension activities have been shown to increase learners' motivation while alleviating language learning anxiety through personalized feedback and adaptive instructional support (Wang, 2025). These developments suggest that AI is no longer merely a technological innovation but an educational environment that shapes learners' cognitive, motivational, and emotional experiences.

Recently, AI literacy has become a multidimensional construct going well beyond traditional digital literacy or technological competence (Carolus et al., 2023). Such a construct comprises the competences of learners to comprehend AI technologies, employ them appropriately, critically analyze AI-produced information, identify ethical considerations, resolve problems by means of AI, and manage emotions during interactions via AI (Carolus et al., 2023; Chee et al., 2025). This kind of literacy is viewed as an integrated blend of technological, cognitive, ethical, and metacognitive competences, allowing for the reflective application of AI (Chee et al., 2025). In addition, according to Lintner (2024), in systematic reviews, AI literacy is now recognized as an increasingly important educational construct in higher education, secondary education, and teacher education. Nevertheless, the research within L2 education that examines AI literacy as a measured learner competency in L2 learning is still scarce, with the majority of studies (e.g., Alharbi & Hassan Al-Ahdal, 2025; Liu et al., 2024; Wang, Amini et al., 2025) having focused on the effect of AI technologies per se rather than measuring individual differences in learners' AI literacy. Thus, it is yet to be known whether the observed positive outcomes of such studies are due to the technologies themselves or to learners' literacy competencies in employing them effectively. This question is especially relevant for Iranian learners of English, who work in an environment of digital constraint, which entails infrastructural

issues, sporadic internet limitations, and even limitations caused by sanctions on AI technology use.

Although research (e.g., He et al., 2025; Xu, 2025) on AI in language education continues to expand, considerable theoretical and empirical gaps remain regarding the integrated psychological mechanisms through which AI literacy influences language learning outcomes. Several studies (e.g., Alharbi & Hassan Al-Ahdal, 2025; Feng, 2025) have emphasized learners' attitudes toward AI, technology acceptance, motivation, anxiety, or cognitive learning performance, while investigating them in isolation rather than examining them within a unified model that includes both motivational and emotional outcomes. Moreover, existing research has paid little attention to the mediating role of learner autonomy in explaining how AI literacy shapes learners' motivational dispositions and emotional experiences (Yang, Wei et al., 2025). Recent scholarship has consequently called for greater investigation into the interrelationships among AI literacy, measured as a distinct competence, learner autonomy, motivation, and emotions within L2 contexts (Yang & Zhao, 2024). In particular, it is worthwhile to see whether AI literacy, measured as a distinct competence, contributes to learners' motivational self-concepts, enhances positive emotions such as enjoyment and hope, reduces negative emotions such as anxiety and confusion, and promotes autonomous engagement during AI-mediated language learning, and whether autonomy as a mediator can explain these relationships.

To address these issues, the present study draws on two complementary theoretical perspectives: The L2 motivational self-system (L2MSS; Dörnyei, 2005) and control-value theory (CVT; Pekrun, 2006). L2MSS explains learners' motivation through their future self-guides, suggesting that AI literacy may strengthen learners' ideal L2 selves by enabling them to use AI strategically and confidently in pursuit of their language-learning goals. CVT complements this perspective by proposing that learners' emotions are determined by their perceptions of control and the value they assign to learning activities (Pekrun, 2006). Within AI-mediated learning, greater AI literacy may increase learners' perceived control over learning tasks, thereby enhancing positive emotions and reducing negative emotions (Mierzwa-Kamińska, 2025, Chapter 1, pp. 7-58).

Learner autonomy serves as the key psychological variable, possibly linking AI literacy and motivational and emotional variables. Autonomy, which is referred to as the ability of learners to take charge of their own learning process through goal-setting, self-monitoring, strategy choice, and reflection, is viewed as being linked with higher motivation, greater engagement, and adaptability of emotions (Ushioda, 2011). It is claimed to be related to

motivation, emotional well-being, and learning outcomes in language learning (Bureau et al., 2022; Csizer & Albert, 2024; Zhao et al., 2025). Despite the established importance of autonomy in the L2 learning process and despite the separate lines of research investigating AI-related motivation (e.g., Wang, 2025) and AI-related emotions (e.g., Yang & Zhao, 2024), not much has been done to study the mediating effect of autonomy on the relationships between AI literacy and both motivational and emotional variables together. To date, the empirical research on such variables has been conducted separately (Yang, Wu et al., 2025), not examining them within an integrated model that considers autonomy as a mediator.

The current study aimed to empirically test a structural model in investigating the relationship between AI literacy and learner autonomy, L2 motivation, and emotions within the Iranian EFL context. More precisely, it examined whether AI literacy had a direct relationship with learner autonomy, L2 motivation, and emotions, and whether learner autonomy could mediate the relationship between AI literacy and other psychological variables such as L2 motivation and emotions. By incorporating AI literacy into the existing theoretical models of L2 motivation and educational psychology, including the L2MSS (Dörnyei, 2005) and CVT (Pekrun, 2006), and by testing a mediation model the present research can expand prior work that has examined these variables separately and identify learner autonomy as the mechanism through which AI literacy may exert effects on learners' psychological experiences in the field of L2 learning. In practice, the findings can offer important insights into the process of designing policies and courses in incorporating AI literacy into language education in a manner that encourages autonomous learning and improves motivation and emotional outcomes among L2 students.

Literature Review

Theoretical Framework

The theoretical framework of the current study draws on two perspectives of L2 motivation: the L2MSS (Dörnyei, 2005) and CVT (Pekrun, 2006) to explain the motivational and emotional outcomes of L2 learning, and the principles of self-determination theory (SDT; Deci & Ryan, 2000) to define learner autonomy as a mediating psychological process. These perspectives can be regarded as different yet complementary psychological mechanisms that account for why enhanced AI literacy might affect L2 psychological outcomes. According to the L2MSS, the development of the learners' motivation is determined by the formation of their future self-concept, a process that can be empowered by AI literacy, enabling learners to envision themselves as competent L2 users. The CVT

focuses on the influence of the learners' perception of their control on their emotional state. This means that AI literacy helps learners strategically maneuver in their learning tasks.

The L2MSS proposes that learners' motivation is driven by their future self-guides, particularly the ideal L2 self, the ought-to L2 self, and language learning experiences. In the current study, it is postulated that AI literacy functions as a facilitator to strengthen the self-regulatory capacity supporting the L2 ideal self by enabling learners to use AI tools strategically, critically, and ethically to achieve their language learning goals, thereby strengthening their self-regulatory capacity and fostering a more vivid vision of themselves as successful L2 users. However, L2MSS does not explicitly explain how these motivational dispositions influence learners' emotional experiences during learning, a gap that can be addressed by CVT through perceived control and achievement emotions. Moreover, although L2MSS has become one of the dominant frameworks in L2 motivation research, scholars have noted that its emphasis on future self-guides pays comparatively less attention to contextual, interactional, and technology-mediated influences on learning motivation. Recent AI-supported learning environments require learners to continuously negotiate their goals while interacting with intelligent systems, suggesting that motivational self-images alone may not fully explain learners' engagement or emotional responses. This limitation provides a rationale for implementing L2MSS with CVT, which accounts for learners' control perceptions and affective experiences. Here, AI literacy is viewed as an external activator for future-self visualization and perceived control, with learner autonomy serving as a mechanism translating them into motivational and emotional outcomes.

CVT assumes that the feelings experienced by learners are based on the control learners feel they have over learning tasks and their evaluations of the importance of the tasks. In the current study, it is assumed that AI literacy enhances learners' control over their learning environment, in turn, strengthening perceived control. Also, learner autonomy is viewed as perceived control, operationalized through SDT, and thus, increased AI literacy may increase L2 learners' autonomy, which in turn facilitates positive emotions and decreases negative emotions during L2 learning. According to SDT, autonomy is viewed as one of the basic psychological needs; however, according to CVT, perceived control is an appraisal process that affects achievement emotions. Taking into consideration this subtle difference, learner autonomy is conceptualized as the psychological pathway through which AI literacy translates into greater perceived control, such that AI literacy increases learners' sense of agency and control over AI-mediated language learning, shaping their achievement emotions through appraisal processes.

The conception of learner autonomy within technology-enhanced learning continues to be debated. Earlier conceptions saw learner autonomy mainly as the capacity of learners to learn materials independently of teachers (Little, 1991), while recent understandings conceive of autonomy as socially embedded, technologically enabled, and facilitated through interactions with technological resources and peers as well as teachers (Ushioda, 2011). In the context of AI-mediated learning, this difference matters since heavy reliance on AI for learning may empower learners with greater self-regulation abilities through the provision of scaffolds, or weaken learners' autonomy if learners become too reliant on AI-provided responses. Therefore, learner autonomy in this study is not basically conceived of as learners' lack of dependence on technology, but rather mostly as learners' capability of controlling and regulating their interaction with the use of AI reflectively and intentionally. This conception of autonomy resonates with the notion of volition stressed in SDT theory while accepting the possibility that autonomy may be assisted rather than undermined by technological mediation. Therefore, autonomy is conceptualized as a mediator that bridges AI literacy and psychological outcomes, thereby avoiding the claim that L2MSS and CVT directly explain AI literacy.

Given the above issues, two conceptual models can be postulated. The first model (see Figure 1) proposes that AI literacy is directly related to L2 learning motivation and emotions. In this model, AI literacy is hypothesized to directly influence L2 learning motivation and positive and negative emotions. The second model (see Figure 2), which is the focus of the current study, expands this framework by introducing L2 autonomy as a mediating variable. In this conceptualization, AI literacy is proposed to enhance a learner's autonomy in the L2 learning process, which positively influences L2 learning motivation. Positive and negative emotions continue to function inversely alongside autonomy in the model.

