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A cross-disciplinary probe into the status of AI literacy among Persian and Iraqi TEFL and non-TEFL students

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Abstract

The outgrowth of artificial intelligence (AI) tools in recent years has led researchers in different disciplines to explore more deeply how AI has transformed our personal, social, and academic lives. The need for conducting such studies on AI is especially significant in less privileged contexts and in third-world and developing countries, such as Iran and Iraq. Inspired by the paucity of research on AI, particularly the lack of cross-disciplinary investigations, the researchers in the current study aimed to determine the level of AI literacy among Iranian and Iraqi TEFL and non-TEFL university students. To conduct the study, an adapted version of an AI scale was distributed among 160 university students from both contexts. In the qualitative phase, one-fifth of the participants (32 students) agreed to participate in semi-structured interviews. The interview consisted of three questions addressing the purposes, needs, and challenges related to AI use. Data analysis revealed that Iraqi students, on average, perceived themselves as having a higher degree of AI literacy than their Iranian counterparts, with this difference being more prominent among TEFL students. Additionally, qualitative findings indicated that students viewed AI tools as primarily useful for providing appropriate feedback, facilitating personalized, self-regulated learning, and assisting with research-related issues. The perceived AI needs from students' perspectives included easy and equitable access to AI tools and proper training on their technical use. Challenges identified by participants included unethical use of AI tools, difficulty accessing AI, and culturally insensitive applications of AI devices. The findings offer valuable implications for both TEFL and non-TEFL students and instructors in Iranian and Iraqi academic contexts regarding the effective use of AI technology.

Keywords: AI literacy, Cross-disciplinary research, Perceptions, Persian and Iraqi students.

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1. Introduction

One of the most outstanding contributions of AI tools to our daily lives, in general, and educational/academic lives, in particular, has been the elevated speed with which information can be retrieved, complex tasks can be performed, and projects can be accomplished (e.g., [1]). The heightened ubiquity and accessibility of AI assistants like ChatGPT, which employ the generative pre-trained transformer (GPT) language model, as well as other AI tools, have become an integral part of our everyday lives, helping us feel much more at ease than before.

However, it must be noted that, like all other technological breakthroughs, AI also brings with it a host of challenges and concerns that must be dealt with in a responsible and accountable manner (e.g., [2-5]). Thus, apart from the demand for augmenting individuals' knowledge and capability of using AI tools in an adept way [6, 7], attempts must be made to create (critical) literacy of AI assistant tools and the way they are expected to be employed in a cogent manner (e.g., [5, 8]).

Characterized as one of the seminal research strands in recent years, AI literacy has been given an increasingly greater amount of attention. Attempts have been made to gauge, evaluate, or augment the degree of AI literacy in individuals in various educational/academic contexts. To create more AI-literate communities, training sessions have become an integral part of pre-service and in-service programs for teachers and even students in different countries (e.g., [8-14]). Furthermore, a number of studies have been conducted to measure the degree of academic literacy possessed by students and instructors in diverse educational settings [9, 13, 15-20].

In spite of the ever-increasing body of research on myriad facets of AI familiarity, use, opportunities, and challenges, it seems that scant heed, if any, has been given to comparative and cross-disciplinary research addressing AI literacy. Thus, informed by this lacuna in research on AI, the current researchers sought to probe AI literacy in the Iranian and Iraqi academic contexts. To this end, the university students' AI literacy was measured to attain a more lucid conceptualization of their perceived AI knowledge, skills, needs, opportunities, and challenges. The main novelty of the study is hence attributable to its focus on two distinct, yet comparable, academic arenas, i.e., Iranian and Iraqi academia. Moreover, the study is thought to be significant on account of the fact that it features as a comparative, cross-disciplinary probe, delving into the status of AI literacy within TEFL and non-TEFL communities.

