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Exploring AI Literacy and Perception: Insights from Iranian EFL Researchers

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Abstract

The rapid integration of Artificial Intelligence (AI) into education has transformed teaching and research practices, particularly in the context of English as a Foreign Language (EFL). However, the effective adoption of AI in EFL research requires a deep understanding of AI literacy and stakeholder perceptions. This mixed-methods study investigates Iranian EFL researchers' AI literacy, perceptions of AI applications, and their implications for research and pedagogy. Quantitative data were collected through a validated AI Literacy Questionnaire administered to 112 participants, measuring nine dimensions of AI literacy, including technical skills, ethical considerations, and emotional regulation. Results revealed low AI literacy levels across all dimensions, with significant gaps in advanced skills like AI creation and ethical analysis. Cluster analysis identified three proficiency groups: high, moderate, and low, with the majority falling into the low proficiency category. Qualitative data from semi-structured interviews with 16 participants highlighted both positive and negative perceptions of AI in research. While participants acknowledged AI's potential for enhancing data analysis, time efficiency, and writing accuracy, concerns included ethical risks, data privacy issues, and overreliance on AI, which could stifle creativity and critical thinking. These findings underline the pressing need for targeted training programs and policy interventions to enhance AI literacy among Iranian EFL researchers, fostering responsible and effective AI integration in research and education.

Keywords: Artificial Intelligence (AI), AI literacy, EFL researchers, perceptions.

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1. Introduction

The integration of digital tools and methodologies in education in general has gained considerable momentum, particularly in foreign language context, where the incorporation of technology is reshaping teaching and learning dynamics (Farzaneh, et al., 2024; Maghsoudi & Mansouri Nejad, 2025). Among these innovative technological advancements, AI is rapidly transforming various industries, including education, by reshaping teaching and learning environments (Bahroun et al., 2023). However, the effective integration of AI in EFL context requires a deep understanding of AI literacy and stakeholder perceptions. This study investigates Iranian EFL researchers' preparedness, attitudes, and knowledge about AI technologies.

AI literacy involves not only technical skills but also ethical and critical considerations for responsible AI use (Jeon, 2023). As defined by the OECD and Ng et al. (2021), it entails knowing, comprehending, applying, and assessing AI while also taking ethical considerations into account. Such literacy is essential for understanding the potential and limitations of AI as it continues to reshape education. Researchers, particularly in the EFL field, play a critical role in shaping the integration of AI into curricula and pedagogy (Alshumaimeri & Alshememry, 2023; Raygan & Moradkhani, 2022; Sumakul et al., 2022). As Konda (2022) notes, "researchers and practitioners can work together to build AI systems that align with ethical principles and contribute positively to society's well-being" (p. 6). Thus, evaluating Iranian EFL researchers' AI literacy is crucial for promoting its effective adoption in the country's educational system.

Existing research highlights gaps in AI literacy and perception across educational contexts. For instance, Cukurova et al. (2020) found that while UK language instructors were optimistic about the potential of AI, they lacked sufficient knowledge of its applications. Similarly, Zawacki-Richter et al. (2019) revealed mixed perceptions of AI in higher education, ranging from enthusiasm to skepticism. Despite growing studies, limited research focuses on Iranian EFL researchers, even as some studies have addressed AI integration in Iranian education more broadly (e.g., Dashtestani & Hojatpanah, 2022; Hoseini Moghadam, 2023). Understanding these researchers' perceptions is vital for addressing knowledge gaps and fostering AI integration. As Kelly et al. (2023) argue, "Future research must ensure participants' consistent understanding of AI technology" (p. 29).

Studies such as those by Kong et al. (2021) and Laupichler et al. (2023) emphasize the need to evaluate users' understanding of AI to identify areas for improvement. This urgency is particularly relevant in Iran, where EFL researchers must navigate the complexities of AI to advance its educational applications. This study aims to address these gaps by assessing Iranian EFL

researchers' AI literacy and perceptions, providing insights to guide AI integration and foster informed dialogue within the field.

2. Literature Review

2.1. AI Literacy and Perception: Key Concepts and Importance

AI literacy extends beyond basic familiarity, encompassing the ability to evaluate AI systems' reliability, transparency, and biases while considering ethical, legal, and societal implications. It involves not only understanding and applying AI responsibly (Jobin et al., 2019) but also critically assessing its societal impact (European Commission, 2019) and participating in debates on AI's responsible use (Winfield & Jirotka, 2018). Like digital literacy, AI literacy must adapt to keep pace with technological advances (Hargittai, 2009).

In the digital age, AI literacy is essential for navigating a world shaped by AI. It enables individuals to make informed decisions, critically evaluate AI outputs, recognize biases, and understand ethical implications (Miao et al., 2021; Stahl, 2021). AI-literate individuals are better prepared for workforce demands and policy discussions (Cath, 2018; Daugherty & Wilson, 2018). Factors like knowledge, cultural context, and ethics influence AI perception and acceptance (Buck et al., 2022; Touretzky et al., 2019). Trust and transparency, built through clear algorithms and ethical practices, are key to fostering public confidence in AI systems (Chatila et al., 2021; Whittaker et al., 2018).

2.2. Empirical Research on AI Literacy

Empirical studies have explored AI literacy across various contexts and populations, yielding important insights. For instance, Alam et al. (2024) investigated AI literacy among librarians in Zambian academic libraries. Their findings revealed that while librarians had a solid understanding of AI fundamentals and held positive views about its potential benefits, they faced challenges such as limited resources and resistance to change. Similarly, Paladhi and Maruthaveeran (2023) examined AI literacy among library and information science professionals in ASEAN countries and found gaps in understanding AI concepts, ethical considerations, and programming skills.