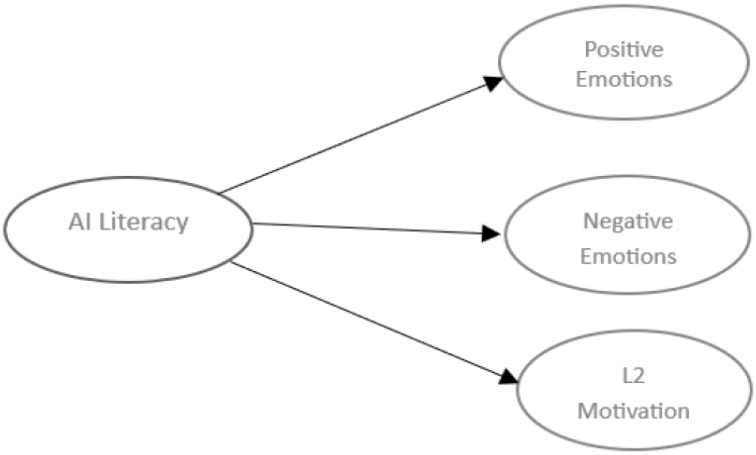

Figure 1. The Direct Role of AI Literacy on Emotions and L2 Motivation

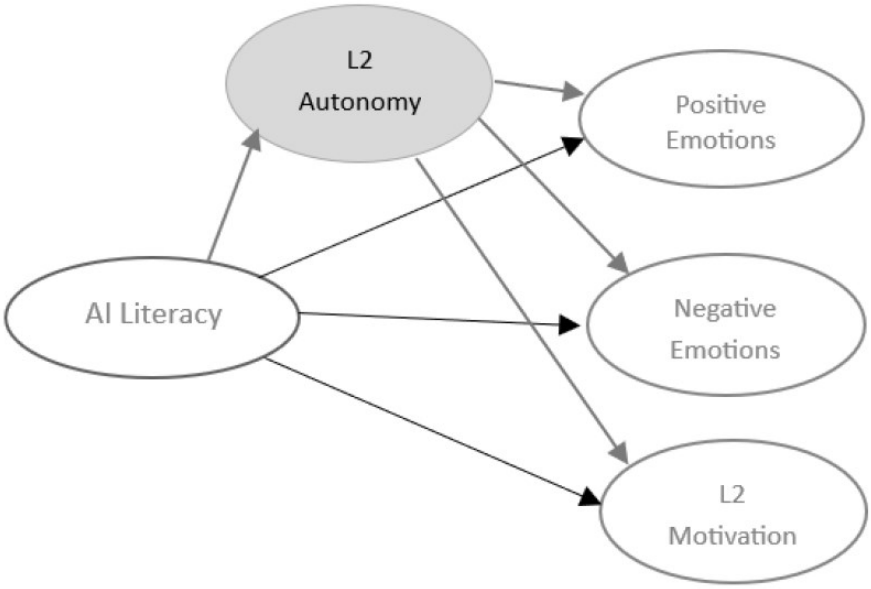

Figure 2. The Expanded Framework Integrating Autonomy as a Mediator

AI Literacy in L2

AI literacy is seen as a multidimensional competency. Rather than being a mere extension of digital literacy or knowledge of how to use AI technologies, AI literacy is viewed as a complex, multifaceted competency including critical, ethical, and cognitive dimensions (Carolus et al., 2023). According to this perspective, AI literacy extends beyond technical proficiency. It includes both cognitive knowledge and meta-cognitive/psychological dimensions. The current study takes on this perspective based on the work of Carolus et al. (2023), who developed a scale assessing AI literacy as a set of competences, such as understanding AI, using AI properly, evaluating the output of AI, identifying the ethics involved, problem-solving using AI, and regulating emotions while interacting with AI.

Other perspectives and scales have been proposed for AI literacy, highlighting several features of the concept. For example, Chee et al. (2025) adopt a developmental perspective and predominantly provide a competence perspective that allows one to identify development trajectories for various groups of learners via learning pathways. However, Carolus et al. (2023) accentuate the metacognitive and psychological dimensions of the learner using AI. Moreover, Markus et al. (2025) emphasize objective evaluation of the competencies of individuals to work with AI technologies. They attempt to establish more objective measures of factual AI knowledge, namely what users actually know about AI, not influenced by learners' personal feelings and interpretations.

Theoretically, the competencies involved in the concept of AI literacy, such as critical evaluation skills, strategic application of AI technologies, and self-regulation skills, are closely linked to the concept of learner autonomy, which has repeatedly proven itself to be one of the key factors that affect the L2 motivation and emotions of the learners (Ushioda, 2011). Additionally, awareness of the capabilities and limitations of AI technologies may help students feel more in control while performing language tasks, which, according to CVT (Pekrun, 2006), may help them promote positive emotions. However, very few empirical studies have explored the interplay between the mentioned variables.

Empirically, there is much research in L2 education exploring AI acceptance, technology adoption, attitudes towards AI, or digital literacy in general (e.g., Alharbi & Hassan Al-Ahdal, 2025; Wang, Amini et al., 2025). However, there is relatively little empirical research focusing on the direct relationship between AI literacy and L2 learning outcomes. Among a few relevant studies, for instance, Xu (2025) found that AI literacy was predictive of self-regulated learning and strategic engagement in L2 academic writing through explicit measurement of Chinese university students' AI literacy. He et al. (2025) observed positive results related to improvements in creativity, self-reflection, emotional resilience, and pleasure from L2 learning due to AI-assisted instruction. However, there was no direct measurement of Chinese undergraduates' AI literacy in their study. This means that its findings demonstrate mainly the advantages of the AI-based pedagogical approach rather than the direct effects of AI literacy on language-related variables. Moreover, Wang (2026) investigated how AI literacy can enhance academic achievement by boosting Chinese university students' self-efficacy. In their study, self-efficacy had a mediating effect, and critical thinking moderated the relationship between AI literacy and self-efficacy. Nonetheless, the above research (e.g., Yang, Wu et al., 2025; Xu et al., 2026) has paid scant attention to the effects of AI literacy on psychological outcomes.

Autonomy, Motivations, and Emotions in L2 Context

In L2 learning research, learner autonomy, motivational dispositions, and emotional experience are primary constructs that shape learners' augmented performance (Saito et al., 2018). Learner autonomy refers to the ability to take charge of one's learning through goal setting, self-monitoring, strategic decision-making, and reflective evaluation, which aligns with self-regulated learning (Little, 1991). Drawing on sociocultural and self-determination theories, autonomy is considered a core psychological need that fosters intrinsic motivation and sustained engagement (Deci & Ryan, 2000). Furthermore, L2 motivation is extensively

conceptualized through the L2MSS framework, which posits the ideal L2 self, ought-to L2 self, and motivated learning behavior as predictors of sustained effort and goal pursuit in language acquisition (Dörnyei, 2005). Emotional dynamics in learning include both positive emotions (e.g., enjoyment, hope, pride, and curiosity) and negative emotions (e.g., anxiety, boredom, confusion, and shame), each influencing learners' willingness to communicate, task persistence, and overall well-being (Mierzwa-Kamińska, 2025, chapter 1, pp. 7-58). Theoretical perspectives, notably Pekrun's (2006) CVT, further explain how emotions emerge from learners' perceptions of control and task value, subsequently affecting cognitive engagement and motivational trajectories.

Studies in L2 learning consistently demonstrate that autonomy, motivation, and emotions are interconnected (Csizer & Albert, 2024). For example, research shows that learner autonomy fosters intrinsic motivation, willingness to communicate, and sustained engagement, as autonomous learners appear to set meaningful goals and regulate their own learning (Ushioda, 2014; Zhao et al., 2025). Studies (e.g., Wang, 2024) in EFL contexts indicate that autonomy-supportive instructions correlate with L2 motivation and learning engagement, emphasizing the role of autonomy in contributing to motivational resilience. Regarding emotions, several investigations report that positive emotions such as enjoyment and curiosity are linked with L2 learning motivation and improved performance, while negative emotions like anxiety and boredom undermine persistence and increase avoidance behavior (MacIntyre & Vincze, 2017). Recent longitudinal studies, such as Lo (2024) and Deng and Chen (2025), reveal that learner autonomy can reduce negative emotional experiences and enhance motivational patterns and positive emotions over time, suggesting a dynamic interplay where autonomy both predicts and moderates emotional and motivational outcomes in L2 learning (Cho et al., 2023). Taken together, the literature demonstrates that autonomy, motivation, and emotions are interwoven constructs to explain learner behavior and success in L2 contexts, but are unexplored when considering AI literacy.

In summary, despite the considerable body of scientific literature about AI in L2 education contexts, most of the studies have concentrated on the analysis of students' attitudes towards AI, technology acceptance, and other variables (e.g., Alharbi & Hassan Al-Ahdal, 2025; Wang, Cui et al., 2025) and AI literacy has not been yet sufficiently explored as a multidimensional concept, which includes technological, critical, ethical, and emotional competencies. Moreover, in previous studies, learner autonomy, motivation, and emotions have mostly been investigated separately in the context of various theoretical approaches, without the exploration of psychological mechanisms underlying the impact of

AI literacy on the above-mentioned concepts. For instance, it is not clear how AI literacy influences both learners' motivation and positive and negative emotions. Although autonomy is linked to greater motivation and positive emotional experience (Cho et al., 2023), the role of learner autonomy as a mediator in the relationship between AI literacy and motivation and emotional experience has not been sufficiently empirically scrutinized. It is important to see whether AI literacy allows learners to maintain autonomy while using smart technologies or undermines autonomous regulation.

