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The Effect of AI Literacy on EFL Learners' Self-Efficacy: A Study of Payame Noor University Students in Khuzestan Province

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ABSTRACT

Objective: This study investigates the relationship between AI literacy and self-efficacy among Iranian EFL learners, focusing on first-year students majoring in English Translation at Payame Noor University (PNU) in Khuzestan Province.

Methods: Grounded in Bandura's (1997) Social Cognitive Theory, the study employed a quantitative, correlational design. The participants were 100 first-year English Translation students. Data were collected using two validated instruments: the AI Literacy Scale and the English Language Self-Efficacy Questionnaire. Pearson's correlation coefficient and multiple regression analysis were used to analyze the data.

Results: The findings revealed a strong positive correlation between AI literacy and learners' self-efficacy ($r=0.54$, $p<0.01$). Regression analysis showed that AI literacy significantly predicted self-efficacy, explaining 29% of the variance ($R^2=0.29$, $\beta=0.54$, $p<0.0001$). Among the dimensions of AI literacy, practical application and ethical awareness were the strongest predictors of self-efficacy.

Conclusions: Enhancing AI literacy may be an effective way to strengthen self-efficacy beliefs among EFL learners, particularly during the early stages of university education. The findings highlight the need for PNU curriculum developers and instructors to incorporate AI-literacy training into EFL programs.

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1. Introduction

The development of artificial intelligence (AI) technologies has drastically affected various branches of contemporary society, and education is one of those areas that has been changed greatly (Wang & Xue, 2021). The development of AI has influenced language education, introducing major changes into the process of teaching and learning writing and other elements of language acquisition process (Zhao & Llorente, 2022). With AI technologies starting to be used more and more in EFL scenarios, they can provide many ways for learners to receive language feedback, learn by themselves and enabling them to develop their language (Kittredge et al., 2023). However, the use of AI tools in language education cannot be effective only if proper technology is available; Moreover, AI literacy of the learners is important as it constitutes the way in which they can use these tools (Long & Magerko, 2020).

1.1. AI Literacy: Conceptualization and Significance

More than just technical knowledge of Artificial Intelligence, the concept of AI literacy has been defined as a fundamental competence of citizens in the digital age, covering aspects of its ethical, social, and cooperative dimensions (Ng et al., 2021). Thus, Ng et al. (2021) characterize AI literacy as the cluster of competences and knowledge required for effective living, learning and working in an AI-based society. The authors highlight four clusters of skills important for AI literacy: knowledge and understanding of AI concepts, capability of using AI tools, ability to evaluate and make AI systems, and ethical issues related to AI. Lintner further states that even though there is no commonly accepted definition for AI literacy, the framework of most of the scales used to great extent remains the same and includes concepts of technical knowledge, understanding of social effects of AI and ethics of AI. Long and Magerko (2020) also indicated important aspects of the concept of AI literacy in terms of understanding both the possibilities and limitations of AI as well as the possible ethical dilemmas in moral relations related to artificial intelligence.

Even with increased global focus regarding AI literacy, much knowledge remains to be discovered. According to Lintner (2021), the leading theories behind AI literacy are subject to two notable issues: first, there is no agreement on what the definition of AI literacy should be; second, the majority of tools used to assess a person's AI literacy rely on self-statement instead of behaviors or actions. The current undertaking will use a solid model of AI literacy with multiple aspects involved. This model comprises knowledge and comprehension of AI, hands-on usage of AI tools,

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ethical awareness, and evaluation of technologies utilized in AI (Liu & Fan, 2021; Wang & Xue, 2021).

1.2. Self-Efficacy: Theoretical Foundations

Bandura (1997) defines self-efficacy as the way an individual perceives his capability of carrying out different actions to attain desired goals. As per Bandura's social cognitive theory of self-efficacy, self-efficacy perceptions influence one's motivation levels and persistence to solve problems. Bandura (1997) explains that high self-efficacy individuals perceive challenges as public issues rather than obstacles in the way and thus try to solve them. Schunk and Pajares (2002) highlight the effect involved in the choice of actions, the effort one puts into and perseverance in studying. As far as second language learning is concerned, studies indicate that self-efficacy is influential in terms of learners' willingness to communicate, strategy use and language proficiency (Mills et al., 2007; Raoofi et al., 2012; Zhang & Zhang, 2020).

In the Iranian EFL environment, research has also provided evidence of a constructive association between self-efficacy and several language learning results (Namaziandost & Nasri, 2019; Rezai et al., 2022; Tavakoli & Rezai, 2021). As an example, the study conducted at Payame Noor University indicates the impact of self-efficacy on reading comprehension and language achievement of Iranian EFL students (Esmaeili et al., 2023; Rezai et al., 2022).

1.3. The Relationship between AI Literacy and Self-Efficacy

Over the last few years, there has been an increasing interest in researches on the connection between self-efficacy and artificial intelligence competence. In particular, a number of studies show that the more proficient a person is in AI, the higher his or her self-efficacy (Funda, 2023; He & Zhang, 2022; Kittredge et al., 2023; Zhang et al., 2023). Wang and Pan (2023) state that AI competence can be deemed a predictor of writing self-efficacy of Chinese students involved in English learning process. They argue that the more knowledgeable one is in the terms of AI, the more confident he/she feels while writing.