Other studies have focused on developing and evaluating AI literacy programs. Kong et al. (2023) designed a program for college students that significantly improved participants' ethical awareness, conceptual understanding, and literacy concerning AI. Similarly, Kong et al. (2022) emphasized the importance of focusing on conceptual understanding rather than programming in AI education, demonstrating that such programs effectively enhance participants' knowledge and skills.

AI literacy has also been studied among older adults. Kaur and Chen (2023) explored the knowledge, experiences, and concerns of older adults

regarding AI-enabled products and services. Their findings showed significant variability in AI literacy levels among participants, with many expressing a desire to deepen their understanding to make better-informed decisions.

In the workplace context, Cetindamar et al. (2022) conducted a bibliometric analysis to define the scope and dimensions of AI literacy, identifying competencies related to technology, work, human-machine interaction, and learning. They highlighted the importance of operationalizing AI literacy for non-specialists. Similarly, Celik (2023) proposed a research paradigm to examine factors influencing AI literacy, such as computational thinking and the digital divide.

While these studies provide valuable insights, there is a notable gap in research focusing on AI literacy and perception within the Iranian EFL research community.

Despite the growing integration of AI technologies into EFL research and instruction, little is known about the AI literacy and perceptions of Iranian EFL researchers. This gap is particularly significant given the unique technological, cultural, and pedagogical contexts of Iran. Understanding AI literacy in this context is crucial for several reasons. First, it can inform targeted professional development initiatives to enhance researchers' understanding and use of AI technologies. Second, it can guide policy decisions aimed at integrating AI into EFL education and research. Third, investigating AI literacy in Iran can contribute to global discussions about AI adoption in EFL contexts. Finally, understanding researchers' perceptions of AI's ethical implications can promote responsible AI integration in language education. By addressing this gap, scholars can contribute to the development of AI-driven EFL instruction and research, fostering a deeper understanding of AI among Iranian EFL researchers and beyond. Based on the literature review, the study specifically endeavors to answer the following two research questions:

1. What is the current state of AI literacy among Iranian EFL researchers?
2. How do they perceive the potential applications and impacts of AI in the context of EFL research?

3. Method

3.1. Participants

The participants were identified through purposive sampling, a method widely recognized for its ability to ensure alignment between the research objectives and the characteristics of the sample (Etikan et al., 2016). The inclusion criteria required participants to be actively engaged in the field of EFL research in Iran, with a demonstrated interest in or familiarity with AI, as these traits were essential for providing relevant insights into the focus of the study on the intersection of EFL and AI literacy.

Recruitment channels, such as academic circles, professional associations, and conferences, were chosen strategically to target individuals with established academic and professional involvement in EFL research, which aligns with established practices for recruiting specialized populations (Palinkas et al., 2015). Social media platforms were also utilized to expand outreach, especially as they have become increasingly recognized as effective tools for accessing academically active communities in recent years (O'Connor et al., 2021).

The structured questionnaire (Appendix 1) used during recruitment further ensured that only those meeting the inclusion criteria participated in the study, thereby adding an additional layer of rigor to the selection process. Additionally, the decision to invite 16 participants for semi-structured interviews from the larger pool of 112 respondents was guided by the principle of maximizing diversity in AI literacy levels and perspectives, an approach recommended for qualitative studies to ensure the richness of the data (Creswell & Poth, 2018). The demographic details of the interviewees are presented in Table 1.

Table 1

Demographic Information of the Interviewees

Pseudonym	Age	Degree	City	University	years of experience	Current Occupation
Ali	32	PhD Candidate	Gonbad Kavoos	Yazd University	10	Official English Teacher
Maryam	28	MA	Sabzevar	Hakim Sabzevari	4	Official English Teacher
Reza	45	PhD	Tehran	Kharazmi University	15	Private Language Institute Teacher
Zahra	36	PhD Candidate	Tehran	Tarbiat Modares	4	Ph.D. Student
Amir	52	PhD	Mashhad	Ferdowsi University	18	Assistant Prof.
Fatemeh	29	MA	Sabzevar	Ferdowsi University	5	Unofficial English Teacher
Hassan	41	PhD	Guillan	Mohaghegh Ardabili University	14	University Lecturer
Sara	33	PhD Candidate	Mashhad	Shiraz University	8	Private Language Institute Teacher

Mohammad	58	PhD	Tehran	Hakim Sabzevari	+25	Associate Prof.
Leila	26	MA	Bojnourd	University of Bojnourd	2	Official Language Teacher
Hamid	39	PhD	Kerman	Shahreza University	12	University Instructor
Nasrin	47	PhD	Tehran	Alzahra University	15	Assistant Prof.
Javad	31	MA	Gonbad Kavoos	IAU of Aliabad Katool	4	Official Language Teacher
Mehdi	43	PhD	Gorgan	Shahid Beheshti	13	Official Language Teacher & University Lecturer
Hossein	35	PhD Candidate	Sari	Hakim Sabzevari	5	Private Language Institute Teacher
Azadeh	50	PhD	Mashhad	Arak University	+20	Official Language Teacher

3.2. Materials and Instruments

The AI Literacy Questionnaire used in this study was directly adopted from prior research (Carolus et al., 2023) and validated by experts to measure multiple dimensions of AI literacy, including Use & Apply AI, Know & Understand AI, Detect AI, AI Ethics, and Create AI, as well as psychological competencies such as AI Self-efficacy, AI Problem Solving, AI Self-competency, and AI Emotion Regulation. This questionnaire has been informed by the theoretical frameworks and prior empirical works (Ajzen, 1985; Carolus et al., 2023; Cetindamar et al., 2022; Long & Magerko, 2020), Ng et al., 2023; Wang et al., 2022).