Accordingly, an attempt is made in the present study to address the above points and gaps by proposing and empirically validating a hypothetical structural model that relies on L2MSS and CVT while using learner autonomy as the connecting psychological mechanism. AI literacy is expected to strengthen learners' autonomous engagement with AI tools, based on SDT, which enhances their perceived control over learning activities, based on CVT, thereby supporting more adaptive emotional experiences while simultaneously reinforcing motivational self-guides described in L2MSS. The novelty of this research lies in conceptualizing learner autonomy as the central psychological mechanism through which AI literacy is translated into enhanced motivation, increased positive emotions, and reduced negative emotions. Unlike previous studies that looked into these concepts separately, the present study simultaneously investigated their direct and indirect relationships using structural equation modeling (SEM), thereby providing a more comprehensive explanation of the psychological processes underlying AI-mediated language learning. By explicitly acknowledging different explanatory roles of SDT, L2MSS, and CVT, rather than treating them as fully overlapping theories, and by engaging with ongoing debates regarding the scope of L2MSS and the nature of learner autonomy in AI-supported learning environments, this study can extend existing theoretical frameworks and contribute new empirical evidence regarding the domain of AI literacy and L2 learning. Therefore, this study tested a model examining both the direct effects of AI literacy on autonomy, motivation, and emotions and the indirect effects of AI literacy on motivation and emotions through learner autonomy (See Figure 2). The following two research questions were addressed:

1) What are the relationships between L2 autonomy, emotional outcomes, and motivation among Iranian EFL learners?

2) Does L2 learner autonomy mediate the effect of AI literacy on the learners' L2 emotional outcomes and motivation?

Methods

Design and Participants

A quantitative cross-sectional design was used, with SEM employed to test the direct and indirect pathways or relationships among AI literacy, learner autonomy, L2 motivation, and emotional outcomes. As Table 1 shows, demographic statistics, such as the number of participants, academic information, gender, age, language, proficiency level, and AI-related data, are summarized.

Table 1. Comprehensive Participant Demographic and Proficiency Information

Characteristic	Details
Final Sample Size	221 undergraduate students
Initial Recruitment	280 students (59 excluded due to incomplete questionnaires or inclusion criteria)
Academic Institution	Shahrekord University, Iran
Academic Year	2024–2025
Gender	66 males and 155 females
Academic Majors	Engineering, Psychology, Agriculture, etc.
First Language	Persian
Age Range	18-28 years
Sampling Method	Convenience sampling (voluntary participation)
OPT Score Range for Intermediate Level	46-55
OPT Internal Consistency	Cronbach's $\alpha = 0.86$
Prior AI Experience	Several months to one year using generative AI tools for academic purposes
AI Tools Used	ChatGPT, Google Gemini, Microsoft Copilot, and Grammarly
AI Use	Writing, vocabulary development, grammar checking, translation, and reading comprehension

Initially, 280 undergraduate students, who were accessible to the researchers of the present study, were recruited. After excluding 59 participants due to incomplete questionnaires and failure to meet the inclusion criteria, the final analytical sample comprised 221 volunteer participants, corresponding to an attrition rate of 21.1% (see Table 1 for more

details). The participants (66 males and 155 females) were undergraduate EFL students from various academic majors (e.g., Engineering, Psychology, Agriculture, etc.), enrolled at Shahrekord University, Iran, during the 2024–2025 academic year. Their first language was Persian, and they ranged in age from 18 to 28 years. Participants were recruited through voluntary participation following invitations distributed to undergraduate EFL classes using a convenience sampling strategy. Students who met the inclusion criteria and agreed to participate provided informed consent prior to data collection. The participants were enrolled in undergraduate general English courses. In addition, participants reported prior experience using generative AI tools for academic purposes, ranging from several months to one year. The most frequently used AI applications included ChatGPT, Google Gemini, Microsoft Copilot, and Grammarly, used for writing, vocabulary development, grammar checking, translation, and reading comprehension. The final sample size of 221 exceeded the recommended minimum of 200 cases for maximum likelihood estimation in covariance-based structural equation modeling (CB-SEM; Hair, Black et al., 2022; Kline, 2023) and satisfied the heuristic of at least 10 observations per freely estimated parameter.

Instruments

AI Literacy Questionnaire. The AI literacy questionnaire in English, developed and validated by Carolus et al. (2023) on a five-point Likert scale with 34 items, was translated into Persian to ensure linguistic accessibility and readability for the participants. The AI literacy questionnaire went through a forward–backward translation process, expert review by two associate professors of applied linguistics and a specialist in educational technology at Shahrekord University, and piloting (see the Procedure section). The AI literacy questionnaire comprises nine components, including applying, understanding, detecting, ethics, creating, problem solving, learning, persuasion literacy, and emotion regulation of AI. Construct validity of the Persian version was examined through confirmatory factor analysis (CFA), with standardized loadings ranging from 0.62 to 0.88, supporting the validity of the nine components. In addition, reliability was supported by Cronbach's alpha (0.64 to 0.91) and composite reliability values. While the Cronbach's alpha of 0.64 was a little below the conventional 0.70 benchmark, the Cronbach's alpha of 0.06 and above was considered acceptable for the purpose of the study given the number of items and the multidimensional nature of the constructs used in the current study (Cortina, 1993; Nunnally, 1978).

L2 Learning Motivation. The English L2 learning motivation questionnaire, developed and validated by Csizér et al. (2024) on a five-point Likert scale (*1* = Strongly Disagree to

5 = Strongly Agree), was translated into Persian to ensure linguistic accessibility and readability for the participants (see Appendix). Like the AI literacy questionnaire, it went through a forward–backward translation process, expert review, and piloting (see the Procedure section). The motivation questionnaire comprised five scales, including motivated learning behavior, ideal L2 self, ought-to L2 self, language learning experiences, and perceived importance of contact. Construct validity was confirmed through CFA, with standardized loadings from 0.61 to 0.86. Reliability was supported by Cronbach's alpha values between 0.74 and 0.90 and corresponding composite reliability measures.

L2 Autonomy. The L2 autonomy instrument, the validated English version based on Csizér et al. (2024) on a five-point Likert scale (*1* = Strongly Disagree to *5* = Strongly Agree), was translated into Persian. This questionnaire also went through a forward–backward translation process, expert review, and piloting (see the Procedure section). This 14-item instrument included two subscales: autonomous language learning behavior and autonomous use of technology, employed in the current study. Both scales demonstrated strong construct validity, with standardized loadings from 0.64 to 0.84. The scales also showed good reliability, with Cronbach's alpha values of 0.82 and 0.83 and supporting composite reliability indices.

L2 *Emotions.* The emotions questionnaire in English, developed and validated by Csizér et al. (2024) on a five-point Likert scale (*1* = Strongly Disagree to *5* = Strongly Agree), was translated into Persian. This questionnaire also went through a forward–backward translation process, expert review, and piloting (see the Procedure section). It included measures of positive emotions (enjoyment, hope, pride, and curiosity) and negative emotions (anxiety, boredom, apathy, confusion, and shame). The scales demonstrated strong construct validity, with CFA standardized loadings between 0.61 and 0.86. Reliability was supported by Cronbach's alpha values ranging from 0.71 to 0.88, along with corresponding composite reliability indices.

Procedure and Data Analysis

Voluntary participants were recruited for the current study from undergraduate students at Shahrekord University. Prior to collecting data, all participants were made aware of the nature of the research as well as the confidentiality of their responses and their right to leave the study at any stage without penalty. Informed consent forms were signed by all participants. The OPT was conducted in class settings in order to assess the English language level of the participants. Only those participants who met the criteria of intermediate-level

English proficiency were selected for the study. Eligible participants were then asked to complete the Persian versions of the AI literacy questionnaire, the L2 learning motivation questionnaire, the L2 autonomy scale, and the L2 emotions questionnaire in a single session lasting about 30-40 minutes. The total data collection took around 30-40 minutes.

Translation of all scales from English to Persian followed a forward–backward translation process. Two of the researchers involved in the present study independently translated the questionnaires into Persian. The translation was back-translated to English by a third bilingual translator, who was blind to the English version (see Appendix for sample items). An expert panel comprising two associate professors of applied linguistics and a specialist in educational technology (just for the AI literacy questionnaire) at Shahrekord University compared the back-translation and the original scales for semantic and conceptual equivalence. A pilot study was conducted on 30 Persian-speaking EFL learners before data collection. The pilot data were used to refine wording and check initial clarity; the CFA reported above was conducted on the main study sample**.** It should be noted that the CFA results should be interpreted as preliminary evidence of construct validity.

Before the primary analysis, the data set was checked for missing values, normality, and any possible outliers. For the detection of missing data, frequency was used as a measure. The missing data were very small (less than 5% per variable). Therefore, listwise deletion was applied. The normality assumption was checked via skewness and kurtosis, with cut-off values of ±2 and ±7, respectively; all variables fell within these ranges, supporting the assumption of univariate normality. Descriptive and correlational analyses were carried out using SPSS (version 26) software in order to obtain descriptive statistics and correlation coefficients between the variables under study. After that, SEM was used with the help of AMOS (version 24) software with the maximum likelihood estimation technique. Bootstrapping was performed with 2,000 samples using estimates/bootstrap confidence intervals (95%). In addition, sample adequacy was assessed based on sample size recommendations for covariance-based SEM, apart from conventional sample size tables (e.g., Hair, Black et al., 2022; Kline, 2023).

The construct validity of the instruments was supported through CFA, and internal consistency reliability was tested with the help of Cronbach's alpha and composite reliability (CR). Multiple goodness-of-fit indices, such as chi-square divided by degrees of freedom (CMIN/DF), root mean square error of approximation (RMSEA), incremental fit index (IFI), parsimonious comparative fit index (PCFI), and parsimonious normed fit index (PNFI), were applied for evaluating model fit. The structural model was used to assess the direct and

indirect effects of AI literacy on L2 motivation and emotional outcomes via learner autonomy.

Model identification was ensured prior to estimation. In the measurement model, each latent construct was identified by fixing one factor loading to 1.0 (marker-variable method), thereby setting the scale of the latent variables. The structural model was overidentified, with the number of known variances and covariances exceeding the number of free parameters ($df > 0$), allowing model estimation. Given that each latent variable was measured using multiple observed indicators and all constructs were specified with at least two indicators, the model satisfied the order and rank conditions for identification. Maximum likelihood estimation in AMOS was therefore appropriate for obtaining unique and stable parameter estimates. The hypothesized model (see Figure 2 in the Literature Review section) was tested to investigate the direct and indirect effects of AI literacy on L2 motivation, positive emotions, and negative emotions, with autonomy as a mediator.