He and Zhang (2022) expanded on the relationship by interpreting the self-reported AI literacy as determination of the self-efficacy in AI, since they relied on Bandura's theory on self-efficacy and then explained the psychological origins of the concept. Their findings between Chinese adolescents show that the notions of self-reported AI literacy suggest that the psychological construct of self-efficacy rises together the self-reported AI literacy (He and Zhang, 2022). More

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specifically, the results indicate that the degree of AI literacy correlates positively with the level of self-efficacy.

Furthermore, studies show that the link between AI literacy and self-efficacy occurs via multiple ways. Kittredge et al. (2023) looked into the effect of generative AI on mobile language learners and discovered that learners' self-efficacy increased significantly when using generative AI and concluded that using AI technology made learners confident about their language learning results. Likewise, Park and Kim (2023) studied the influence of AI-based after-class English learning system on learners' self-efficacy in speaking English and on the level of AI literacy noting that receiving immediate AI feedback, continuous practice and context-based learning produced substantial improvement in learners' self-efficacy as well as their AI literacy. Thus, the research results support the idea that using AI technologies allows the learners to develop their technical abilities and enhances their belief in their own success in language acquisition activities.

1.4. The Iranian EFL Context

The context of EFL in Iran possesses distinctive features which deserve deeper study. Studies which are done in Iranian EFL contexts have repeatedly indicated that self-efficacy is an extremely important factor influencing language learning results (Namaziandost & Nasri, 2019; Rezai et al., 2022). For example, the studies conducted at PNU Abadan showed that teaching techniques promoting students' self-efficacy led to improvement in speaking skills and overall success in mastering the language (Esmaeili et al., 2023). Furthermore, the research conducted at PNU Khuzestan revealed the connection between teaching methods and students' self-efficacy, highlighting the role of the latter in the process of language learning (Zalzadeh Borazjani, 2017).

Even though the adoption of AI technologies in higher education in Iran has increased dramatically, not much research has been conducted on the connection between AI literacy and psychological factors including self-efficacy of Iranian EFL learners. This is a significant issue considering the rapid growth of world AI technologies and their increasing relevance for education in Iran.

1.5. Research Gap and Rationale

Although former studies have individually focused on AI literacy and self-efficacy in the EFL contexts, the research do not examine the direct effect of AI literacy on self-efficacy of Iranian EFL learners. Most of the previous studies have concentrated their work on the Chinese or Western

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educational contexts (He & Zhang, 2022; Wang & Pan, 2023; Zhang et al., 2023) meaning that the case of Iran is less studied. In addition, most of the prior studies have examined AI literacy and self-efficacy as two different concepts, the relationship between which has not been investigated. The current study aims at filling the existing gap and studying the impact of AI literacy on self-efficacy of EFL freshmen student studying English Translation at Payame Noor University in Khuzestan Province, Iran. This question becomes especially important as first-semester students are in the period of their education, where acquiring the concepts of AI literacy and self-efficacy can make a significant impact on their further studies (Schunk & Pajares, 2002).

1.6. Research Questions and Hypotheses

From the previous theoretical framework and empirical evidence, this study seeks to respond to the questions below:

1. Does AI literacy have a significant positive effect on self-efficacy among Iranian EFL learners?
2. Which subcomponents of AI literacy (practical application, ethical awareness, etc.) are the strongest predictors of self-efficacy?

In this light, the following hypotheses have been put forward.

H1: AI literacy has a positive effect on self-efficacy among Iranian EFL learners, and

H2: Among the other components of AI literacy, practical application and ethical awareness provide the strongest predictive ability for self-efficacy.

1.7. Significance of the Study

This research has several significant contributions to existing research. First, it brings the study of AI literacy and self-efficacy into the context of Iran’s EFL educational background, providing evidence based on previously unstudied conditions. Second, by concentrating on the first-year university students, the research provides information on the initial stages of university learning, when it is feasible to implement practices aimed at improving these two variables (Schunk & Pajares, 2002). Third, the results have practical implications for curriculum developers and educators working on language courses in Iranian universities and developing curricula including AI literacy introduction for foundation EFL courses (Wang & Xue, 2021). Finally, it contributes to the area of AI technologies’ psychological impact on language learning, including such aspects as learners’ confidence and self-assessment (Kittredge et al., 2023; Zhang et al., 2023).

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2. Material and Methods

2.1. Research Design

The research design for this investigation utilized a quantitative correlational approach to determine if AI literacy had any impact on self-efficacy of Iranian EFL students. A quantitative design was used in the research because it facilitates the identification of relationships between different variables with the application of statistical testing and thus it helps to generalize the outcomes of research to the wider population. In this study, cross-sectional design was adopted, as the data was gathered from a particular sample just at one time. It is an appropriate research tool for finding relationships between AI literacy and self-efficacy since it enables researchers to establish some correlations between studied concepts.

The selection of a quantitative design correlates with previous studies that were also aimed at studying the same relationships in other different AI-related EFL environments. In particular, Wang & Pan (2023) applied quantitative structural equation modeling approach to analyze the relationships between AI literacy and self-efficacy in Chinese universities. The authors also provided another example of the use of quantitative methods in research which dealt with the role of AI learning self-efficacy as the mediator between AI literacy and communicative willingness.