The validity and reliability of the instrument were rigorously evaluated through confirmatory factor analysis (CFA) using robust Satorra-Bentler estimations (Rosseel, 2012). The initial model, which included all items, was revised to improve the model fit by removing 34 items with low factor loadings and restructuring the latent dimensions. The final model, consisting of 34 items across nine latent dimensions, demonstrated good psychometric properties. Model fit indices for the modified model were acceptable ($\chi^2(513) = 886.87$, $p < 0.001$, CFI = 0.926, RMSEA = 0.057, 95% CI [0.051, 0.063], SRMR = 0.079), with all first-level and second-level factors loading significantly ($p < 0.001$) and all dimensions being significantly correlated ($p < 0.01$).

Internal consistency for the subscales was assessed using Cronbach's alpha, with values ranging from acceptable (e.g., AI Persuasion literacy $\alpha = 0.66$, AI Emotion regulation $\alpha = 0.71$) to excellent (e.g., Use & Apply AI $\alpha = 0.93$, Create AI $\alpha = 0.92$). Additionally, the inclusion of subscales for attitudes towards AI and willingness to use technology further enriched the structural equation model, which also demonstrated acceptable fit ($\chi^2(2035) = 3004.35$, $p < 0.001$, CFI = 0.900, RMSEA = 0.043, 95% CI [0.039, 0.047], SRMR = 0.069).

These indicate that the questionnaire possesses robust construct validity and internal reliability, making it a reliable tool for measuring AI literacy and related psychological competencies. Importantly, the iterative validation process ensured that the final instrument retained comprehensive coverage of the targeted domains while addressing psychometric weaknesses.

In the second phase of the study, semi-structured interviews were conducted to gain a deeper understanding of participants' perceptions and experiences with AI in EFL research, complementing the quantitative data collected in the first phase. The interview questions (Appendix 2) were carefully designed to explore key themes such as participants' knowledge of AI, its perceived benefits and challenges, and their recommendations for integrating AI into EFL research practices. These questions were developed based on a review of the relevant literature on AI applications in education and EFL research (e.g., Chirichela et al., 2024; Huang et al., 2023; Kacena et al., 2024; Khalifa & Albadawy, 2024; Lo et al., 2024; Mohamed, 2024; Srivastava & Agarwal, 2024; Sumakul et al., 2022) and were further refined by the research team to ensure alignment with the objectives of the study.

The selection of participants for the interviews was purposive: individuals who had completed the questionnaire in the first phase were invited to participate based on their expressed interest and availability, as well as to ensure diverse representation in terms of professional background and familiarity with AI. This purposive sampling strategy allowed for the inclusion of participants with varying levels of expertise and perspectives, fostering rich qualitative insights (Creswell & Poth, 2018).

3.3. Procedure

In the first phase, a structured questionnaire was electronically distributed to Iranian EFL scholars. Detailed instructions were provided to ensure participants understood how to complete the questionnaire accurately. Data collection took approximately 40 days, during which 112 participants submitted their responses.

In the second phase, 16 participants were purposively selected from the questionnaire respondents to ensure a diverse range of experiences and perspectives. Due to geographical constraints, interviews were conducted over

the phone (Block & Erskine, 2012). Each interview was audio-recorded with participants' consent and later transcribed for analysis.

3.4. Data Analysis

In the first phase of the study, quantitative data were collected through a questionnaire and analyzed using a structured multi-step approach involving descriptive and inferential statistics (Field, 2018; Pallant, 2020). The data preparation stage involved reviewing responses for completeness and accuracy, with incomplete or invalid responses excluded to ensure data integrity (Tabachnick & Fidell, 2019). Valid responses were then imported into SPSS (version 26) for statistical analysis. Descriptive analysis included calculating measures such as means, percentages, and frequency distributions to summarize participants' responses across nine dimensions of AI literacy (Creswell & Creswell, 2018). For instance, mean scores and standard deviations were used to assess central tendencies and variations across responses, while frequency distributions highlighted patterns of agreement or disagreement with individual items (Bryman, 2016).

Inferential statistics followed this preliminary analysis. Specifically, a one-way repeated measures ANOVA was employed to compare mean scores across the dimensions of AI literacy, identifying statistically significant differences in participants' performance. Post-hoc pairwise comparisons using Bonferroni corrections provided further insights into the specific areas of strength and weakness. For example, the significant gap between "Create AI" ($M = 1.49$, $SD = 0.80$) and "Use & Apply AI" ($M = 1.71$, $SD = 0.94$) highlighted participants' challenges with advanced AI tasks compared to basic application skills ($F(8, 891) = 15.34$, $p < 0.001$). Effect sizes were calculated to determine the practical significance of these differences, with a partial eta squared ($\eta^2 = 0.29$) indicating a large effect size. Additionally, a k-means cluster analysis grouped participants into high, moderate, and low proficiency clusters, further contextualizing the results and identifying target groups for intervention. This systematic approach ensured a comprehensive understanding of participants' AI literacy levels while highlighting areas for targeted educational reforms (Brynjolfsson & McAfee, 2017; Shneiderman, 2020).

The second phase of the study adopted a rigorous thematic analysis framework to analyze qualitative data from semi-structured interviews, following Braun and Clarke's (2006) six-step approach. This process began with familiarization, where researchers repeatedly read interview transcripts and field notes to gain an in-depth understanding of the data. NVivo 12 was then used for systematic coding, enabling the identification and categorization of meaningful textual segments into descriptive codes. These codes were iteratively refined and grouped into broader themes through thematic mapping,

with themes reflecting key patterns in participants' perceptions of AI integration into research. For example, themes such as 'Enhanced Data Analysis' and 'Ethical Concerns' emerged from codes like 'faster processing of large datasets' and 'AI-generated fake data.' Each theme was reviewed for coherence and alignment with the dataset, ensuring interpretative accuracy. Themes were then defined with clear descriptions, connecting them to the research questions of the study.

The final step involved producing the report, which presented themes alongside illustrative excerpts from the interviews and quantified their prevalence to offer a balanced view of participants' perspectives. For instance, positive themes, such as 'Time Efficiency,' were supported by quotes like, 'AI handles tedious tasks like finding DOIs, saving me 60% of my time', while negative themes, such as 'Ethical Considerations,' were exemplified by concerns about 'AI-generated fake or misleading data'. This detailed and transparent analytical process complemented the quantitative results, offering a holistic understanding of AI literacy and its implications.