Ethical considerations were addressed by obtaining written informed consent from participants, ensuring voluntary participation, and guaranteeing the right to withdraw at any time. Anonymity and confidentiality were maintained, as no personally identifiable information was reported and participants were assured that their data would be used only for research purposes.

Results

Established conventions for interpreting five-point Likert scales classify mean scores as low (1.00–2.33), moderate (2.34–3.67), and high (3.68–5.00) (e.g., Oxford & Burry-Stock, 1995). Using these benchmarks, descriptive statistics indicated moderate to high levels across the main study variables (see Table 2).

Table 2. Descriptive Statistics of the Study Variables

Variables	Sub-scales	*SD*	*M*
AI Literacy	Apply AI	.60302	4.1983
	Understand AI	.68595	3.6531
	Detect AI	.79445	3.6923
	AI Ethics	.70502	3.8567
	Create AI	.98462	2.7296
	AI Problem Solving	.82739	3.5626

Variables		Sub-scales	*SD*	*M*
		Learning	.85563	3.5535
		AI Persuasion Literacy	.71861	3.7843
		AI Emotion Regulation	.74258	3.6998
L2 Motivation		Ideal L2 self	.74419	4.3620
		Ought-to L2 self	.54886	3.9214
		Motivated Learning Behavior	.57859	4.2633
		L2 Learning Experience	.72511	3.7330
		Perceived Importance of Contact	.84294	4.1855
Emotions	Positive	Enjoyment	.79940	4.0362
		Hope	.93118	4.1478
		Pride	1.07381	3.8480
		Curiosity	1.01424	3.6953
	Negative	Anxiety	.66441	2.8597
		Boredom	.92994	2.2842
		Apathy	.59686	2.3665
		Confusion	.97898	3.1041
		Shame	1.07749	3.0579
L2 Autonomy		Autonomous Learning Behavior	.84294	3.6742
		Autonomous Use of Technology	.79940	3.8887

Note: SD = Standard Deviation; M = Mean

Based on Table 2, within AI literacy, *Apply AI* showed the highest mean score (*M* = 4.19, *SD* =0.60), suggesting frequent practical use of AI in learning, while other dimensions, such as *Understand AI* (*M* = 3.65, *SD* = 0.68) and *AI Ethics* (*M* = 3.85, *SD* = 0.70), were also well represented. However, *Create AI* received the lowest mean value (*M* = 2.72, *SD* = 0.98), suggesting that the participants were less confident in creating AI solutions themselves. Regarding L2 motivation, *Ideal L2 Self* recorded the highest mean (*M* = 4.36, *SD* = 0.74), followed by *Motivated Learning Behavior* (*M* = 4.26, *SD* = 0.57) and *Perceived Importance of Contact* (*M* = 4.18, *SD* = 0.84). This pattern suggests that the learners were primarily motivated by their aspiration to be proficient in L2, which could be reflected in their learning behavior. Interestingly, moderate levels of *L2 Learning Experience* (M = 3.73, *SD* = 0.72) suggest that the learning environment might not be as motivating as

their *Ought-to L2 Self* (M = 3.92, SD = 0.54). Overall, the data showed complex emotional profiles. Positive emotions such as *Hope* (M = 4.14, SD = 0.93) and *Enjoyment* (M = 4.03, SD = 0.79) were relatively high, whereas negative emotions, particularly *Confusion* (M = 3.10, SD = 0.97) and *Shame* (M = 3.05, SD = 1.07), were also evident. The presence of negative emotions might be relevant to new AI technologies for language learning and the anxiety associated with using them, combined with the relatively low scores for *Create AI*. Finally, L2 autonomy was notably strong, with *Autonomous Learning Behavior* (M = 3.67, SD = 0.84) and *Autonomous Use of Technology* (M = 3.88, SD = 0.79) indicating a generally high level of learner autonomy among the participants. This issue suggests that the learners can take initiative to integrate technology into their self-directed learning.

Furthermore, the relationships among the study variables were examined using Pearson correlation analysis, the results of which supported the appropriateness of conducting path analysis. The analysis was conducted in two stages. First, descriptive statistics and correlations among core variables were analyzed to understand the distribution and the interrelationships. The correlation coefficients are presented in Table 3. Second, SEM was run to test the hypothesized mediating role of autonomy in the relationship between L2 motivation and emotions.

The Pearson correlation analysis revealed significant relationships among AI literacy, L2 autonomy, L2 learning motivation, and emotional variables. Overall, AI literacy showed strong positive correlations with its subcomponents, particularly *Understand AI* (r = .85, p < .05), *Learning* (r = .77, p < .05), and *AI Problem Solving* (r = .76, p < .05), indicating good internal coherence of the construct. However, relatively weak correlations between *AI Persuasion Literacy* (r = .52, p < .05), *Apply AI* (r = .60, p < .05), and *Create AI* (r = .60, p < .05) were observed. This pattern suggests that mere use of AI does not foster the skills to critically evaluate the AI-generated output. AI literacy was also moderately and positively correlated with L2 autonomy (r = .49, p < .05), including both *Autonomous Learning Behavior* (r = .44, p < .05) and *Autonomous Use of Technology* (r = .49, p < .05), as well as with overall L2 learning motivation (r = .35, p < .05). These results indicate that AI literate learners are more likely to take charge of their own learning and use technology autonomously.

Table 3. Correlation Coefficients of the Research Variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 AI Literacy	1															
2 Apply AI	.608**	1														
3 Understand AI	.852**	.560**	1													
4 Detect AI	.717**	.342**	.625**	1												
5 AI Ethics	.743**	.327**	.705**	.622**	1											
6 Create AI	.603**	.131	.410**	.328**	.343**	1										
7 AI Problem Solving	.755**	.362**	.543**	.482**	.495**	.400**	1									
8 Learning	.770**	.429**	.579**	.443**	.481**	.415**	.657**	1								
9 AI Persuasion Literacy	.528**	.102	.308**	.376**	.445**	.202**	.389**	.343**	1							
10 AI Emotion Regulation	.551**	.229**	.329**	.295**	.267**	.223**	.424**	.424**	.454**	1						
11 L2 Motivation	.347**	.249**	.321**	.300**	.371**	.084	.242**	.298**	.208**	.108	1					
12 Positive Emotions	.363**	.220**	.336**	.242**	.348**	.135*	.296**	.361**	.192**	.123	.746**	1				
13 Negative Emotions	-.211**	-.117	-.211**	-.191**	-.253**	-.003	-.209**	-.106	-.148*	-.135*	-.389**	-.446**	1			
14 L2 Autonomy	.491**	.267**	.419**	.363**	.469**	.247**	.412**	.449**	.227**	.202**	.679**	.736**	-.418**	1		
15 Autonomous Learning Behavior	.439**	.222**	.365**	.316**	.411**	.261**	.369**	.394**	.214**	.162*	.643**	.715**	-.372**	.961**	1	
16 Autonomous Use of Technology	.489**	.295**	.431**	.375**	.481**	.175**	.407**	.459**	.205**	.233**	.604**	.630**	-.417**	.876**	.707**	1

*Note: **p < .01; *p < .05*

As shown in Table 3, only two correlation coefficients of the subscales exceeded r = .85 (e.g., AI Literacy ↔ Understand AI: r = .852; L2 Autonomy ↔ Autonomous Use of Technology: r = .876), indicating intercorrelation. However, these high correlations are sometimes theoretically expected given that they measure facets of the same construct. Nevertheless, this raises a methodological concern as it inflates the standard errors and destabilizes parameter estimates in SEM (Hair, Hult et al., 2022). Variance inflation factors (VIFs) were examined in SPSS (version 26) to address this; all VIF statistics remained below the threshold of 5, suggesting that multicollinearity is unlikely to affect the SEM results in this study.

Based on the results in Table 3, AI literacy demonstrated a significant positive association with positive emotions (r = .36, $p < .05$) and a significant negative association with negative emotions (r = −.21, $p < .05$), suggesting that the relationship is likely complex and mediated by other factors. L2 autonomy showed strong positive correlations with L2 learning motivation (r = .68, $p < .05$) and positive emotions (r = .74, $p < .05$), while it was

negatively related to negative emotions (r = −.42, p < .05). Furthermore, L2 learning motivation was strongly associated with positive emotions (r = .75, p < .05) and negatively associated with negative emotions (r = −.39, p < .05). These significant correlations provided empirical support for examining the proposed mediation model through structural equation modeling.

To address the research questions and examine the hypothesized mediation model, SEM was conducted using AMOS (version 24), with the results presented in Figure 3 and Table 4. The analysis tested both the direct effects (see Figure 1) of AI literacy on L2 motivation, positive emotions, and negative emotions, and its indirect effects or mediations (see Figure 2), in which autonomy was added as a mediator. This allowed us to investigate the relationships, direct, indirect, and total effects of AI literacy on positive emotions, negative emotions, and motivation, with L2 autonomy as a mediator.