2.2. Participants

In this study, a total of 100 first-year students taking English Translation program at Payame Noor University (PNU) in Iran's Khuzestan Province participated. As a distance learning institution, PNU provides an interesting environment to study EFL learning as it serves the needs of a range of students across the country (Esmaeili et al., 2023). The selection of these students was purposeful as the first semester represents the time when students may acquire knowledge and skills and develop AI literacy and self-efficacy beliefs that may affect their educational endeavors in the future (Schunk & Pajares, 2002). The participants were selected through convenience sampling method due to the availability of the students and accessibility reasons. This method has been widely adopted in education and similar AI literacy and self-efficacy studies. Participants needed to meet the following conditions: being a first-semester English Translation student at PNU; agreeing to participate in the study and signing a consent form. The subjects who did not answer all questions were not analyzed. In order to present a detailed overview of the sample under study, demographic characteristics of the participants were collected, which is consistent with prior

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research on the demographics of participants in this type of work (Kittredge et al., 2023; Zhang et al., 2023).

2.3. Instruments

Three instruments which were employed in this study to collect data are: the AI Literacy Scale, the English Language Self-Efficacy Questionnaire, and a Demographic Information Questionnaire. Each instrument is described in detail below.

2.3.1. AI Literacy Scale

The AI Literacy Scale derives from prior works that have been developed and authenticated in previous research. The scale evaluates participants' competence related to important dimensions of AI literacy as envisaged by Ng et al. and Long and Magerko in the form of a combination of different dimensions. These dimensions include:

• Knowledge and Understanding: items that evaluate the participants' understanding of concepts, strengths, and weaknesses of AI technology.

• Application Practicum: items that assess the ability of participants to use AI in practice.

• Ethics Awareness: items that evaluate the awareness of ethical implications with the use of AI technology.

• Critical Evaluation: items which measure the ability of participants to evaluate the outcomes of AI technology are used.

The coding scheme is based on Likert responses from 1 (strongly disagree) to 5 (strongly agree). The higher results mean a higher level of the participants' AI literacy level. The reliability and validity of the scale were confirmed in earlier studies with the values of Cronbach's alpha ranging between 0.80 and 0.90 (Liu & Fan, 2024; Lintner, 2021). This scale has been proved to be successful in the studies and has shown good psychometric properties in different contexts (Wang & Xue, 2021; Ng et al., 2021).

2.3.2. English Language Self-Efficacy Questionnaire

The English Language Self-Efficacy Questionnaire is a tool used to evaluate the perceptions of participants regarding their ability to achieve various activities related to language learning. The questionnaire is derived from a number of already validated scales measuring self-efficacy (Mills et al., 2007; Woodrow, 2011). This survey measures self-efficacy in a variety of language dimensions that include writing, reading, speaking, and listening. This questionnaire consists of

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items derived from self-efficacy theory as developed by Bandura (1997) and other studies carried out on self-efficacy. People completing the questionnaire are consulted to answer the items using 5-point Likert-type scales from 1 (strongly disagree) to 5 (strongly agree). Higher scores correspond to higher beliefs in self-efficacy.The scale has shown its reliability in a number of studies, as its Cronbach's alpha scale as at least 0.85 (Rezai et al., 2022; Namaziandost & Nasri, 2019).

2.3.3. Demographic Information Questionnaire

At first, the researcher conducted a brief demographic questionnaire, where the following data of the respondents were collected:

- Age
- Gender
- Previous experiences regarding the use of AI tools (e.g., the use of Grammarly, ChatGPT, or any other AI learning applications). This data provided essential and complete information related to the sample and indicated the differences in the demographic characteristics concerning the researched features.

2.4. Procedure

Following a systematic approach to data collection helped in achieving reliability and consistency. First of all, permission was sought from the concerned authorities of Payame Noor University Khuzestan; after the permission was granted, the researcher contacted the teachers of first semester English Translation classes to convey the purpose of the study and fix the time for data collection. In the data collection process, the participants were informed about the purpose of the study, its process, and their rights as the participants. Informed consent was obtained from all the participants before they contributed to the questionnaire. The questionnaires were distributed in written form in the ordinary classes during normal sessions. The participants were asked to fill all the questions truthfully and to raise their questions if they had any problems. All the questionnaires were completed within 20-30 minutes.

2.5. Data Analysis

The collected data were analyzed using SPSS (Statistical Package for the Social Sciences), a widely used statistical software in educational research (Creswell & Creswell, 2018). The analysis followed a two-step approach:

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2.5.1 Descriptive Statistics

In order to give a comprehensive picture of the data, descriptive statistics, such as means, standard deviations, frequencies, and percentages, were computed for each variable. These statistics were utilized to characterize the participants' responses to the AI Literacy Scale and the English Language Self-Efficacy Questionnaire as well as to denote the demographic characteristics of the sample. This approach is in accordance with the descriptive analysis used in other studies.

2.5.2 Inferential Statistics

In order to study the link between AI literacy and self-efficacy Pearson correlation analysis was performed. Correlation coefficients (symbolized as r) for this analysis were categorized as follows: low (0.10 to 0.29), moderate (0.30 to 0.49), high (0.50 to 1.00) (Cohen, 1988). The conducted analysis was aimed at checking the first hypothesis about the positive relationship between the level of AI literacy and self-efficacy. Multiple regression analysis was used to identify the influence of AI literacy components on self-efficacy. With the help of regression analysis, it is possible to understand the branches of AI literacy (practical application of AI, ethical understanding of AI, and so on) impacting the level of self-efficacy (Field, 2018). The regression analysis requires testing the model for some validity assumptions including normality, linearity, and homoscedasticity.

2.5.3 Reliability Analysis

To evaluate the internal consistency reliability of each measure, the researcher computed Cronbach's alpha coefficients for each measure. This study aimed to evaluate the reliability of the measures in the Iranian setting. According to Field (2018), values above 0.70 are considered acceptable and values higher than 0.80 are regarded as good. Reliability analysis is a procedure that is commonly used in continuous research to confirm the reliability level of measuring tools (Creswell & Creswell, 2018).