2. Literature Review

Along with the burgeoning movement of AI development in recent years, researchers have become more focused on the importance of creating proper AI literacy among different educational stakeholders, including students, teachers, and educational administrators in diverse teaching and learning contexts. It must be noted that the concept of literacy, once encompassing merely the ability to read and write, has undergone significant reappraisal and modification. For instance, the term 'digital literacy,' which entails a range of literacy types, including media and information literacy, has become more widespread in the current decade (e.g., [19]). AI literacy as an offspring of digital literacy, was characterized by Long and Magerko [8] as the abilities and competencies that are ascribed to the proper use of AI tools, as well as the critical awareness and evaluation of AI systems. Though a great many conceptualizations and delineations for AI literacy have been provided by different researchers, all of them unanimously focus on cogent knowledge, use, and evaluation of AI technologies as the three principal components of AI literacy.

Though studies on AI are miscellaneous and have tried to address the issues and concerns surrounding this field from manifold perspectives, in what follows an account is provided regarding the studies that have focused on both positive aspects of AI, like the efficacy of AI tools and the need for AI literacy, as well as the negative facets, including social injustice and academic/research dishonesty. The researchers in this section commence the review of previous works by evaluating the efficacy of AI in learning contexts based on the research findings. A study by Özdere [21] investigated the practicality of AI-generated feedback on students' writing enhancement. Following a mixed-methods research paradigm, he selected a sample of 16 university students from Turkey. The students were majoring in the fields of TEFL and English Language and Literature (ELL) and were at intermediate and upper-intermediate levels of proficiency, specifically at the B1-B2 level based on the Common European Framework of Reference (CEFR). The AI tools utilized in the study were ChatGPT and You.com. At the culmination of the research, a significant amount of improvement was observed in the students' writing performance. The qualitative data gathered via focus group interviews also revealed the participants' positive attitudes towards the efficacy of AI-based feedback.

In a similar vein, Fan et al. [22] explored the efficacy of generative artificial intelligence (GAI) for students' motivation, self-regulated learning, and writing performance. In their study, which was also carried out in the university context, 117 students were exposed to ChatGPT feedback and support, along with human-generated feedback. Hence, hybrid feedback (support from both AI and human sources) was also tested in their research. The findings indicated that while differences in the degree of intrinsic motivation were not observed among the groups, the students in the ChatGPT group performed better than the other groups in terms of writing performance, which resulted from improved self-regulated learning practices.

Also, regarding the perceptions of different educational stakeholders of the efficacy of AI tools, several studies have been conducted, two of which are reported in the following section. One of the studies related to AI perceptions is the probe conducted by Otermans et al. [23] in which they were interested in seeing the effects of students' attitudes toward AI on their AI usage and awareness. The participants of their research were 176 university students studying in England. The students' perceptions were gathered via administering a set of Likert-type AI questionnaires adopted from different sources. The findings were indicative of the predictive role of positive AI attitudes in determining different facets of students' AI awareness and usage.

In the second investigation which was focused on AI perceptions, Torun and Sanal [24] probed the attitudes of 36 university students concerning the efficacy and utilization of AI technology, in general, and generative AI, in particular. To collect the data, they made use of semi-structured interviews. Based on the findings, it was indicated that academics are in dire need of upgrading GAIs, especially when it comes to providing sufficient support for the teaching and learning process, and ensuring easy and equitable access to the needed information. The findings also highlighted the compelling need for informative training sessions and workshops addressing GAI.

Another prominent AI research strand in recent years has been concerned with the concepts of social injustice and academic dishonest. In this line, Pourbahram and Sadeghi [25] embarked on analyzing the papers issued on the concept of social injustice. The papers they reviewed had been published over a period of eight years. The results of their meta-analytic scrutiny demonstrated an outstanding transformation concerning the amount of attention given to the notion of social justice in the pre- and post-pandemic eras. To put it more clearly, post-pandemic researchers were found to be more cognizant of the concept and were consequently characterized by reflecting a lower level of social injustice. In accordance with the findings, the indisputable role of training for promoting the researchers' knowledge concerning such critical issues as social injustice and inequity was also confirmed.