Table 4. Direct, Indirect, and Total Effects of Study Variables

	Direct Effects		**Indirect Effects**		**Total Effects**	
Paths	**β**	**p**	**β**	**p**	**β**	**p**
AI Literacy → L2 Autonomy	0.66	0.001*	-	-	0.66	0.001
AI Literacy → Positive Emotions	-0.34	0.001*	0.76	0.001*	0.42	0.001
AI Literacy → Negative Emotions	0.30	0.012*	-0.51	0.001*	-0.21	0.018
AI Literacy → L2 Motivation	-0.29	0.001*	0.79	0.001*	0.50	0.001

*Note: *p < .05*

The paths with p-values below .05 were considered statistically significant at the 95% confidence level. The SEM results (see Figure 3 and Table 4) revealed that AI literacy exerted a significant positive direct effect on L2 autonomy (β = 0.66, p < .05). Although AI literacy showed negative direct effects on positive emotions (β = −0.34, p < .05) and L2 learning motivation (β = −0.29, p <.05), it demonstrated strong positive indirect effects on both variables through L2 autonomy (β = 0.76, p < .05; β = 0.79, p < .05, respectively), resulting in positive total effects. This can be interpreted as AI literacy per se does not directly improve positive emotions or motivation of L2 (English) learners; however, AI literacy through mediating autonomy can lead to enhanced positive emotions and motivation among learners. In contrast, AI literacy had a positive direct effect on negative emotions (β = 0.30, p < .05), but a significant negative indirect effect via L2 autonomy (β = −0.51,

$p < .05$), leading to an overall negative total effect (β = −0.21, $p < .05$). This indicates that AI literacy can mitigate the negative emotions through autonomy, thereby possibly transforming learners' anxiety or confusion into a controlled learning experience. Using Cohen's (1988) conventions for effect sizes (small: .10, medium: .30, large: .50) in behavioral research regarding the standardized coefficients (β), the direct positive effect of AI literacy on autonomy (β = 0.66) is considered a large effect; while its direct negative direct effects on emotions (β = −0.34) and motivation (β = −0.29) fell between medium and large in magnitude. The indirect effects through autonomy (β = 0.76 and β = 0.79) were large. These findings indicate that L2 autonomy plays a crucial mediating role in transforming AI literacy into enhanced motivational and emotional outcomes in L2 learning.

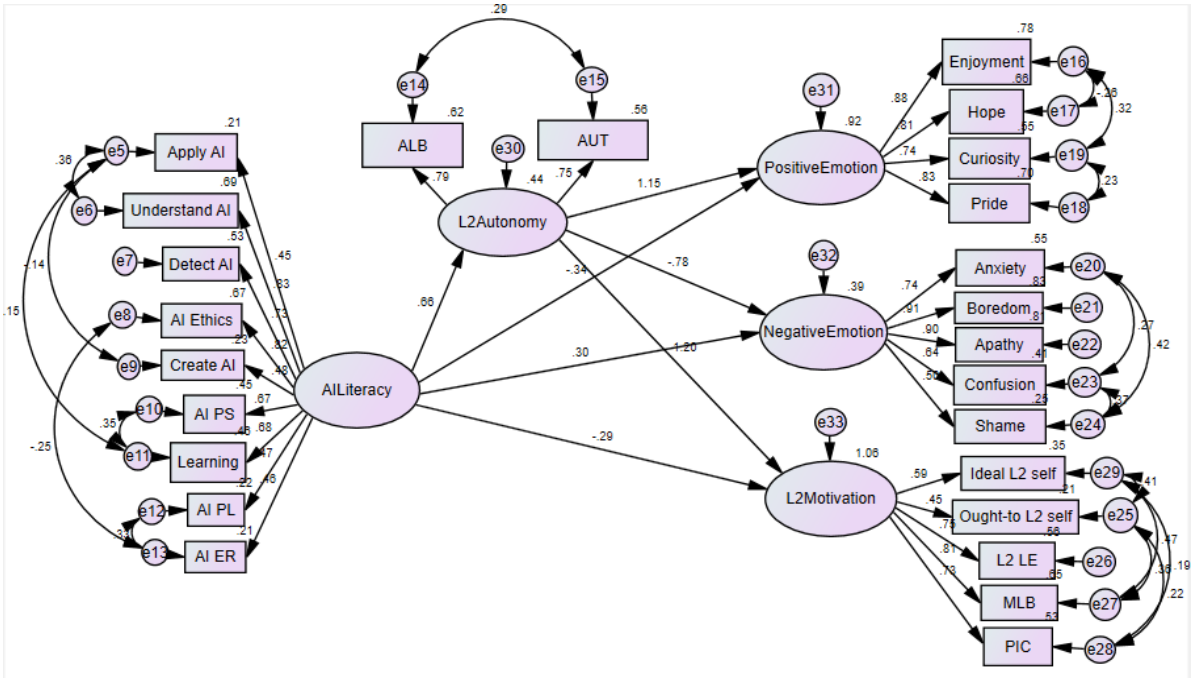

Figure 3. Direct, Indirect, and Total Effects of Study Variables

Furthermore, the overall model fit was evaluated using multiple fit indices. Table 5 presents the model fit results of the study.

Table 5. Goodness-of-Fit Indices for the Hypothesized Model

Fit index	CMIN/DF	IFI	RMSEA	PCFI	PNFI
Model	1.92	.93	.06	.077	.72

Based on the results in Table 5, all indices met or exceeded the thresholds. The CMIN/DF value of 1.92 indicated a good fit, as values between 1 and 3 are considered acceptable. The IFI value of 0.93 confirmed an acceptable model fit, as fit indices larger than 0.90 and 0.95 are acceptable and good to excellent, respectively. The RMSEA value of 0.06 was between the thresholds of 0.05 and 0.08, indicating a good/acceptable model fit. Moreover, the PCFI (0.77) and PNFI (0.72) values were both above the acceptable criterion of 0.50, confirming that the proposed structural model demonstrated a satisfactory fit to the data.

Discussion

The present study investigated the relationships among AI literacy, learner autonomy, L2 motivation, and emotional experiences in an AI-mediated language learning context, with particular attention to the mediating role of learner autonomy. The findings provide empirical evidence that AI literacy is associated with L2 learners' motivational and emotional experiences in complex ways. While AI literacy demonstrated a significant relationship with learner autonomy and exhibited a positive direct effect on learner autonomy in the SEM analysis, its direct effects on L2 motivation and positive emotions were not very large. The relationships changed when learner autonomy was introduced as a mediator. Through autonomy, AI literacy exerted significant positive indirect effects on L2 motivation and positive emotions and a significant negative indirect effect on negative emotions, resulting in overall beneficial total effects. These findings indicate that AI literacy does not automatically coincide with motivational and emotional benefits; instead, its psychological value may depend largely on L2 learners' capacity to employ AI autonomously and strategically during language learning.

The significant positive relationship between AI literacy and learner autonomy lends credence to the claim that AI literacy involves not only technical abilities but also strategic, critical, ethical, and self-regulatory skills that allow learners to learn autonomously (Carolus et al., 2023; Chee et al., 2025). It seems that L2 learners who have knowledge about AI systems, critical awareness of AI-produced texts, problem-solving through AI, and emotional regulation while interacting with AI tend to report greater capacity to plan, monitor, and evaluate language learning activities autonomously. This is in line with previous studies which have found that AI literacy is positively associated with strategic processing and self-regulated learning (Xu, 2025), thereby showing a link to learner autonomy by minimizing unnecessary cognitive effort while learning through AI (Hong & Guo, 2025). In addition, this

finding is also supported by empirical evidence that demonstrates that AI literacy is an inherently multidimensional construct that should be regarded as distinct from digital literacy (Lintner, 2024). This means that the results of the current study contribute to the understanding of the theoretical conceptualization of AI literacy as an educational construct, which is distinguished from other constructs like technology acceptance and attitudes towards AI literacy (Alharbi & Hassan Al-Ahdal, 2025; Feng, 2025; Wang, Amini et al., 2025). While positive attitudes might motivate learners to employ AI technologies, AI literacy helps them implement these technologies competently.

Apparently, the relationship between AI literacy and L2 motivation and both positive and negative emotions seems contradictory, as much research has reported positive influences of AI-supported learning (He et al., 2025; Hong & Guo, 2025; Zhang & Liu, 2025). Yet, such results carry theoretical meaning when considered in the context of psychological demands related to learning through AI. The development of AI literacy involves understanding sophisticated technological systems, critical thinking about information generated by AI, awareness of ethical issues, and making choices about the application of AI. Such demands imply that, even for learners with prior experience, the application of AI literacy to L2 tasks is challenging for the learner. This can be justified based on the scientific literature, which suggests that AI-supported learning is associated with increased cognitive load, technostress, and AI-induced anxiety under specific task conditions (Mohd Daud, 2026; Soriano et al., 2026). In a similar way, Yang, Wu et al. (2025) state that AI-supported learning often involves negotiation of technological challenges by learners during language tasks, which contributes to an increase in perceived complexity and emotional burden. Also, Xu et al. (2026) have pointed out that AI literacy is a bivalent construct, which may result in both positive psychological outcomes and negative psychological effects, depending on certain conditions. Instead of contradicting the previous scientific literature, the current results reveal that AI literacy is not expected to greatly and directly relate to the motivation and emotional state of learners since L2 learners should first obtain autonomy in the context of AI-supported learning.

The Iranian EFL context provides an additional explanation of these results as well. Whereas learners who function in contexts without restrictions regarding technology use, Iranian learners face unstable internet connections, limited access to AI, infrastructural restrictions, and socio-economic barriers that make it difficult for them to benefit from the help of AI. Consequently, even L2 learners who possess a high level of AI literacy might feel frustrated, uncertain, or emotionally stressed while trying to use AI tools productively.

AI literacy in the Iranian context may demand not only the ability of learners to understand AI technologies but also their capacity to deal with the restrictions in the area of technology, critically assess outputs generated by AI tools amid limitations, and regulate the emotions that accompany them.

The primary contribution of this research lies in demonstrating how learner autonomy exerts a significant mediating effect on the above-mentioned relationships and acts as the main psychological channel through which AI literacy can lead to positive motivational and emotional outcomes. L2 learners with AI literacy but without learner autonomy are not likely to effectively translate their technological literacy into helpful learning strategies. However, the learners who have adequate levels of AI literacy and learner autonomy might be capable of doing so. This mediation effect finds support from prior studies, which have found that learner autonomy constitutes one of the most robust predictors of motivational growth and emotional well-being in L2 learning (Bureau et al., 2022; Csizer & Albert, 2024; Zhao et al., 2025). Reportedly, emotion regulation was an important factor that could lead to learner autonomy and motivation in intelligent computer-assisted language learning situations. Also, Deng and Chen (2025) found that learner autonomy was associated with emotional resilience, academic perseverance, and self-regulation of learning. Additionally, evidence shows that learner autonomy is a potential factor that can contribute to sustained growth in positive emotions while alleviating anxiety and other negative emotional states (Cho et al., 2023; Lo, 2024). Altogether, the above-mentioned studies corroborate the present findings in the sense that technology competencies become useful for L2 education mostly through autonomous control over the learning process.