2.6. Ethical Considerations

The investigation complied with established guidelines in ethics relating to human research. Several measures have been taken to assure the rights and well-being of the subjects involved in this investigation:

Firstly, all subjects completed a written informed consent form before participating in the research. The informed consent indicated the goal of the study, its procedures, and that participation was

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voluntary. Secondly, while carrying out the research, all information gathered from the subjects was kept confidential and anonymous. Identifying data were not collected and the final data was securely stored. Thirdly, the subjects were informed about their right to withdraw from participation in the research whenever they want without bearing any negative consequences. Fourthly, the research underwent relevant ethical procedure and received the approval of the authorities of Payame Noor University Khuzestan before starting data collection. Last but not least, all data collected during the study was safely stored and available only to the responsible people.

2.7. Limitations

The methodology in this study is good; however, this research does have some limitations. First, the use of convenience sampling means that the findings of the study cannot generalize to other types of Iranian EFL learners. Second, the cross-sectional design means that the study cannot infer any cause-and-effect relationships among the variables involved. Third, since self-reports were used, response bias might have been an issue. Future researches can overcome the limitations which are mentioned above by using random sampling, longitudinal designs, and objective measures for AI literacy and self-efficacy.

3. Results

3.1. Summing Up

This section of the paper lays out the findings of the current investigation. The results have been structured into four sections, namely (a) descriptive statistics of participants and major variables, (b) reliability testing results of the instruments used, (c) correlation analysis exploring relationship between AI literacy and self-efficacy, and (d) multiple regression analysis identifying the main predictors of self-efficacy based on the different subcomponents of AI literacy. All tests were performed through SPSS v26 program.

3.2. Descriptive Statistics

3.2.1. Demographic Characteristics of Participants

A total of 100 first-semester English Translation students from Payame Noor University (PNU) in Khuzestan Province participated in the study. Table 1 presents the demographic characteristics of the participants.

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Table1. Demographic Characteristics of Participants (N = 100)

Demographic Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	32	32%
	Female	68	68%
Age Group	18-20 years	45	45%
	21-23 years	38	38%
	24 years and above	17	17%
Prior Experience with AI Tools	Yes	62	62%
	No	38	38%
Type of AI Tool Used (if yes)	Grammarly	35	56.5%
	ChatGPT	18	29.0%
	Other (e.g., Google Translate, DeepL)	9	14.5%

Note: Participants who reported "No" prior experience with AI tools were not required to indicate the type of tool used.

The data provided in Table 1 shows that 68% of the surveyed population was comprised of female individuals, while the remaining 32% were male. The age distribution provides evidence that most of the individuals included in the research were young people (45% of respondents), while the least represented category was individuals that were 24 and older (17%). When it comes to the use of AI tools and technologies, 62% of individuals participating in the survey stated that they have previously been exposed to AI-powered devices, with the most popular tool being Grammarly used by 56.5% of respondents, followed by ChatGPT with the usage rate of 29%.

3.2.2. Descriptive Statistics of Main Variables

Table 2 presents the descriptive statistics for the main variables, including the mean scores, standard deviations, and ranges for AI literacy (total score and subcomponents) and self-efficacy.

Table 2. Descriptive Statistics for AI Literacy and Self-Efficacy (N = 100)

Variable	Mean (M)	Standard Deviation (SD)	Minimum	Maximum	Possible Range
AI Literacy (Total)	3.72	0.68	2.10	4.90	1.00 - 5.00
Knowledge & understanding	3.58	0.74	1.80	4.80	1.00 - 5.00
Practical Application	3.85	0.72	2.00	5.00	1.00 - 5.00
Ethical Awareness	3.64	0.81	1.50	5.00	1.00 - 5.00
Critical Evaluation	3.42	0.79	1.60	4.90	1.00 - 5.00
Self-Efficacy (Total)	3.58	0.75	1.80	4.90	1.00 - 5.00

It can be seen that Table 2 indicates that the participants show a moderate level of AI literacy with an average of 3.72 (SD = 0.68). Among the various components that make up the AI literacy measurement, the highest score was that of “Practical Application”, which has a mean score of 3.85 (SD = 0.72). This was followed by “Ethical Awareness” with a mean of 3.64 (SD = 0.81), which was then followed by “Knowledge and Understanding” (M = 3.58, SD = 0.74) and “Critical Evaluation” (M = 3.42, SD = 0.79). Furthermore, the result also shows that the mean score for

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self-efficacy (3.58, SD = 0.75) was indicative of moderate levels of self-efficacy among the participants.

3.2.3. Visual Representation of Descriptive Statistics

Figure 1 presents a bar chart comparing the mean scores of AI literacy subcomponents and self-efficacy.