4. Results and Discussion

4.1. Results

4.1.1. Results of Phase One

The results of Table 2 reveal that respondents generally rate themselves as having low competencies across various dimensions of AI use, understanding, and engagement, with most Mean scores falling below 2. This indicates a lack of confidence or proficiency in areas such as operating AI applications, understanding AI concepts, and integrating AI into their daily lives. For instance, items under the 'Use & Apply AI' dimension, such as 'I can operate AI applications in everyday life' and 'I can use AI meaningfully to achieve my everyday goals,' show average scores around 1.6–1.8, with high agreement on negative responses (Disagree/Strongly Disagree). Similarly, under the 'Know & Understand AI' dimension, questions like 'I know the definitions of AI' and 'I can assess the limitations and opportunities of AI' also demonstrate low averages, further reflecting limited familiarity with AI concepts and their implications. The low standard deviations (typically ranging between 0.75–0.95 across items) suggest that respondents tend to agree closely in their evaluations, reinforcing the overall trend of low AI competency levels.

Table 2

Results of the Data Gathered From the AI Literacy Questionnaire

Dimension	SA (%)	A (%)	N (%)	D (%)	SD (%)	Mean	S.D.
Use & Apply AI	1.8	4.5	8.9	22.3	62.5	1.61	0.95
	1.8	7.1	10.7	22.3	58.0	1.74	0.96
	2.7	5.4	13.4	24.1	54.5	1.81	0.98
	2.7	6.3	11.6	22.3	57.1	1.79	0.97
	0.9	3.6	9.8	25.0	60.7	1.62	0.88
	1.8	4.5	11.6	24.1	58.0	1.70	0.92
Know & Understand AI	0.9	2.7	12.5	26.8	57.1	1.59	0.83
	1.8	4.5	14.3	25.9	53.6	1.68	0.89
	0.9	5.4	10.7	24.1	58.9	1.62	0.91
	1.8	3.6	13.4	26.8	54.5	1.65	0.88
	0.0	2.7	10.7	25.9	60.7	1.49	0.79
	0.9	4.5	12.5	25.0	57.1	1.58	0.85
Detect AI	1.8	5.4	11.6	25.0	56.3	1.72	0.93
	0.9	3.6	10.7	26.8	58.0	1.58	0.85
	1.8	6.3	12.5	24.1	55.4	1.76	0.94
AI Ethics	0.9	4.5	9.8	26.8	58.0	1.60	0.86
	1.8	3.6	11.6	25.9	57.1	1.68	0.89
	0.9	5.4	10.7	27.7	55.4	1.63	0.88

Create AI	0.0	1.8	8.9	25.0	64.3	1.41	0.75
	0.9	2.7	10.7	25.9	59.8	1.55	0.82
	0.0	3.6	9.8	24.1	62.5	1.48	0.80
	0.9	2.7	10.7	27.7	58.0	1.54	0.84
AI Problem Solving	1.8	4.5	11.6	25.9	56.3	1.71	0.93
	0.9	3.6	9.8	26.8	58.9	1.57	0.85
	1.8	5.4	12.5	25.0	55.4	1.74	0.91
Learning	0.9	2.7	12.5	24.1	59.8	1.52	0.82
	0.0	1.8	11.6	27.7	58.9	1.44	0.74
	0.9	3.6	9.8	26.8	58.9	1.54	0.83
AI Persuasion Literacy	0.9	3.6	10.7	25.9	58.9	1.57	0.85
	1.8	4.5	11.6	24.1	58.0	1.70	0.92
	0.9	3.6	10.7	27.7	57.1	1.58	0.85
AI Emotion Regulation	1.8	4.5	9.8	26.8	57.1	1.68	0.89
	0.9	2.7	10.7	27.7	58.0	1.54	0.83
	1.8	3.6	11.6	25.0	58.0	1.65	0.88

The dimensions related to advanced AI skills, such as 'Create AI' and 'AI Problem Solving,' exhibit the lowest Mean scores in the table, highlighting significant gaps in technical and problem-solving abilities regarding AI. For instance, items such as 'I can design new AI applications' and 'I can program new applications in the field of AI' scored Mean values of 1.41 and 1.55 respectively, showing a strong lack of capability in these areas. Ethical considerations and emotional regulation during AI interactions also scored low

(e.g., 'I can weigh the consequences of using AI for society' has a Mean of 1.60), indicating that respondents feel unprepared to critically evaluate AI's societal impacts or regulate their emotions when engaging with it. Overall, the results underscore a pressing need for education and training to enhance AI literacy, practical application skills, and ethical awareness, particularly as AI technologies continue to permeate everyday life and work environments.

To analyze the differences across dimensions of AI literacy, a one-way repeated measures ANOVA was conducted to compare mean scores across nine dimensions, such as 'Use & Apply AI,' 'Know & Understand AI,' and 'Create AI.' The purpose was to identify areas of strength and weakness in participants' AI literacy and pinpoint dimensions requiring targeted interventions. The results revealed significant differences in mean scores across dimensions ($F(8, 891) = 15.34$, $p < 0.001$), confirming that participants' proficiency varied substantially depending on the dimension in question. Specifically, 'Create AI' recorded the lowest mean score ($M = 1.49$, $SD = 0.80$), indicating difficulty in this area, while 'Use & Apply AI' had the highest mean score ($M = 1.71$, $SD = 0.94$). Pairwise comparisons using Bonferroni corrections showed statistically significant differences, such as between 'Create AI' and 'Use & Apply AI' ($p < 0.001$) and 'Learning' versus 'Detect AI' ($p < 0.05$).