The results can help to extend the L2MSS by positioning autonomy as a critical pathway through which AI literacy fosters learners' motivational development. Although the L2MSS proposes that learners' future self-guides shape sustained motivational behavior (Dörnyei, 2005), the present findings suggest that AI literacy strengthens these motivational self-concepts only when learners exercise autonomous control over AI-supported learning. AI literacy therefore functions as an antecedent that enhances learners' capacity to pursue their ideal L2 selves through strategic, reflective, and self-directed engagement with AI technologies. This interpretation responds to recent calls for extending traditional motivational theories to account for technology-mediated learning environments, where learners continuously negotiate goals while interacting with intelligent systems (Pan & Zhang, 2025; Yang, Wei, et al., 2025). However, as the current study did not examine the

future self-guides directly, the extension of L2MSS remains theoretical; perhaps future research needs to investigate the interplay between AI literacy, autonomy, and L2 selves.

Additionally, the study results provide empirical evidence for the application of CVT, since they highlight the role of learner autonomy in mediating the effect of AI literacy on learners' feelings of perceived control in language learning activities. Indeed, as per CVT (Pekrun, 2006), achievement emotions turn out to be positive because the learners feel more control over valued learning activities. It is likely that AI literacy helps L2 learners experience positive emotions and reduce negative emotions by fostering autonomy. Nevertheless, the current study did not measure task value, meaning that the theoretical prediction is partially supported. Moreover, the results are aligned with the previous literature that suggests a reduction in anxiety, boredom, and other negative emotions and an increase in such emotions as enjoyment and hope due to increased learner autonomy (Cho et al., 2023; MacIntyre & Vincze, 2017).

The results also support the tenets of SDT in that they underscore the role of autonomy as the key psychological need. However, this study considered autonomy as a mediator between AI literacy and emotional or psychological outcomes. While SDT would predict autonomy-supportive environments, which AI literacy might facilitate, this study did not test this pathway directly. The results demonstrated that autonomy functions as a psychological process linking AI literacy to motivational and emotional outcomes (Deci & Ryan, 2000). Moreover, instead of perceiving AI as the technology that replaces learner agency, the results suggest that AI is educationally useful for learners if learners voluntarily regulate the ways of using it in language learning. Such an approach is consistent with the modern understanding of learner autonomy as the learner activity that is socially and technologically mediated but not independent (Little, 1991; Ushioda, 2011).

It is important here to accentuate the conceptual difference between AI literacy and AI-assisted teaching. The majority of studies tend to relate improvements in motivation, engagement, creativity, or emotional state to AI-mediated learning without measuring learners' AI literacy (He et al., 2025; Li, 2025). The question of whether educational advantages are caused by the AI technologies per se or by the ability of learners to use them efficiently remains unanswered. With direct measurement of AI literacy based on the multidimensional concept of Carolus et al. (2023), along with the investigation of correlations between AI literacy and learner autonomy, motivation, and emotions, the current study contributes to filling the conceptual gap. More likely, technology access itself is not enough, and the competencies of learners to perceive, evaluate, regulate, and employ AI can

facilitate the success of AI-mediated learning in terms of obtaining positive psychological outcomes. Additionally, AI literacy may develop in autonomous learning settings where L2 learners can boost their sense of agency and maximize the motivational and emotional gains in L2 learning. In such settings, instruction should allow for evaluation of AI-generated material, reflection on ethical matters, emotional regulation during AI interaction, and decision-making on the part of learners regarding the use of AI.

Conclusions and Implications

This study demonstrated that AI literacy played a significant role in shaping L2 learners' motivational, emotional, and autonomous learning outcomes, with autonomy as a key mediating variable. The findings showed that while AI literacy exerted varying direct effects on motivation and emotion, its indirect effects through enhanced autonomy were positive, resulting in heightened L2 motivation, increased positive emotions, and reduced negative emotions. The distinction between direct and indirect effects is theoretically significant. It implies that AI literacy alone does not guarantee psychological benefits; rather, it requires L2 AI-literate learners to autonomously control their learning processes. Without autonomous application, AI literacy may have adverse effects, such as technological frustration.

Several limitations should be considered when interpreting the findings. First, the sample consisted of undergraduate Iranian EFL students from a single university, which may limit the generalizability of the results to other educational and cultural contexts. The convenience sampling might inflate the correlations and is a legitimate threat to external and internal validity. Moreover, although the final sample size remained sufficient for the SEM analysis, the study experienced a 21.1% attrition rate, which could bias the estimates. Second, although the Persian versions of the questionnaires demonstrated acceptable psychometric properties, full cross-cultural equivalence with the original instruments was not established through measurement invariance testing. Third, CFA was conducted using the same sample, providing only preliminary evidence of construct validity; future studies should validate the measurement model with an independent sample and consider alternative competing models. Fourth, one AI literacy subscale showed a Cronbach's alpha below the recommended threshold (.64), suggesting that this subscale should be interpreted with caution. Fifth, although Little's (1991) definition of autonomy has been used in this study, it ignores more recent critiques that autonomy in AI-mediated learning may be qualitatively different from autonomy in traditional settings and fails to address the distinction between autonomy *from* technology and autonomy *with* technology. Sixth, the study relied on self-report measures.

The mere reliance on self-report measures, the conceptual overlap between AI literacy and autonomous use of technology, and the broad categorization of emotions into positive and negative dimensions may have limited the power of the findings. Finally, theoretical extension is partially supported in this study; firm conclusions require more rigorous methodological procedures.

By empirically validating a structural model that integrates AI literacy with established motivational and emotional frameworks in L2, the study extends current theoretical perspectives. The findings can extend L2MSS (Dörnyei, 2005) by demonstrating that AI literacy indirectly fosters the expansion of L2 selves by enhancing autonomy. This means that L2MSS may incorporate a mediation component that interacts with self-regulatory processes. Moreover, the study can expand the CVT perspective (Pekrun, 2006) by showing that autonomy precedes emotions but can be enhanced by AI literacy in a chain to control appraisals. This extends CVT by identifying AI literacy as a predictor of achievement emotions. This issue also broadens the SDT conceptualization, as autonomy is not merely a basic psychological need. It can be a mediating appraisal mechanism; AI literacy, through mediating the autonomy process, can support L2 learners' technologically enabled agency by equipping them with strategic and critical skills.

In practice, the results suggest that L2 programs should move beyond teaching AI tools as mere technical skills and instead foster autonomy-supportive learning environments where students are encouraged to use AI strategically, ethically, and reflectively. In other words, the findings imply that there is a need to move beyond merely training students on how to use AI and instead ensure that AI literacy develops in autonomous learning environments where they can achieve motivational and emotional gains. For instance, pedagogical programs should design structured lesson plans for critical AI evaluation, learner-based AI tasks for building autonomy, and assessment rubrics for using AI autonomously. Without such operationalized strategies, the practical implications cannot be applied in classroom settings. However, the recommendations should be considered with caution when contextualized in Iranian EFL classes due to the practical constraints in the Iranian educational system, unstable access to AI technologies, socioeconomic inequalities, and restricted AI platforms. Instead of offering universal strategies, educators should adapt these suggestions to their local settings. Given some potential negative effects of prior experience with AI use, L2 educators can employ reflection protocols (e.g., journaling about the negative impacts of AI) to lessen the emotional costs. Guided AI tasks, critical evaluation of AI outputs, and opportunities for self-regulated learning are recommended.

Future research should then employ multiple data sources, further examine discriminant validity, and advance beyond cross-sectional and correlational designs to adopt multi-method longitudinal or experimental studies to examine AI literacy and autonomy over a long period of time, measuring the different types of emotions (e.g., hope or anxiety) separately. Alternative models (e.g., motivation → autonomy → AI literacy) should also be tested to investigate the reversed causality. Moreover, future studies should take into account measurement invariance across various linguistic and cultural groups to investigate cross-cultural comparisons. Given the contextual constraints in Iran and socioeconomic inequalities, comparative studies with various levels of internet access (e.g., those in the megacity of Tehran compared to small provincial cities or towns) are needed to understand how infrastructural factors can influence the relationships under study.

Acknowledgements

We would like to thank the participants who cooperated with us.

Declaration of Conflicting Interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

References

Alharbi, M. A., & Hassan Al-Ahdal, A. A. M. (2025). Exploring Saudi EFL learners' engagement with ChatGPT: A mixed-methods study of perceptions, attitudes, and intentions. *Sage Open*, *15*(4), 1-16. https://doi.org/10.1177/21582440251392080

Bureau, J. S., Howard, J. L., Chong, J. X., & Guay, F. (2022). Pathways to student motivation: A meta-analysis of antecedents of autonomous and controlled motivations. *Review of Educational Research*, *92*(1), 46-72. https://doi.org/10.3102/00346543211042426

Carolus, A., Koch, M. J., Straka, S., Latoschik, M. E., & Wienrich, C. (2023). MAILS - Meta AI literacy scale: Development and testing of an AI literacy questionnaire based on

well-founded competency models and psychological change- and meta-competencies. *Computers in Human Behavior: Artificial Humans, 1*(2), Article 100014. https://doi.org/10.1016/j.chbah.2023.100014

Chee, H., Ahn, S., & Lee, J. (2025). A competency framework for AI literacy: Variations by different learner groups and an implied learning pathway. *British Journal of Educational Technology, 56*(5), 2146–2182. https://doi.org/10.1111/bjet.13556

Cho, H. J., Levesque-Bristol, C., & Yough, M. (2023). How autonomy-supportive learning environments promote Asian international students' academic adjustment: A self-determination theory perspective. *Learning Environments Research, 26*(1), 51–76. https://doi.org/10.1007/s10984-021-09401-x

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates.