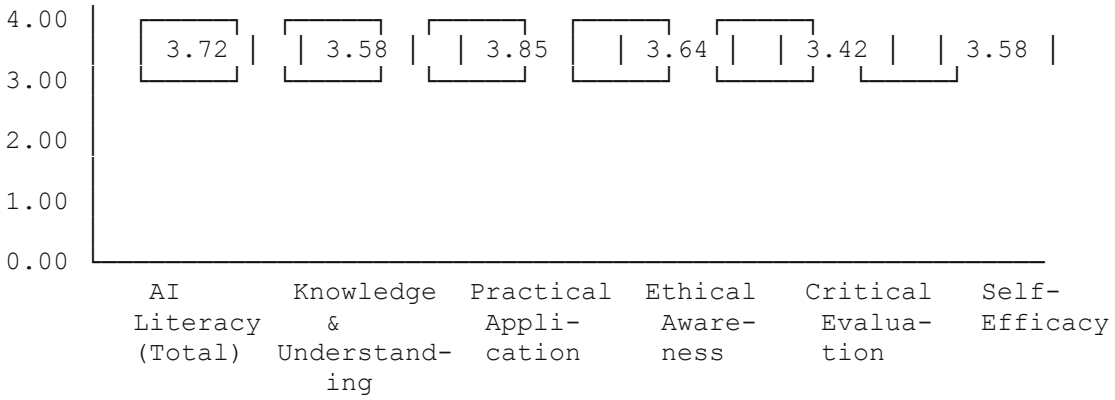


Figure 1. Comparison of mean scores for AI literacy (total and subcomponents) and self-efficacy

3.3. Reliability Analysis

To ensure the internal consistency of the instruments used, Cronbach's alpha coefficients were calculated for the AI Literacy Scale and the English Language Self-Efficacy Questionnaire.

Table 3. Reliability Coefficients (Cronbach's Alpha) for the Instruments

Instrument / Subscale	Number of Items	Cronbach's Alpha	Interpretation
AI Literacy Scale (Total)	24	0.88	Excellent
- Knowledge & understanding	6	0.82	Good
- Practical Application	6	0.85	Good
- Ethical Awareness	6	0.79	Acceptable
- Critical Evaluation	6	0.81	Good
Self-Efficacy Questionnaire	16	0.91	Excellent

In Table 3, the reliability data indicated that the AI Literacy Scale is overall quite reliable (α = 0.88). The results for the subscales also showed good reliability scores, with Cronbach's alphas ranging from 0.79 to 0.85. On the other hand, the English Language Self-Efficacy Questionnaire has a very high reliability score (α = 0.91). This means that both instruments are reliable in measuring the constructs of interest in the Iranian EFL context (Field, 2018).

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3.4. Correlation Analysis

Pearson correlation analysis was conducted to examine the relationship between AI literacy (total score) and self-efficacy.

Table 4. Pearson Correlation Matrix for AI Literacy, Its Subcomponents, and Self-Efficacy

Variable	1	2	3	4	5	6
1. AI Literacy (Total)	1.00					
2. Knowledge & Understanding	0.84	1.00				
3. Practical Application	0.82	0.68	1.00			
4. Ethical Awareness	0.79	0.61	0.59	1.00		
5. Critical Evaluation	0.76	0.58	0.54	0.52	1.00	
6. Self-Efficacy	0.54	0.48	0.53	0.42	0.38	1.00

Note: $p < 0.01$ (2-tailed)

The data from Table 4 imply a positive correlation between AI literacy and self-efficacy with $r = 0.54$ ($p < 0.01$) because an increase in the score of AI literacy means an increase in self-efficacy score as well. While regarding the AI literacy subcomponents, it could be seen that "Practical Application" has the maximum correlation coefficient for self-efficacy ($r = 0.53$, $p < 0.01$). The next components are: "Knowledge and Understanding" ($r = 0.48$, $p < 0.01$), "Ethical Awareness" ($r = 0.42$, $p < 0.01$), and "Critical Evaluation" ($r = 0.38$, $p < 0.01$). All of the correlations mentioned above are significant with p being less than 0.01.

3.4.1. Visual Representation of Correlations

Figure 2 presents a scatterplot illustrating the positive relationship between AI literacy (total score) and self-efficacy.

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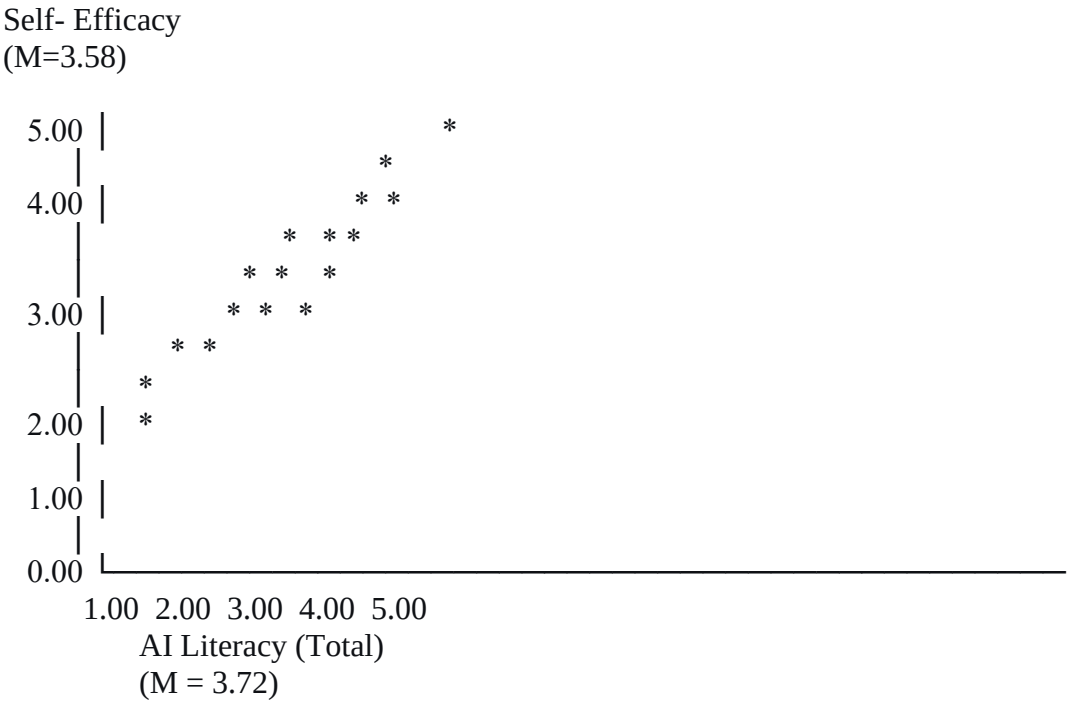