Moreover, in another scrutiny, Zhao et al. [26] probed the concept of academic dishonesty by reviewing the available literature on peer cheating and its ramifications. Thus, in a meta-analytic study, they strove to investigate cheating behavior in learners in relation to their perspectives regarding their peers' acts of cheating. Conducting the review and analysis of 38 studies conducted over eight decades of research on the issue, they concluded that although perceived peer cheating had an intermediate effect size, it served as a prominent factor in students' propensity to cheat in academic contexts.

Finally, browsing the literature on the issue, part of which was presented in this section, depicted that despite the researchers' interest in probing different perspectives of AI efficacy and use, the concept of AI literacy still remains an under researched domain. This dearth of research becomes more tangible when we venture into the less explored instructional contexts like the EFL conditions in Iran and Iraq. The study gains further significance if we consider the paucity of investigations in the academic context, particularly those with a cross-disciplinary focus. Thus, in an attempt to bridge these observed gaps, the researchers in the current study tried to pinpoint the extent of AI literacy among Iranian and Iraqi TEFL and non-TEFL students. More specifically, the study sought to find cogent answers to the following research questions:

RQ1: What is the degree of AI literacy among Iranian and Iraqi TEFL university students?

RQ2: What is the degree of AI literacy among Iranian and Iraqi non-TEFL university students?

RQ3: Are there any differences between Iranian and Iraqi TEFL students' AI-assistance literacy?

RQ4: Are there any differences between Iranian and Iraqi non-TEFL students' AI-assistance literacy?

RQ5: What are the perceptions of Iranian and Iraqi TEFL and non-TEFL students regarding AI-related purposes, needs and challenges?

3. Method

3.1. Design of the Study

Due to its focus and scope, the current study opted for the use of questionnaires and interviews for data collection. Accordingly, the research at hand qualifies as a survey-type scrutiny, in which two distinct, yet intertwined phases of quantitative and qualitative analysis were carried out. To put it more clearly, in the first phase, Iranian and Iraqi EFL and non-EFL students' AI assistance literacy was gauged through employing an adapted version of the AI literacy scale (a 5-point Likert-type measure). In the second phase, however, a semi-structured interview was utilized, which was intended to triangulate the data collection and add to the accuracy and reliability of the conclusions reached based on the gathered data. The main variables of interest in the current study were the students' fields of study (TEFL vs. non-TEFL), and their nationality (Iranian vs. Iraqi), on the one hand, and the degree of AI literacy, on the other.

3.2. Participants

A total of 160 university students from both Iranian and Iraqi contexts were selected for the current research. The participants represented both genders, and in terms of age range and educational background, the sample was quite diverse. It should also be noted that one-fifth of the participants (32 students) volunteered to participate in the interview phase. The

primary sampling method used was convenience sampling; thus, participants were recruited based on availability and the researchers' convenience. However, as previously mentioned, the sampling procedure for the interview phase was voluntary. Regarding language background, Iranian participants were native speakers of Persian, Kurdish, or Turkish, while Iraqi participants spoke Arabic or Kurdish as their mother tongues.

3.3. Instruments

The data were collected via questionnaire and interview in the current study. Also, in an attempt to move in line with the ethical considerations, prior to data collection, the researchers briefed the participants on the study objectives and assured them of anonymity and confidentiality conditions. In so doing, the researchers told them that the gathered data are going to be utilized simply for research purposes. In addition, informed consent was obtained from all the participants prior to questionnaire and interview administration. For the ease of data collection and due to the difficulty of reaching all the participants in person, the questionnaire was prepared in Google Forms, and then its link was shared with the participants in social media channels, particularly in Telegram and WhatsApp.

The scale used in the study was an adapted version of AI literacy questionnaire used in the previous investigations, mainly those of Tamori et al. [27] and Yurt and Kasarci [28]. The questionnaire employed a 5-point Likert scale ranging from 1 (Strongly disagree) to 5 (Strongly agree). It must also be noted that, since the current research is part of a large-scale study, the data used here are based on a subset of the administered questionnaire, which contained 10 questions on the degree of AI literacy. To measure the reliability of the questionnaire, Cronbach's Alpha was calculated for the scale, resulting in a satisfactory coefficient of $r = .81$.