Cortina, J. M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of Applied Psychology, 78*(1), 98-104. https://doi.org/10.1037/0021-9010.78.1.98

Csizer, K., & Albert, A. (2024). The relationship of emotions, motivation, and language learning autonomy: Differences in Hungarian secondary schools. *Porta Linguarum Revista Interuniversitaria de Didáctica de las Lenguas Extranjeras*, (IX), 31-47. https://doi.org/10.30827/portalin.viIX.29890

Csizér, K., Smid, D., Zólyomi, A., & Albert, Á. (2024). *Motivation, autonomy and emotions in foreign language learning: A multi-perspective investigation in Hungary* (Vol. 27). Multilingual Matters.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 227-268. https://doi.org/10.1207/S15327965PLI1104_01

Deng, K., & Chen, X. (2025). Exploring the impact of AI-driven emotional resilience on academic persistence, motivation, cognitive flexibility, and autonomy in self-regulated learning: A self-determination theory perspective. *Learning and Motivation*, *92*, 102167. https://doi.org/10.1016/j.lmot.2025.102167Dörnyei, Z. (2005). *The psychology of the language learner: Individual differences in second language acquisition*. Lawrence Erlbaum.

Feng, L. (2025). Investigating the effects of artificial intelligence-assisted language learning strategies on cognitive load and learning outcomes: A comparative study. *Journal of Educational Computing Research, 62*(8), 1741-1774. https://doi.org/10.1177/

07356331241268349Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2022). *Multivariate data analysis* (9th ed.). Cengage.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A primer on partial least squares structural equation modeling (PLS-SEM)* (3rd ed.). SAGE Publications.

He, M., Abbasi, B. N., & He, J. (2025). AI-driven language learning in higher education: An empirical study on self-reflection, creativity, anxiety, and emotional resilience in EFL learners. *Humanities and Social Sciences Communications, 12*(1), 1-20. https://doi.org/10.1057/s41599-025-05817-5

Hong, X., & Guo, L. (2025). Effects of AI-enhanced multi-display language teaching systems on learning motivation, cognitive load management, and learner autonomy. *Education and Information Technologies*, *30*(12), 17155-17189. https://doi.org/10.1007/s10639-025-13472-1

Kline, R. B. (2023). *Principles and practice of structural equation modeling* (5th ed.). Guilford Press.

Li, S. (2025). Generative AI and second language writing. *Digital Studies in Language and Literature*, *2*(1), 122-152. https://doi.org/10.1515/dsll-2025-0007

Lintner, T. (2024). A systematic review of AI literacy scales. *Npj Science of Learning, 9*(1), 50. https://doi.org/10.1038/s41539-024-00264-4

Little, D. (1991). *Learner autonomy 1: Definitions, issues and problems*. Authentik Language Learning Resources.

Liu, G. L., Darvin, R., & Ma, C. (2024). Unpacking the role of motivation and enjoyment in AI-mediated informal digital learning of English (AI-IDLE): A mixed-method investigation in the Chinese context. *Computers in Human Behavior, 160*, Article 108362. https://doi.org/10.1016/j.chb.2024.108362

Lo, M. T. (2024). The intraindividual dynamics of university students' motivation and emotions: The role of autonomy-supportive learning climates and learning activities. *British Journal of Educational Psychology*, *94*(4), 1011-1032. https://doi.org/10.1111/bjep.12703

MacIntyre, P. D., & Vincze, L. (2017). Positive and negative emotions underlie motivation for L2 learning. *Studies in Second Language Learning and Teaching, 7*(1), 61–88. https://doi.org/10.14746/ssllt.2017.7.1.4

Markus, A., Carolus, A., & Wienrich, C. (2025). Objective measurement of AI literacy: Development and validation of the AI Competency Objective Scale (AICOS).

Computers and Education: Artificial Intelligence, 9, Article 100485. https://doi.org/10.1016/j.caeai.2025.100485

Mierzwa-Kamińska, E. (2025). *Foreign language enjoyment and anxiety among Polish EFL students: Theory and practical implications for foreign language educators*. Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-86122-2

Mohd Daud, N. (2026). Resisting the machine: Modeling emotional friction and academic decline in enforced AI learning environments. *Smart Learning Environments, 13*, Article 10. https://doi.org/10.1186/s40561-026-00435-3

Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). McGraw-Hill.

Oxford, R.L., & Burry-Stock, J.A. (1995). Assessing the use of language learning strategies worldwide with the ESL/EFL version of the Strategy Inventory for Language Learning (SILL). *System, 23*, 1-23. https://doi.org/10.1016/0346-251X(94)00047-A

Pan, Z., & Zhang, Y. (2025). Exploring L2 writing motivation in AI-mediated EFL contexts: The role of teacher affective support, AI literacy, and self-efficacy through the lens of self-determination theory. *Learning and Motivation*, *92*, Article 102214. https://doi.org/10.1016/j.lmot.2025.102214

Pekrun, R. (2006). The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. *Educational Psychology Review, 18*(4), 315–341. https://doi.org/10.1007/s10648-006-9029-9

Saito, K., Dewaele, J. M., Abe, M., & In'nami, Y. (2018). Motivation, emotion, learning experience, and second language comprehensibility development in classroom settings: A cross-sectional and longitudinal study. *Language Learning, 68*(3), 709–743. https://doi.org/10.1111/lang.12297

Soriano, D. D., Salenga, J. L., Miranda, J. P. P., Grume, J. C., Fernando, E. Q., Martinez, Jr., A. B., Cabrera, R. A., & Yambao, J. A. (2026). AI-induced fatigue among students in higher education: A latent profile analysis. *IAES International Journal of Artificial Intelligence (IJ-AI)*, *15*(2), 1963-1971. https://doi.org/10.11591/ijai.v15.i2.pp1963-1971

Tzirides, A. O. O. (2026). Translanguaging and transposition in the generative AI era: Exploring multimodal meaning without borders in second language education. In G. C. Zapata (Ed.), *Generative AI technologies, multiliteracies, and language education* (pp. 40–57). Routledge.

Ushioda, E. (2011). Why autonomy? Insights from motivation theory and research. *Innovation in Language Learning and Teaching, 5*(2), 221-232. https://doi.org/10.1080/17501229.2011.577536

Ushioda, E. (2014). Motivation, autonomy and metacognition: Exploring their interactions. In D. Lasagabaster, A. Doiz, & J. M. Sierra (Eds.), *Motivation and foreign language learning: From theory to practice* (pp. 31–49). John Benjamins. https://doi.org/10.1075/lllt.40.02ush

Wang, K., Cui, W., & Yuan, X. (2025). Artificial intelligence in higher education: The impact of need satisfaction on artificial intelligence literacy mediated by self-regulated learning strategies. *Behavioral Sciences, 15*(2), Article 165. https://doi.org/10.3390/bs15020165

Wang, M. (2024). Modeling the contributions of perceived teacher autonomy support and school climate to Chinese EFL students' learning engagement. *Perceptual and Motor Skills, 131*(5), 2008–2029. https://doi.org/10.1177/00315125241272672

Wang, Q., Amini, M., & Fu, Z. (2025). AI acceptance and Chinese EFL learners' behavioral engagement with mediating effects of motivation. *Scientific Reports, 15*(1), 33310. https://doi.org/10.1038/s41598-025-11305-2

Wang, Y. (2025). Reducing anxiety, promoting enjoyment and enhancing overall English proficiency: The impact of AI-assisted language learning in Chinese EFL contexts. *British Educational Research Journal*, *52*, 2386-2386. https://doi.org/10.1002/berj.4187

Wang, Y. (2026). The effect of generative artificial intelligence literacy on academic achievement: The mediating role of academic self-efficacy and the moderating role of critical thinking. *Frontiers in Psychology*, *17*, 1761562. https://doi.org/10.3389/fpsyg.2026.1761562

Wu, Y. (2025). The impact of AI- and peer-assisted interaction modes on oral ability, interactive experiences, and perceptions among adolescent Chinese Tibetan students. *Journal of Multilingual and Multicultural Development*, 1–22. https://doi.org/10.1080/01434632.2025.2567036

Xu, J. (2025). Harnessing AI in academic writing: The complex interplay of AI literacy and self-directed learning among university L2 learners. *System, 135*, Article 103855. https://doi.org/10.1016/j.system.2025.103855

Xu, T., Wu, K., Wang, D., & Wang, W. (2026). The double-edged sword of AI literacy: Functional differentiation of anxiety and motivational regulation in the GenAI context. *Learning and Motivation*, *94*, Article 102276. https://doi.org/10.1016/j.lmot.2026.102276

Yang, C., Wei, M., & Liu, Q. (2025). Intersections between cognitive-emotion regulation, critical thinking and academic resilience with academic motivation and autonomy in EFL learners: Contributions of AI-mediated learning environments. *British Educational Research Journal, 52*(3), 94-131. https://doi.org/10.1002/berj.4140

Yang, L., & Zhao, S. (2024). AI-induced emotions in L2 education: Exploring EFL students' perceived emotions and regulation strategies. *Computers in Human Behavior*, *159*, Article 108337. https://doi.org/10.1016/j.chb.2024.108337

Yang, M., Wu, X., & Deris, F. D. (2025). Exploring EFL learners' positive emotions, technostress and psychological well-being in AI-assisted language instruction with/without teacher support in Malaysia. *British Educational Research Journal, 52*(3), 37-67. https://doi.org/10.1002/berj.4184

Zhang, S., & Liu, X. (2025). Learner emotions in AI-assisted English as a second/foreign language learning: a systematic review of empirical studies. *Frontiers in Psychology*, *16*, Article 1652806. https://doi.org/10.3389/fpsyg.2025.1652806

Zhao, M., Li, T., Yu, Y., Sin, K. F., & Zheng, E. (2025). Metacognitive strategies and willingness to communicate in L2 learning: A mediation model of self-efficacy and intrinsic motivation. *SAGE Open, 15*(2), 1-17. https://doi.org/10.1177/21582440251340830

Appendix: Sample Items of the AI Literacy, L2 Motivation, Emotions, and Autonomy Scales (Carolus et al, 2023; Csizér et al, 2024)