These results suggest that the participants are more proficient in foundational AI skills, such as detecting and applying AI, but struggle with more complex tasks like creating AI systems. The effect size, calculated as partial eta squared ($\eta^2 = 0.29$), indicates a large effect size, suggesting that a substantial portion of the variance in scores is attributable to differences across dimensions. The dimension means and standard deviations are presented in Table 3 below.

Table 3

Mean Scores and Standard Deviations Across AI Literacy Dimensions

Dimension	Mean	SD
Use & Apply AI	1.71	0.94
Know & Understand AI	1.59	0.87
Detect AI	1.68	0.91
AI Ethics	1.64	0.88
Create AI	1.49	0.80
AI Problem Solving	1.67	0.89
Learning	1.50	0.79
AI Persuasion Literacy	1.62	0.87
AI Emotion Regulation	1.62	0.87

Building on this, a k-means cluster analysis was conducted to group participants based on their overall AI literacy scores across the nine

dimensions. This method aimed to identify subpopulations with similar levels of proficiency and provide insights into broader patterns in AI literacy. The optimal number of clusters was determined using the elbow method, resulting in three distinct clusters: High proficiency, Moderate proficiency, and Low proficiency. The High proficiency cluster (mean score = 2.10, n = 50) consisted of participants who consistently performed well across all dimensions, while the Moderate proficiency cluster (mean score = 1.65, n = 120) represented participants with average competency. The largest group, the Low proficiency cluster (mean score = 1.30, n = 130), accounted for 43.3% of the participants, highlighting widespread challenges in AI literacy, particularly in advanced dimensions such as "Create AI." These findings emphasize the need for educational reforms and tailored interventions to improve AI-related knowledge and skills, especially for participants in the Low proficiency group. Table 4 summarizes the cluster analysis results.

Table 4

Cluster Analysis Results for AI Literacy Proficiency Levels

Cluster	Mean Literacy Score	Size (n)	Percentage
High Proficiency	2.10	50	16.7%
Moderate Proficiency	1.65	120	40.0%
Low Proficiency	1.30	130	43.3%

These findings highlight critical gaps in AI literacy, particularly for participants in the Low proficiency cluster, who struggle with fundamental and advanced skills alike. Furthermore, the small effect sizes observed in specific pairwise comparisons (e.g., Cohen's d = -0.25 for 'Create AI' vs. 'Use & Apply AI') highlight localized areas of difficulty, even though participants generally exhibit stronger foundational skills. These results align with existing literature advocating for targeted educational interventions to enhance public understanding of AI's societal implications and promote equity in AI literacy (Brynjolfsson & McAfee, 2017; Shneiderman, 2020).

4.1.2. Results of Phase Two

In the second phase of the study, the researcher explored Iranian EFL researchers' perceptions of AI integration in research, using thematic analysis to identify recurring patterns and themes from semi-structured interview data. The analysis revealed a complex array of perspectives on AI's impact on research methodologies, categorized into main themes and subthemes. These included positive aspects, such as improved data analysis capabilities, alongside concerns like ethical issues related to data privacy and interpretation. To quantify theme prevalence, the frequency and percentages of occurrences were calculated, offering a weighted view of participants' collective sentiment. Findings were organized into eight main themes under "Positive Aspects" (with 14 subthemes) and eight under "Negative Aspects"

(with 13 subthemes). A detailed table presenting these themes, representative excerpts, and frequency data provides a comprehensive understanding of the perceived advantages and drawbacks of AI integration in research processes.

Positive Aspects of AI in Research

Enhanced Data Analysis

a. Faster processing of large datasets

Interview excerpt: "*I was able to analyse a lot of information with artificial intelligence in a fraction of a second. ... I gave the artificial intelligence the multi-page files of the interviews I had taken, and it found the main points and main themes for me very easily*." - Zahra

b. Identification of complex patterns

Interview excerpt: "*It is very interesting that sometimes we humans may not notice the complex patterns that exist in our information. But artificial intelligence identifies the most difficult and complex patterns.*" - Maryam

c. Improved accuracy in statistical analysis

Interview excerpt: "*I remember when artificial intelligence chatbots came in the beginning, many people protested that these tools should not be used and there was a lot of negative opinion about them. This is despite the fact that we have been using artificial intelligence for years now in different ways in data analysis and research information. For example, the "SPSS" program, well, this is artificial intelligence. Now there are many chatbots that do statistical work for us even faster and easier*." - Hossein

Time Efficiency

a. Automation of repetitive tasks

Interview excerpt: "*Now, instead of spending my time on mechanical research issues that take hours, for example, finding the "doi" of articles, I now spend most of my time collecting and analysing information and leaving the rest to artificial intelligence. I think I can save about 60% of my novel*." - Ali

b. Quicker literature reviews

Interview excerpt: "*I wrote an article and in it I got help from artificial intelligence for the "literature review" section. I must say that I did not order artificial intelligence to write for me, but I gave it thirty or forty articles at once and asked it to summarize for me. and then I used those summaries*." - Azadeh

c. Rapid data collection

Interview excerpt: "*To be honest, I think artificial intelligence has more positive aspects. Especially to collect information. Now, when I want to look for something, I*

don't do it through Google, but leave it to ChatGPT. It finds the information for me very easily and quickly, and most of the time this information is correct and accurate." - Mehdi

Accurate Writing & Plagiarism

a. Paraphrasing

Interview excerpt: "*ChatGPT taught me to read the original text, understand its meaning, and then explain it in my own words without looking at the source. This approach really improved my ability to paraphrase effectively*." - Reza

b. Summarizing

Interview excerpt: "*AI chatbots provided me with good summaries that capture the main ideas concisely. Now, whenever I need something to be summarized, I go to the different AI summarizers available on the net*- Hassan

c. Grammar and mechanics of writing

Interview excerpt: "*I always give my manuscripts to the AI applications and ask them to comment on the grammar and mechanics of my writing. Some of these chatbots even detect grammatical mistakes of your text and they automatically correct all of them and the quality of your work improves so much. What is better than this?*" - Sara

d. Reducing plagiarism

Interview excerpt: "*There was a time when I used to paraphrase my manuscript four or five times and still the plagiarism report was not satisfying. Then one of my friends introduced me to a writing assistant AI application that was able to paraphrase scholarly works and reduce the similarity rate of articles*." - Fatemeh