Finally, in an attempt to come up with more reliable generalizations about the findings, a semi-structured interview was conducted. The interview questions were developed following the lead of the previous researchers working in this domain, mainly the ones mentioned in the previous paragraph. To substantiate the validity of the interview questions, expert views were consulted, based on which some revisions and modifications were applied. In this vein, the researchers tried to merge the overlapping questions and eradicate the redundant ones. Thus, the final number of questions was reduced to only three items.

3.4. Procedure

As stated previously, to address ethical issues, the researchers initially provided sufficient information to the participants concerning the study objectives. Moreover, the participants were reassured regarding anonymity and confidentiality considerations and informed that they had the right to withdraw from the research at any time during the procedure. Informed consent was also obtained from them in accordance with research ethics. Following these preliminary measures, the researchers administered the AI literacy scale to all the participants. In doing so, the study questionnaire was prepared in Google Forms, and its link was sent to the participants. It is also worth noting that the administered questionnaire included a demographic section that gathered information about the participants' gender, age, and academic/educational background. As mentioned in the foregoing section, the AI literacy scale used in the current study was adapted from the questionnaires utilized in Tamori et al. [27] and Yurt and Kasarci [28] investigations. Being a 5-point Likert-type measure, the administered AI literacy questionnaire comprised 10 items inquiring about the participants' perceptions. The questionnaire data were then analyzed to specify the frequencies and percentages of responses for each item and to measure their self-perceived AI literacy level. Next, the semi-structured interview was conducted with those participants who volunteered for this phase of data collection. The interview protocol encompassed three questions that delved into the participants' perspectives on AI-focused purposes, needs, and challenges. After gathering the interview data, the current researchers transcribed the responses, following which the overarching themes were extracted.

3.5. Data Analysis

Data analysis for research questions one to four was conducted by calculating the frequencies and percentages of the agreement expressed by participants in their responses to various questionnaire items. In other words, the analysis of research questions one to four depended on the questionnaire data. However, regarding research questions three and four, comparisons were made among participants based on nationality and fields of study. Furthermore, to analyze the fifth research question, data collected during the qualitative (interview) phase were examined. The participants' interview responses were carefully transcribed, and emerging themes were identified. It should be noted that the interview analysis employed an inductive, bottom-up coding procedure (e.g., [29]). To safeguard the reliability of the coding procedure, two coders were involved, thereby ensuring inter-coder reliability.

4. Results

In what follows, the obtained findings are first presented for the quantitative phase (research questions one to four), and then the qualitative findings are reported. The findings for the first four questions rely on the self-reported questionnaire responses, for which the frequencies and percentages of the participants' agreement with the statements are presented. Also, as regards the qualitative findings for research question five, the themes extracted from the participants' interview responses are highlighted.

4.1. Findings Obtained for the First Research Question

The first research question of the study analyzed Iranian and Iraqi TEFL university students' AI literacy. In what follows, initially, the responses given by Iranian TEFL students are expounded. Table 1 depicts Iranian TEFL students' AI literacy profile.

Table 1.
Iranian TEFL Students' AI Literacy Profile.