Scale		Item
AI literacy	Apply AI	۱.می‌توانم از برنامه‌های هوش مصنوعی در زندگی روزمره استفاده کنم. ۲.در زندگی روزمره، می توانم به گونه‌ای با هوش مصنوعی تعامل کنم که انجام کارهایم را آسان تر کند. 1. I can operate AI applications in everyday life. 2. In everyday life, I can interact with AI in a way that makes my tasks easier.
	Understand AI	۱.می‌توانم محدودیت‌ها و فرصت‌های استفاده از هوش مصنوعی را ارزیابی کنم ۲. می‌توانم استفاده‌های احتمالی از هوش مصنوعی در آینده را تصور کنم. 1. I can assess what advantages and disadvantages the use of an artificial intelligence entails. 2. I can imagine possible future uses of AI.
	Detect AI	۱.می‌توانم ابزارهای مبتنی بر هوش مصنوعی را از ابزارهایی که از هوش مصنوعی استفاده نمی‌کنند تشخیص بدهم. ۲. می‌توانم تشخیص بدهم که آیا با هوش مصنوعی یا انسان واقعی تعامل دارم. 1. I can distinguish devices that use AI from devices that do not. 2. I can distinguish if I interact with an AI or a "real human.
	AI Ethics	۱. می‌توانم عواقب استفاده از هوش مصنوعی را برای جامعه ارزیابی کنم. ۲. هنگام تصمیم‌گیری درباره‌ی استفاده از اطلاعات ارائه شده توسط هوش مصنوعی، می‌توانم ملاحظات اخلاقی را در نظر بگیرم. 1. I can weigh the consequences of using AI for society. 2. I can incorporate ethical considerations when deciding whether to use data provided by an AI.

Scale		Item
	Create AI	۱. می‌توانم اپلیکیشن‌های جدید در حوزه‌ی هوش مصنوعی را برنامه‌نویسی.کنم. ۲. می‌توانم ابزارهای مفید (مانند چارچوب‌ها و زبان‌های برنامه‌نویسی) را برای برنامه‌نویسی اپلیکیشن‌های هوش مصنوعی انتخاب کنم. 1. I can program new applications in the field of artificial intelligence. 2. I can develop new AI applications.
	AI Problem Solving	۱. هنگام استفاده از هوش مصنوعی می‌توانم در شرایط سخت به مهارت‌های خود تکیه کنم. ۲. می‌توانم به تنهایی از پس اکثر مشکلات در برخورد با هوش مصنوعی برآیم. 1. I can rely on my skills in difficult situations when using AI. 2. I can handle most problems in dealing with artificial intelligence well on my own.
	Learning	۱. می‌توانم خود را با جدیدترین نوآوری‌های حوزه‌ی اپلیکیشن‌های هوش مصنوعی به‌روز نگه دارم. ۲. علیرغم تغییرات سریع در حوزه‌ی هوش مصنوعی، همیشه می‌توانم دانش و اطلاعات خود را به روز نگه دارم. 1. I can keep up with the latest innovations in AI applications. 2. Despite the rapid changes in the field of artificial intelligence, I can always keep up to date.
	AI Persuasion Literacy	۱. اجازه نمی‌دهم هوش مصنوعی بر تصمیم‌های روزمره‌ام تأثیر بگذارد. ۲. می‌توانم مانع از تأثیرگذاری هوش مصنوعی در تصمیم‌گیری‌های روزمره‌ام شوم. 1. I don’t let AI influence me in my everyday decisions. 2. I can prevent an AI from influencing me in my everyday decisions.

Scale		Item
	AI Emotion Regulation	۱.می‌توانم احساساتی مثل ناامیدی و اضطراب را در حالی که برای کارهای روزمره از هوش مصنوعی استفاده می‌کنم کنترل کنم. ۲.می‌توانم تعاملات روزانه‌ای را که با هوش مصنوعی دارم و باعث ناامیدی و یا ترس من می‌شوند، مدیریت کنم. 1. I keep control over feelings like frustration and anxiety while doing everyday things with AI. 2. I can handle it when everyday interactions with AI frustrate or frighten me.
L2 Motivation	**Ideal L2 Self**	۱.فکر می‌کنم دانش زبان انگلیسی در آینده شغلی من کمک زیادی خواهد کرد ۲.وقتی به زندگی آینده ام فکر می‌کنم، تصور می کنم که به طور مرتب از زبان انگلیسی استفاده می‌کنم. 1. I think that English language knowledge will greatly help in my future career. 2. When I think of my future life, I imagine myself using English regularly.
	Ought-to L2 Self	۱. هیچ کس واقعاً اهمیت نمی‌دهد که من انگلیسی بخوانم یا نخوانم. ۲. به گفته‌ی والدین خود، برای یادگیری زبان انگلیسی باید هر کاری که از عهده‌ام برمی‌آید انجام دهم. 1. Nobody really cares whether I study English or not. 2. According to my parents, I have to do everything I can to learn English.
	L2 Learning Experience	۱. در درس زبان انگلیسی، احساس خوبی دارم. ۲. تجربه‌های خوبی از کلاس‌های زبان انگلیسی دارم. 1. I feel good in the English lessons. 2. I have good experiences from the English lessons.
	Motivated Learning Behavior	۱. برایم خیلی مهم است که انگلیسی صحبت کنم. ۲. مصمم هستم انگلیسی را خیلی خوب یاد بگیرم. 1. It is very important for me to speak English. 2. I am determined to learn English very well.

Scale			Item
	Perceived Importance of Contact		۱. وقتی باید با دوستان خود به زبان انگلیسی صحبت کنم، تجربه‌ی خوبی است. ۲. به نظر من صحبت کردن با خارجی‌ها خوب است زیرا هر چه بیشتر با افراد خارجی ملاقات کنم، انگیزه‌ی بیشتری برای یادگیری زبان انگلیسی دارم. 1. It is a good experience when I have to speak in English with my foreign friends. 2. In my opinion, it is good to speak with foreigners because the more foreigners I meet, the more motivation I have to learn English.
L2 Autonomy	Autonomous Language Learning Behavior		۱. در اوقات فراغتم همیشه برای یادگیری زبان انگلیسی وقت می‌گذارم. ۲. از هر فرصتی برای خواندن به زبان انگلیسی استفاده می‌کنم. 1. I always have time to learn English in my free time. 2. I take every opportunity to read in English.
	Autonomous Use of Technology		۱. اغلب از اینترنت برای بهبود زبان انگلیسی خود استفاده می‌کنم. ۲. اغلب متون انگلیسی می‌خوانم، زیرا از این طریق می‌توانم زبان انگلیسی خود را تمرین کنم. 1. I often use the Internet to improve my English. 2. I often read in English because this way I can practice my English.
Emotions	Positive Emotions	Enjoyment	۱. در کلاس‌های انگلیسی از صحبت کردن به زبان انگلیسی با دیگران لذت می‌برم. ۲. از موضوعاتی که در حین کلاس انگلیسی بحث می‌کنیم لذت می‌برم. 1. I enjoy talking to others in English during our English lessons. 2. I enjoy the topics that we discuss in English lessons.
		Hope	۱. امیدوارم مطالب ارائه شده در کلاس زبان انگلیسی را به‌خوبی درک کنم. ۲. امیدوارم با دانش زبان انگلیسی خود موفق بشوم.

Scale			Item
			1. I hope that I will understand the material in the English lessons. 2. I hope to be successful with my English language knowledge.
		Curiosity	۱. در کلاس زبان انگلیسی به موضوعاتی می پردازیم که کنجکاوی مرا برمی‌انگیزد. ۲. روند یادگیری زبان انگلیسی برای من جالب است. 1. In English lessons, we deal with topics that arouse my curiosity. 2. I find the process of learning English interesting.
		Pride	۱. به موفقیت‌های خود در یادگیری زبان انگلیسی افتخار می‌کنم. ۲. افتخار می‌کنم که می توانم همپای بقیه در کلاس‌های زبان انگلیسی پیش بروم. 1. I am proud of my achievements in English learning. 2. I am proud that I can keep up with the others in the English lessons.
	Negative Emotions	**Anxiety**	۱. وقتی به انگلیسی می‌نویسم معمولاً احساس می‌کنم مطمئن نیستم. ۲. اگر نتوانم متنی انگلیسی زبان را بفهمم ناامید می‌شوم. 1. I usually feel unsure when I write in English. 2. I get frustrated if I can't understand an English-language text.
		Boredom	۱. موضوعات مطرح‌شده در کلاس زبان انگلیسی خسته‌کننده هستند. ۲. از فعالیت‌های کلاس زبان انگلیسی خسته می‌شوم. 1. The topics of the English lessons are boring. 2. I get bored by the activities in English lessons.
		Apathy	۱. فکر می‌کنم هیچ امیدی نیست که در درس زبان انگلیسی به موفقیتی دست پیدا کنم. ۲. فکر نمی‌کنم فعالیت‌هایی که در کلاس‌های انگلیسی انجام می‌دهیم به من در یادگیری زبان انگلیسی کمک کند.

Scale			Item
			1. It's hopeless that I will ever accomplish anything in the English lessons. 2. I do not think that the tasks we do in English classes will help me learn English.
		Confusion	۱. ساختارهای پیچیده دستور زبان انگلیسی معمولاً مرا گیج می‌کنند. ۲. اگر کسی انگلیسی را با لهجهٔ غلیظ صحبت کند، معمولاً گیج می‌شوم. 1. Complicated grammar structures in English usually confuse me. 2. I find it quite confusing if someone speaks English with a strong accent.
		Shame	۱. اگر در زبان انگلیسی نمره خوبی نگیرم، احساس شرمندگی می‌کنم. ۲. اگر نتوانم در حین کلاس زبان انگلیسی به سؤالی پاسخ بدهم، احساس شرمندگی می‌کنم. 1. I feel ashamed if I get a bad grade in English. 2. I feel ashamed if I can't answer a question during our English lessons.