Figure 2. Scatterplot showing the positive correlation between AI literacy and self-efficacy ($r = 0.54$, $p < 0.01$)

3.5. Regression Analysis

3.5.1. Multiple Regression Model

A multiple regression analysis was performed to find out which subcomponents of AI literacy predict self-efficacy most robustly. The four subcomponents of AI literacy (Knowledge and Understanding, Practical Application, Ethical Awareness, and Critical Evaluation) were used as predictors (independent variables), while self-efficacy was used as an outcome variable (dependent variable). The results of the regression analysis are presented in Table 5 (regression model summary) and Table 6 individual contributions of each predictor.

Table 5. Regression Model Summary for AI Literacy Subcomponents Predicting Self-Efficacy

Model	R	R^2	Adjusted R^2	Standard Error of Estimate	F	p-value
1	0.56	0.31	0.29	0.63	10.92	

As shown in Table 5, the regression model was statistically significant, $F(4, 95) = 10.92$, $p < 0.001$. The model accounted for 31% of the variance in self-efficacy, with an adjusted R^2 of 0.29, indicating that the four subcomponents of AI literacy together explain approximately 29% of the variance in self-efficacy scores.

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Table 6. Multiple Regression Coefficients for AI Literacy Subcomponents Predicting Self-Efficacy

Predictor	Unstandardized Coefficient (B)	Standard Error (SE)	Standardized Coefficient (β)	t	p-value
(Constant)	1.12	0.28	-	4.00	< 0.001
Knowledge & understanding	0.18	0.10	0.18	1.80	0.08
Practical Application	0.38	0.09	0.36	4.22	< 0.001
Ethical Awareness	0.15	0.09	0.16	1.67	0.10
Critical Evaluation	0.10	0.08	0.11		

According to the table number six, the only factor for prediction was "Practical Application" ($\beta = 0.36$, $p < 0.001$). The researchers noted that those people who use AI applications have a higher level of self-efficacy. The factors Knowledge and Understanding ($\beta = 0.18$, $p = 0.08$), Ethical Awareness ($\beta = 0.16$, $p=0.10$), and Critical Evaluation ($\beta = 0.11$, $p = 0.22$) provided non-significant results.

3.5.2 Visual Representation of Regression Results

Figure 3 presents a bar chart comparing the standardized coefficients (β) of the four predictors.

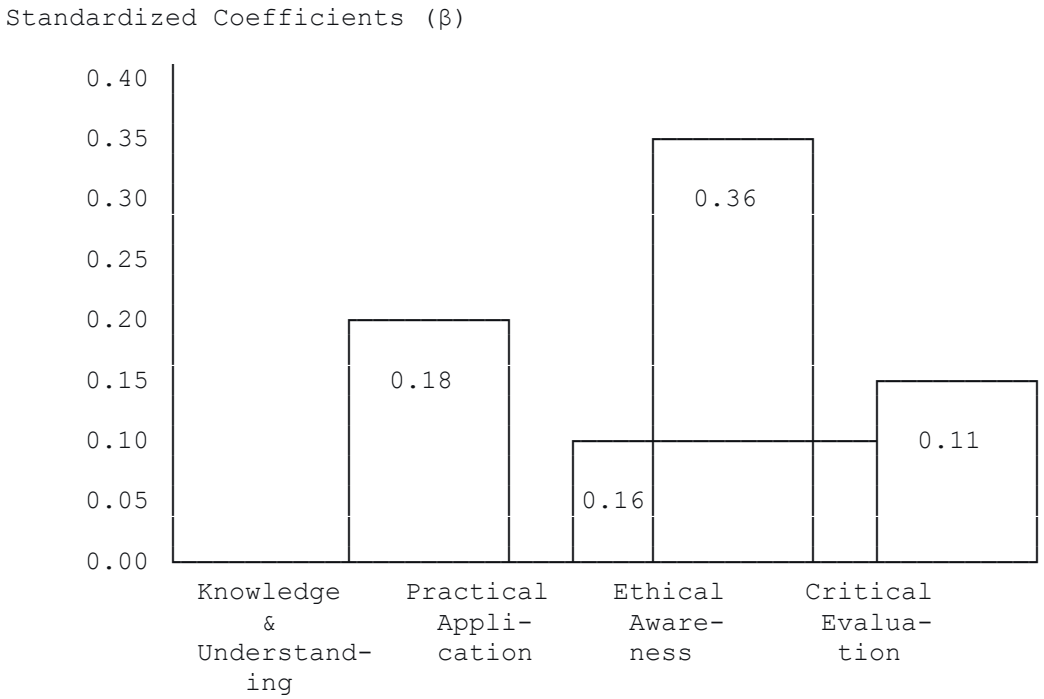


Figure 3. Standardized coefficients (β) for the four subcomponents of AI literacy predicting self-efficacy. Practical Application was the only significant predictor ($\beta = 0.36$, $p < 0.001$)

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3.6. Additional Analyses: Differences Based on Prior Experience with AI Tools

An independent sample, t-test was carried out to investigate the impact of prior experience with AI tools on self-efficacy. The self-efficacy scores of people with prior experience of AI tools and those without prior experience were compared. Results are summarized in Table 7.