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1. I can learn the skills that enable the effective use of artificial intelligence applications.	15%	42.5%	20%	12.5%	10%
2. My general knowledge about different AI tools is more than sufficient compared to many.	40%	20%	25%	10%	5%
3. I am better than most of my peers in effectively using artificial intelligence applications.	37.5%	27.5%	7.5%	15%	12.5%
4. My potential to effectively use artificial intelligence applications surpasses many people in my surroundings.	22.5%	35%	27.5%	10%	5%
5. Following developments in artificial intelligence is an interesting activity for me.	17.5%	45%	25%	7.5%	5%
6. Developing my skills in using artificial intelligence is a delightful learning process for me.	15%	45%	27.5%	7.5%	5%
7. Investing time and effort to learn artificial intelligence applications is worthwhile for me.	12.5%	52.5%	17.5%	7.5%	10%
8. Learning artificial intelligence applications is an easy task for me.	25%	30%	17.5%	10%	17.5%
9. I am inclined to sacrifice time from other activities to learn artificial intelligence applications.	22.5%	35%	12.5%	20%	10%
10. I am not hesitant to invest a considerable amount of time and effort to enhance my skills related to artificial intelligence.	42.5%	25%	7.5%	15%	10%

The first item on the questionnaire concerned gaining skills that enable the effective use of artificial intelligence applications. As seen in Table 1, out of the total 40 TEFL students at the academic context, 6 members (15%) strongly agreed, 17 (42.5%) agreed, 8 (20%) were undecided, 5 (12.5%) disagreed, and 4 (10%) strongly disagreed. The combined percentage of strongly agree and agree responses was 57.5%, indicating a majority of students acknowledged the importance of AI literacy. The second item explored participants' familiarity with different AI tools. In response, 16 participants (40%) strongly agreed, 8 (20%) agreed, 10 (25%) were undecided, 4 (10%) disagreed, and 2 (5%) strongly disagreed. Consequently, 24 participants (60%) held a positive view regarding this aspect. The third item assessed self-perceived familiarity with and use of AI-assistance tools. Results showed 15 respondents (37.5%) strongly agreed, 11 (27.5%) agreed, 3 (7.5%) were undecided, 6 (15%) disagreed, and 5 (12.5%) strongly disagreed. The total responses in favor amounted to 26 (65.0%), reflecting a generally positive attitude. The fourth item examined the potential for effectively using AI applications. Here, 9 students (22.5%) strongly agreed, 14 (35%) agreed, 11 (27.5%) were undecided, 4 (10%) disagreed, and 2 (5%) strongly disagreed. The majority, 23 participants (57.5%), expressed a positive outlook. The fifth item addressed interest in following developments in AI. In this case, 7 participants (17.5%) strongly agreed, 18 (45%) agreed, 10 (25%) were undecided, 3 (7.5%) disagreed, and 2 (5%) strongly disagreed. Overall, 25 participants (62.5%) voiced positive attitudes. The sixth statement investigated whether developing skills in AI was perceived as a delightful learning process. Results indicated 6 participants (15%) strongly agreed, 18 (45%) agreed, 11 (27.5%) were undecided, 3 (7.5%) disagreed, and 2 (5%) strongly disagreed. Most participants (24, 60%) opted for strongly agree and agree. The seventh item gauged whether investing time and effort in learning AI was considered worthwhile. In response, 5 participants (12.5%) strongly agreed, 21 (52.5%) agreed, 7 (17.5%) were undecided, 3 (7.5%) disagreed, and 4 (10%) strongly disagreed. A total of 26 participants (65%) chose strongly agree and agree, indicating a high level of self-perceived AI literacy. The eighth item assessed the perceived ease of learning about AI applications. In total, 10 (25%) strongly agreed, 12 (30%) agreed, 7 (17.5%) were undecided, 4 (10%) disagreed, and 7 (17.5%) strongly disagreed, with 22 participants (55%) expressing agreement. The ninth item examined willingness to sacrifice time from other activities to learn about AI. Results showed 9 students (22.5%) strongly agreed, 14 (35%) agreed, 5 (12.5%) were undecided, 8 (20%) disagreed, and 4 (10%) strongly disagreed. Overall, 23 participants (57.5%) agreed by choosing either strongly agree or agree. Finally, the tenth item examined the extent to which the participants were willing to invest a considerable amount of time and effort to enhance their AI-related skills. Based on the findings, 17 respondents (42.5%) strongly agreed, 10 (25%) agreed, 3 (7.5%) were undecided, 6 (15%) disagreed, and only 4 (10%) strongly disagreed. This indicates that the majority of participants (27 out of 40, totaling 67.5 percent) expressed agreement or strong agreement regarding this aspect of AI literacy. The analysis of results, in line with the findings obtained for the ten questionnaire items measuring the degree of

AI literacy among Iranian TEFL university students, points toward a relatively high level of AI literacy among the respondents. Table 2 displays Iraqi TEFL students' AI literacy profile.