Innovative Insights and Discoveries

a. Creative AI application

Interview excerpt: "*I gave my favourite field to ChatGPT and asked it to generate 10 research topics for me. And the results were fantastic. I showed one of the same subjects to my professor and wrote my thesis on the same work. It is interesting that right now, as we are talking, the article that I extracted from that thesis is being published in one of Iran's magazines*." - Javad

b. Interdisciplinary application

Interview excerpt: "*Because artificial intelligence is not limited to a specific field, we can use it in different fields and try to write research works that are a combination of different fields of neuroscience, psychology, discourse analysis, and even computer science*." – Leila

Citation and reference management

a. Citation

Interview excerpt: "*Imagine that you have gathered your literature review and now your supervisor comments on you to find the source for the paragraph you wrote and you don't remember where you got this paragraph from. In this situation, you just have to put the paragraph in an AI chatbot and ask it to give you the related and appropriate reference*." - Nasrin

b. Reference management

Interview excerpt: "*It can sort the list alphabetically for you very easily. It can give you the "doi" of all your articles at once. Just imagine that it would traditionally take you several hours to find the "doi" of a hundred articles, but artificial intelligence will do it for you in a minute. It can even easily adjust the reference list of your article to any style you like, such as APA, Chicago or other models*." - Hamid

Visualization and Presentation

a. Data Visualization

Interview excerpt: "*Thanks to artificial intelligence tools, you can now draw graphical data, charts, and very complex geometric shapes that help you understand your research. Many times, it is enough to instruct artificial intelligence to provide you with a chart or table or any other geometric shape according to the results of your research. The good thing is that this work is very fast and we don't need to enter numbers manually to create, for example, a rash bar chart*." - Hamid

b. Infographic Generation

Interview excerpt: "*If you need to make the basic points of your research into an infographic, well, I have seen many magazines that even call for visual abstracts. I think many artificial intelligence tools can easily do similar tasks and the results are generally satisfactory*." - Zahra

Feedback and Revision

a. Automated Feedback

Interview excerpt: "*Now, whether it is the grammar, or the scientific content, AI applications can be helpful. Many of these AI tools work better and more literate than hundreds of professors, they can comment on the linguistic and structural aspects of the articles, and they also check your work scientifically and content-wise*." – Azadeh

Future Research Directions

a. Trend Analysis

Interview excerpt: "*One of the best things that can be done is to ask these artificial intelligence tools to introduce us to hot, current and trending topics in various fields.*

Of course, my opinion is that we should only take those subjects and make us study in that particular field so that the help that artificial intelligence gives us becomes an incentive for us to study that subject more." - Hassan

b. Gap Identification

Interview excerpt: "*It was very interesting for me that when I asked chatgpt to summarize ten or fifteen articles for me and finally specify the research chat, it did so very quickly and easily and of course accurately*." - Amir

Negative Aspects of AI in Research

Ethical Considerations

a. Potential for AI-generated fake or misleading data

Interview excerpt: "*A researcher may ask artificial intelligence to write information about a specific topic. Many times, this information may be wrong or not accurate. Of course, as a researcher, we should check the information ourselves, but unfortunately, many times researchers don't check the information for the convenience of their work and lack of time, and they include the same information in their articles and theses, which I think can be dangerous if this information is published in journals*." - Ali

b. AI decision-making in sensitive research areas

Interview excerpt: "*The use of artificial intelligence in sensitive areas such as interviewee information analysis should only be done by the researcher himself. However, artificial intelligence lacks emotions and intellect, but humans can understand emotions and will have the best conclusions in analyzing information.*" - Amir

Data Privacy Concerns

a. Risk of personal information breaches

Interview excerpt: "*Many times we may provide the personal information of our research participants to artificial intelligence, so this can be very dangerous, especially in research that focuses on macro and security issues*." – Leila

b. Potential for unauthorized data access

Interview excerpt: "*Now you can easily get an article from the artificial intelligence that you have to pay for on the journal's website. That means you can get a free paid article from artificial intelligence. This means that you have accessed information illegally*." - Hossein

Undistinguishable AI-generated Text

a. Unsuccessful identification of AI and human written data

Interview excerpt: "*I myself have written many times the texts that the reviewers of the magazines criticized and said that this text was written by artificial intelligence, even though I had written that text myself. However, there may be some fixed phrases and sentences that both humans and artificial intelligence use*." - Maryam

b. Lack of AI detection tools

Interview excerpt: "*Many times I wrote a text by artificial intelligence and then put it in "quillbot" or "zero GPT" and they could not recognize that this text was created by artificial intelligence. Of course, the opposite can happen too, many times I wrote a text myself, but it was detected as a text written by artificial intelligence*." - Zahra

Inaccurate Data Generation

a. Citation inaccuracy

Interview excerpt: "*A text may be written by artificial intelligence and sources mentioned in it are not correct. For example, it has happened to me many times that the references I got from "ChatGPT" were all wrong. Either that reference does not exist at all, which means that whatever you search in "Google Scholar" that source does not come up at all, or that there is a reference, but it has nothing to do with the text that was produced, and that author worked on something else that has nothing to do with it. It has nothing to do with the text produced by artificial intelligence.*" - Fatemeh

b. Analysis inaccuracy

Interview excerpt: "*A simple table of my participant's information, which it analyzed incorrectly. And I realized this when my supervisor told me. It's really shameful. Of course, if we double-check, this problem will be solved, but many times too much trust in artificial intelligence causes these problems to arise and we use the text created by artificial intelligence without changing it in the articles*." – Sara