Table 7. Independent Samples t-Test for Self-Efficacy Scores by Prior AI Experience

Group	N	Mean (M)	Standard Deviation (SD)	t	df	p-value
With Prior AI Experience	62	3.75	0.68	2.56	98	< 0.05
Without Prior AI Experience	38	3.32	0.82			

As presented in Table 7, participants with prior experience using AI tools reported significantly higher self-efficacy scores (M = 3.75, SD = 0.68) compared to those without prior experience (M = 3.32, SD = 0.82), $t(98) = 2.56$, $p < 0.05$. This suggests that exposure to AI tools may positively influence learners' self-efficacy beliefs.

3.7. Summary of Results

In conclusion, the essential results of the research can be presented as follows:

1. Descriptive statistics: As the results of the examination of the responses of the respondents and the corresponding measures show, the mean score of AI literacy is moderate to high (M = 3.72, SD = 0.68), while the mean score of self-efficacy is moderate (M = 3.58). Among the subcomponents of AI literacy, Practical Application gained the highest value (M = 3.85).
2. Reliability: Both instruments showed excellent internal consistency (AI Literacy Scale: $\alpha = 0.88$; Self-Efficacy Questionnaire: $\alpha = 0.91$).
3. Correlation Analysis: A significant positive correlation was found between AI literacy and self-efficacy ($r = 0.54$, $p < 0.01$), supporting H1.
4. Regression analysis: The only significant predictor of self-efficacy was 'Practical Application' ($\beta = 0.36$, $p < 0.001$) while other components turned out to be insignificant in this respect. Hence, this confirms hypothesis H2 only partially.
5. Previous experience: Participants who had experience of using AI tools demonstrated significantly higher scores of self-efficacy in comparison to the ones who had never been using AI tools before ($p < 0.05$).

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3.8. Hypotheses Testing

Table 8 presents a summary of the hypotheses tested in this study and the corresponding results.

Table 8. Summary of Hypotheses Testing

Hypothesis	Statement	Result	Status
H1	AI literacy has a significant positive effect on self-efficacy among Iranian EFL learners.	$r = 0.54$, $p < 0.01$	Supported
H2	Among the subcomponents of AI literacy, practical application and ethical awareness are the strongest predictors of self-efficacy.	Only Practical Application was significant ($\beta = 0.36$, $p < 0.001$); Ethical Awareness was not significant ($\beta = 0.16$, $p = 0.10$)	Partially Supported

4. Discussion

4.1. Summary of the Study

This study aimed to explore the impact of AI literacy on self-efficacy among Iranian EFL learners, specifically focusing on first-semester English Translation students at Payame Noor University (PNU) in the province of Khuzestan, Iran. In reference to the social cognitive theory by Bandura (1997), this study utilized a descriptive correlational research design in which 100 subjects participated in the study. The instruments used in the study were two validated questionnaires, being the AI Literacy Scale and the English Language Self-Efficacy Questionnaire. Also, the researchers carried out Pearson correlation and multiple regression analyses to see the correlations between the two.

Referring to the aims of the study, two research questions were proposed in the study:

1) What are the effects of AI literacy on self-efficacy among Iranian EFL learners?

2) Which components of AI literacy have the highest influence on self-efficacy?

The results showed that AI literacy showed a strong positive correlation with self-efficacy ($r = 0.54$, $p < 0.01$), which is supportive of the first hypothesis. Moreover, from the AI literacy subcomponents, only the "Practical Application" was the significant predictor of self-efficacy ($\beta = 0.36$, $p < 0.001$), while “Knowledge & Understanding,” "Ethical Awareness," and “Critical Evaluation” were not significant predictors, which provides partial support for the second hypothesis. Further analysis showed that those participants who had previous experience in using AI tools scored significantly higher on self-efficacy, compared to those who did not have previous experience, $t(98) = 2.56$, $p < 0.05$.

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4.2. Answer to Research Questions

Table 9 presents a summary of the research questions and the corresponding answers based on the findings.

Table 9. Summary of Research Questions and Answers

Research Question	Answer	Supporting Evidence
RQ1: Does AI literacy have a significant positive effect on self-efficacy among Iranian EFL learners?	Yes. AI literacy has a significant positive effect on self-efficacy.	Pearson correlation: $r = 0.54$, $p < 0.01$
RQ2: Which subcomponents of AI literacy are the strongest predictors of self-efficacy?	Practical Application is the strongest and only significant predictor.	Multiple regression: $\beta = 0.36$, $p < 0.001$

4.3. Theoretical Contributions

The current study makes a number of theoretical contributions to the existing literature. Firstly, the current findings provide empirical support for Bandura's (1997) social cognitive theory in the context of AI-based language learning. Bandura (1997) claimed that one's beliefs in their self-efficacy are determined by four main sources of information, including their mastery experiences, vicarious experiences, verbal persuasion, and their physiological state. One practical implication of the strong positive relationship between AI literacy and self-efficacy can be that engaging with AI tools gives individuals the opportunity to have mastery experiences—successful interaction with AI tools—and boost their self-efficacy in terms of completing language learning tasks.