Table 2.
Iraqi TEFL Students' AI Literacy Profile.

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Item 1	32.5%	37.5%	10%	7.5%	12.5%
Item 2	35%	32.5%	12.5%	15%	5%
Item 3	30%	32.5%	15%	10%	12.5%
Item 4	32.5%	27.5%	10%	12.5%	17.5%
Item 5	20%	37.5%	25%	12.5%	5%
Item 6	17.5%	37.5%	30%	5%	10%
Item 7	32.5%	35%	17.5%	7.5%	7.5%
Item 8	32.5%	32.5%	12.5%	7.5%	15%
Item 9	27.5%	40%	10%	17.5%	5%
Item 10	35%	37.5%	5%	15%	7.5%

A quick glance at the data reported in Table 4 reveals that regarding Iraqi TEFL university students' AI literacy, in response to the first item, out of a total of 40 students, 13 participants (32.5%) strongly agreed, 15 (37.5%) agreed, 4 (10%) were undecided, 3 (7.5%) disagreed, and 5 (12.5%) strongly disagreed. The combined percentage of strongly agree and agree responses is 70%, indicating a majority of students' positive attitude toward this aspect of AI literacy. For the second item, 14 participants (35%) strongly agreed, 13 (32.5%) agreed, 5 (12.5%) were undecided, 6 (15%) disagreed, and 2 (5%) strongly disagreed. Consequently, 67.5% of participants held a positive view. Regarding item 3, 12 respondents (30%) strongly agreed, 13 (32.5%) agreed, 6 (15%) were undecided, 4 (10%) disagreed, and 5 (12.5%) strongly disagreed, totaling 62.5% in favor. For item 4, 13 students (32.5%) strongly agreed, 11 (27.5%) agreed, 4 (10%) were undecided, 5 (12.5%) disagreed, and 7 (17.5%) strongly disagreed, with 60% expressing a positive attitude. In response to item 5, 8 participants (20%) strongly agreed, 15 (37.5%) agreed, 10 (25%) were undecided, 5 (12.5%) disagreed, and 2 (5%) strongly disagreed, with 57.5% showing positive attitudes. For item 6, 7 participants (17.5%) strongly agreed, 15 (37.5%) agreed, 12 (30%) were undecided, 2 (5%) disagreed, and 4 (10%) strongly disagreed, resulting in 55% favoring strongly agree and agree. Regarding item 7, 13 participants (32.5%) strongly agreed, 14 (35%) agreed, 7 (17.5%) were undecided, 3 (7.5%) disagreed, and 3 (7.5%) strongly disagreed, with 67.5% in agreement. For item 8, 13 participants (32.5%) strongly agreed, 13 (32.5%) agreed, 5 (12.5%) were undecided, 3 (7.5%) disagreed, and 6 (15%) strongly disagreed, with 65% favoring agreement. In response to item 9, 11 students (27.5%) strongly agreed, 16 (40%) agreed, 4 (10%) were undecided, 7 (17.5%) disagreed, and 2 (5%) strongly disagreed, totaling 67.5% in agreement. Finally, for the last item, 14 respondents (35%) strongly agreed, 15 (37.5%) agreed, 2 (5%) were undecided, 6 (15%) disagreed, and 3 (7.5%) strongly disagreed, with 72.5% expressing agreement or strong agreement. The analysis indicates a high degree of AI literacy among Iraqi TEFL university students based on responses to these ten questionnaire items.

4.2. Findings Obtained for the Second Research Question

The second research question inquired about the extent of AI literacy among Iranian and Iraqi non-TEFL students. In addressing this research question, the responses provided by Iranian students are analyzed (see Table 3).