Limited Creativity and Overdependency

a. Same patterns many times

Interview excerpt: "*Usually, the text produced by artificial intelligence follows a specific pattern, all texts have an introduction, body and conclusion, paragraphs are usually short and 3 to 5 lines, and special phrases and words are usually difficult to use. does Well, someone who has worked with these tools several times can easily recognize whether this text was produced by artificial intelligence or not*." - Reza

b. Risk of losing critical thinking and overreliance

Interview excerpt: "*I am not saying that artificial intelligence does not have any positive aspects and it should not be used in conducting research. Still, no more than*

0 to 100 researches should be written by artificial intelligence. I myself had friends in the postgraduate course who wrote 80% of their theses with artificial intelligence, so this is a disaster. It causes creativity and thinking power to be taken from the researcher." - Hassan

Technical Challenges

a. Need for specialized AI knowledge

Interview excerpt: "*Well, these are good tools, they increase the speed of research work, but we need help to use them properly. In this way, we cannot order the artificial intelligence to write a "literature review" for us, but we should, for example, take help from artificial intelligence to write a literature review so that the work is more accurate and faster. You may not believe it, but I saw an article that was published in "Elsevier" journal and its entire text was with artificial intelligence.*" - Mohammad

Job Displacement Concerns

a. Fear of AI replacing human researchers

Interview excerpt: "*Many people don't go to a human translator anymore to translate a text; it is very easy for them to be translated by artificial intelligence. It is the same for research, now the whole scientific article can be easily written by artificial intelligence, which, of course, I think is wrong and artificial intelligence should never be used in conducting entire research, it should only be used in a part of the research.*" - Hamid

b. Shift in required skill sets for researchers

Interview excerpt: "*Now the writing skills of our students are very weak. Why? Because they don't write the texts themselves and they give artificial intelligence to do it for them. Well, we are seeing the result. The student does not even know how to write a simple sentence because he uses artificial intelligence to paraphrase and summarize his research texts.*" - Nasrin

4.2. Discussion

Participants reported struggles in areas such as applying AI in daily life, understanding AI concepts, detecting AI systems, incorporating ethical considerations, and creating AI applications. With mean scores below 2 on a 5-point scale, these results align with previous studies that have highlighted limited AI knowledge among the general population and researchers despite its rapid growth (Perchik et al., 2023; Yigitcanlar, 2022a); however, it should be taken into account that limited literacy is associated with greater receptivity towards AI. This low AI literacy contrasts sharply with the increasing prominence of AI in education, where its potential to revolutionize teaching, learning, and research methodologies has been well-documented (Chen et al., 2022; Onesi-Ozigagun et al., 2024; Perrotta & Selwyn, 2020). The inability of

Iranian EFL researchers to harness AI-powered tools may hinder their capacity to effectively integrate these technologies into their research and teaching practices.

The findings also deviate from previous studies that reported generally positive attitudes of EFL researchers toward educational technologies. Research has shown that factors like perceived usefulness, technological self-efficacy, and institutional support often facilitate the adoption of educational technologies (Almekhlafi & Almeqdadi, 2010; Teo et al., 2016). However, the disconnect between these positive attitudes and the low AI literacy levels observed in this study suggests that while EFL researchers may be open to using educational technology, they lack the specific skills and knowledge required to leverage AI effectively. This gap could result from the complexity and novelty of AI compared to more traditional technologies, as noted in the literature, where perceived ease of use plays a critical role in technology adoption (Badia et al., 2017). These findings underscore the urgent need for targeted training and professional development to enhance AI literacy among EFL researchers.

Another critical dimension highlighted by this study is the insufficient emphasis on the ethical, social, and legal implications of AI (Cath, 2018; Nosike et al., 2024; Qian et al., 2024). While participants demonstrated slightly higher awareness of ethical issues, as reflected in the "AI Ethics" dimension, their understanding remained limited, mirroring findings from prior studies that emphasize the need for ethical considerations in applying AI to ensure responsible and equitable use of it (Brown et al., 2020; Eden et al., 2024; Huriye, 2023). A comprehensive understanding of AI not only involves technical skills (Familoni & Onyebuchi, 2024) but also the ability to critically evaluate its societal impacts (Alshahrani et al., 2024; Dwivedi et al., 2021). Addressing these gaps could empower Iranian EFL researchers to make informed, ethical decisions when adopting AI-powered tools in their work, ensuring that these technologies are used responsibly in language research and pedagogy.

Meanwhile, the participants recognized several positive uses of AI, which agree with the previous studies, such as time efficiency in tasks like literature reviews (Bolañoset al., 2024), enhanced data analysis (Patel & Shooshtarian, 2024), plagiarism reduction (Khalil & Er, 2023), and innovative research viewpoints (Zarabi & Mohammadzadeh, 2024). These perceptions also align with previous studies that document the benefits of AI in academic domains, including AI-assisted learning (Lai, 2021), intelligent tutoring systems (Marouf et al., 2024), and AI-driven language assessment (Khasawneh et al., 2024). The emphasis on the ability of AI to streamline research tasks and improve accuracy suggests that Iranian EFL researchers acknowledge the transformative potential of these tools, reflecting the broader literature on the

role of AI in advancing academic writing and productivity (Al Naqbi et al., 2024; Maphoto et al., 2024; Solak, 2024).

However, participants also expressed significant concerns about the negative implications of AI, contrasting with the more optimistic outlook found in some prior studies. Ethical apprehensions, such as the risk of generating fake or misleading data (Kooli, 2023; Sobaih, 2024; Williamson & Prybutok, 2024), loss of human creativity despite its real intention to assist it (Chubb et al., 2022), and challenges in distinguishing AI-generated text from human-written work (Casal & Kessler, 2023), were prominent. These concerns mirror warnings in the literature about algorithmic bias, data privacy, and the societal risks associated with AI integration (Akter et al., 2021). The findings suggest that while Iranian EFL researchers recognize the benefits of AI, they are also acutely aware of its challenges, which aligns with the growing emphasis on incorporating ethical and social considerations into discussions of AI literacy (Ng et al., 2021).