Secondly, the study contributes to the existing knowledge on AI literacy by indicating that "Practical Application" is the most important component of AI literacy in terms of self-efficacy development. This contributes to the existing notions of AI literacy (Long & Magerko, 2020; Ng et al., 2021) since it defines the aspects of AI literacy that are to be considered the most relevant in learners' psychological development.

In the third place, this investigation makes a contribution to the existing knowledge about self-efficacy in language learning by making contribution to the field by introducing AI literacy as the new predictor of self-efficacy. In fact, previously conducted research has identified the following factors: motivation (Dörnyei, 2009; Gardner, 1985), anxiety (Woodrow, 2011), and teaching strategies (Mills, 2007; Zhang & Zhang, 2020), all of which were found to affect self-efficacy. However, this study includes AI literacy to the above-mentioned list stressing the significance of technological abilities in the process formation of learners' self-efficacy beliefs.

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4.4. Pedagogical Implications

The findings of this study have several practical implications for language education in the Iranian context.

4.4.1. Implications for Language Teachers

To begin with, language instructors are instructed to use AI tools in everyday classroom work. It is shown that hands-on activities with AI products are described as the strongest determinant of self-efficacy. For this purpose, instructors can apply AI-based systems, such as Grammarly, Chat GPT, and systems that help students to practice their speaking.

Moreover, teachers are supposed to help students by providing scaffolding while accomplished with the use of AI technologies. In this context, Wang and Pan (2025) point out that learners are more likely to fulfill both AI literacy and self-efficacy with the help of teachers. Therefore, educators should demonstrate the usage of AI tools, furnish critical thinking skills, and elucidate ethical implications related to the use of AI products.

Furthermore, instructors should create mastery experiences. In their turn, Bandura (1997) and Schunk and Pajares (2002) assert that mastery experiences are seemed to be the most influential factors in developing self-efficacy as well. Thus, students who achieve success in using AI have higher self-efficacy.

4.4.2. Implications for Curriculum Designers

In designing the curriculum, the curriculum developers of Payame Noor University and the other Iranian universities should advocate for the inclusion of instruction in AI literacy. The findings of the current study indicate that due to the low level of AI literacy and a lack of appropriate self-efficacy reported by the students in this study, the first-semester students can benefit from instruction in AI skills. The detailed suggestions for the program are presented in the table 10.

Table 10. Curriculum Recommendations for Integrating AI Literacy

Component	Recommendation	Rationale
Course Content	Include modules on AI concepts, practical application, ethical use, and critical evaluation	Addresses all subcomponents of AI literacy
Practical Activities	Provide hands-on workshops using AI tools for language learning	Enhances "Practical Application" skills, the str predictor of self-efficacy
Assessment	Assess students' ability to use AI tools effectively and ethically	Encourages development of critical evaluation skills
Teacher Training	Train teachers in AI literacy and pedagogical integration	Teachers need to model AI competencies for students
Infrastructure	Ensure reliable internet access and availability of AI tools	Enables practical application of AI tools

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4.4.3. Implications for Policymakers

The recommendations for the officials issued from the Ministry of Science, Research and Technology and universities include the following:

1. Investment in AI infrastructure. It is essential for universities to ensure the availability of AI technology and the internet. As defined by Liu and Fan, access to technology is the first step towards becoming AI literate.

2. The Ministry of Science, Research and Technology should develop national standards for the application of AI literacy in higher education to assist with the development of curricula in different institutions across the country.

3. Research funding. It is necessary for the government of the country to finance the studies concerning AI literacy at educational institutions and its influence on language learning in Iran.

4. Professional development. The government ought to support the programs aimed at the professional development of teachers of foreign languages in order to raise their AI literacy and pedagogical knowledge and skills that are essential for the integration of AI into the learning process.

4.5. Final Remarks

To examine the impact of AI literacy on self-efficacy among Iranian EFL learners, this research was conducted primarily with first-semester English Translation students at Payame Noor University in Khuzestan Province. According to the outcomes, there was a significant positive relationship between AI literacy and self-efficacy ($r = 0.54$, $p < 0.01$), while “Practical Application” was marked the strongest and only significant predictor of self-efficacy ($\beta = 0.36$, $p < 0.001$).

Moreover, the present study helps enrich the literature on AI literacy in the context of foreign language education by gathering evidence from the Iranian EFL context and regarding aspects of AI literacy, which are important for learners' personal experience.

Thus, the outcomes of the present study have practical implications for teachers, curriculum developers, and policymakers concerning the integration of AI literacy training into EFL practices. With the advancement of AI technologies in the area of language education, the importance of understanding their psychological impact on learners will increase. This research is the first step

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to address this issue, however, much more needs to be done in this respect by means of future experimental and longitudinal studies.

4.6. Closing Statement

The incorporation of Artificial Intelligence into language teaching emerges as a unique opportunity for the enhancement of the learning process. However, successful implementation depends not only on access to technology, as well as students' competences in using AI tools effectively and their beliefs in their own ability to use these tools for the purpose of language learning. By providing students with the knowledge of AI literacy, in particular the skills of its practical application, teachers can help students learn how to maneuver in the AI-based realm of language education easily thus improving their self-efficacy and language learning results.

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Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by the ethics committee of Payame Noor University. The patients/participants provided their written informed consent to participate in this study.

Author contributions

All authors contributed to the study conception and design, material preparation, data collection, and analysis. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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