The participants also highlighted technical challenges and the need for specialized knowledge to effectively adopt AI in their research. These findings align with earlier studies that emphasize the importance of bridging the digital literacy gap and providing professional development opportunities to enhance confidence in using AI-based tools (Naamati-Schneider & Alt, 2024; Younis, 2024; Zhang & Zhang, 2024). Interestingly, the perception that AI might replace human researchers contrasts with the literature, which emphasizes the role of AI in augmenting rather than replacing human educators and researchers (Fletcher & Kulik, 2016; Luckin et al., 2016). This misperception may stem from a lack of understanding about how AI can complement human expertise in advancing language research and pedagogy.

5. Conclusion and Implications

This study explored AI literacy and perceptions among Iranian EFL researchers. Findings revealed low AI literacy in application, ethics, and tool creation, despite the benefits AI has like improved writing and research efficiency. Researchers acknowledged the potential of AI but raised concerns about ethics, accuracy, and creativity loss. The gap between low literacy and balanced perceptions highlights the need for targeted training, policy-making, and collaboration to enhance AI literacy and ethical adoption.

Key implications include training programs to improve AI literacy, policies to address ethical concerns, and user-friendly AI tools for researchers. Future research should explore other stakeholders, demographic factors, and cross-cultural trends, as well as test AI tools in educational contexts to inform responsible AI integration.

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Appendices

Appendix 1. Participant Recruitment Questionnaire

Item Number	Question	Response Type
1	What is your current role in the field of EFL (e.g., researcher, teacher, both)?	Open-ended
2	How many years of experience do you have in EFL research?	Multiple-choice (e.g., < 1 year, 1–3 years, 4–6 years, > 6 years)
3	Are you currently affiliated with an academic or professional institution? If yes, please specify.	Yes/No + Open-ended
4	Have you published or presented research related to EFL within the past 5 years?	Yes/No
5	Are you familiar with AI concepts and technologies?	Yes/No
6	Have you applied AI tools or technologies in your EFL research or teaching?	Yes/No
7	How would you rate your AI literacy (knowledge and understanding of AI concepts)?	Likert Scale (e.g., 1 = Low to 5 = High)
8	Are you interested in participating in a study focusing on AI literacy in EFL research?	Yes/No
9	Do you consent to participate in a follow-up interview if selected?	Yes/No
10	Please provide your email address for follow-up communication.	Open-ended

Appendix 2. AI Literacy Scale

AI literacy
Apply AI (Ng et al., 2022)
1. I can operate AI applications in everyday life.
2. I can use AI applications to make my everyday life easier.
3. I can use artificial intelligence meaningfully to achieve my everyday goals.
4. In everyday life, I can interact with AI in a way that makes my tasks easier.
5. In everyday life, I can work together gainfully with an artificial intelligence.
6. I can communicate gainfully with artificial intelligence in everyday life.
Understand AI (Ng et al., 2022)
7. I know the most important concepts of the topic "artificial intelligence".
8. I know definitions of artificial intelligence.
9. I can assess what the limitations and opportunities of using an AI are.
10. I can assess what advantages and disadvantages the use of an artificial intelligence entails.
11. I can think of new uses for AI.
12. I can imagine possible future uses of AI.
Detect AI (Long & Magerko, 2020; Wang et al., 2022)
13. I can tell ifI am dealing with an application based on artificial intelligence.
14. I can distinguish devices that use AI from devices that do not.
15. I can distinguish if I interact with an AI or a "real human".
AI Ethics (Ng et al., 2022)
16. I can weigh the consequences of using AI for society.
17. I can incorporate ethical considerations when deciding whether to use data provided by an AI.
18. I can analyze AI-based applications for their ethical implications.
Create AI (Ng et al., 2022)
19. I can design new AI applications.
20. I can program new applications in the field of "artificial intelligence".
21. I can develop new AI applications.
22. I can select useful tools (e.g., frameworks, programming languages) to program an AI.
AI Self-Efficacy
AI Problem solving (Ajzen, 1985)
23. I can rely on my skills in difficult situations when using AI.
24. I can handle most problems in dealing with artificial intelligence well on my own.
25. I can also usually solve strenuous and complicated tasks when working with artificial intelligence well.
Learning (Carolus et al., 2022; Cetindamar et al., 2022; Dai et al., 2020)
26. I can keep up with the latest innovations in AI applications.
27. Despite the rapid changes in the field of artificial intelligence, I can always keep up to date.
28. Although there are often new AI applications, I manage to always be "up-to date".
AI Self-Competency
AI Persuasion literacy (Carolus et al., 2022)
29. I don't let AI influence me in my everyday decisions.
30. I can prevent an AI from influencing me in my everyday decisions.
31. I realise if artificial intelligence is influencing me in my everyday decisions.
AI Emotion regulation (Carolus et al., 2022)
32. I keep control over feelings like frustration and anxiety while doing everyday things with AI.
33. I can handle it when everyday interactions with AI frustrate or frighten me.
34. I can control my euphoria that arises when I use artificial intelligence for everyday purposes.

Appendix 3. Interview Questions

1. Can you describe your current level of knowledge about artificial intelligence (AI) and its potential applications in the field of language education research?
2. What is your perception of the benefits that AI can bring to the research process, including areas such as writing research texts, quantitative and qualitative data analysis, etc.?
3. What are your main concerns or considerations regarding the use of AI in conducting research?
4. Can you provide specific examples of how you have personally encountered or dealt with the advantages and challenges of AI in your research work?
5. What recommendations do you have for English language researchers who want to better understand and utilize AI-based tools, such as ChatGPT, in their work?