Table 3.
Iranian Non-TEFL Students' AI Literacy Profile.

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Item 1	17.5%	47.5%	20%	7.5%	7.5%
Item 2	20%	25%	32.5%	12.5%	10%
Item 3	15%	30%	35%	7.5%	12.5%
Item 4	15%	32.5%	30%	15%	7.5%
Item 5	17.5%	42.5%	22.5%	12.5%	5%
Item 6	15%	45%	25%	10%	5%
Item 7	12.5%	47.5%	22.5%	5%	12.5%
Item 8	20%	25%	27.5%	12.5%	15%
Item 9	22.5%	20%	37.5%	10%	10%
Item 10	15%	30%	25%	22.5%	7.5%

In accordance with the results portrayed in Table 3, in response to the first questionnaire item, out of the total 40 respondents (non-TEFL students at the academic context), 7 members (17.5%) strongly agreed, 19 (47.5%) agreed, 8 (20%) were undecided, 3 (7.5%) disagreed, and 3 (7.5%) strongly disagreed. The combined percentage of strongly agree and agree responses is 65%, indicating that a majority of students expressed positive attitudes toward this aspect of AI literacy. For the second item, 8 participants (20%) strongly agreed, 10 (25%) agreed, 13 (32.5%) were undecided, 5 (12.5%) disagreed, and 4 (10%) strongly disagreed. Consequently, 18 participants (45%) held a positive view. Regarding

the third item, 6 respondents (15%) strongly agreed, 12 (30%) agreed, 14 (35%) were undecided, 3 (7.5%) disagreed, and 5 (12.5%) strongly disagreed, totaling 18 (45%) responses in favor. For the fourth item, 6 students (15%) strongly agreed, 13 (32.5%) agreed, 12 (30%) were undecided, 6 (15%) disagreed, and 3 (7.5%) strongly disagreed, with 19 (47.5%) expressing positive attitudes. In the fifth item, 7 participants (17.5%) strongly agreed, 17 (42.5%) agreed, 9 (22.5%) were undecided, 5 (12.5%) disagreed, and 2 (5%) strongly disagreed, resulting in 24 (60%) responses indicating positive attitudes. For item 6, 6 participants (15%) strongly agreed, 18 (45%) agreed, 10 (25%) were undecided, 4 (10%) disagreed, and 2 (5%) strongly disagreed, with 24 (60%) responses in favor. The seventh item saw 5 participants (12.5%) strongly agree, 19 (47.5%) agree, 9 (22.5%) undecided, 2 (5%) disagree, and 5 (12.5%) strongly disagree, with 24 (60%) responses indicating high self-perceived AI literacy. On item 8, 8 (20%) strongly agreed, 10 (25%) agreed, 11 (27.5%) were undecided, 5 (12.5%) disagreed, and 6 (15%) strongly disagreed, totaling 18 (45%) agreement. For the ninth item, 9 students (22.5%) strongly agreed, 8 (20%) agreed, 15 (37.5%) were undecided, 4 (10%) disagreed, and 4 (10%) strongly disagreed, with 17 (42.5%) responses in agreement. Finally, for item 10, 6 respondents (15%) strongly agreed, 12 (30%) agreed, 10 (25%) were undecided, 9 (22.5%) disagreed, and 3 (7.5%) strongly disagreed, with 18 (45.5%) responses indicating agreement or strong agreement. The analysis of the results across the ten questionnaire items suggests a satisfactory, though not high, level of AI literacy among Iranian non-TEFL university students. Table 4 reports Iraqi non-TEFL students' AI literacy profile.

Table 4.
Iraqi Non-TEFL Students' AI Literacy Profile.

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Item 1	22.5%	22.5%	20%	17.5%	17.5%
Item 2	32.5%	35%	12.5%	12.5%	7.5%
Item 3	30%	32.5%	15%	5%	17.5%
Item 4	27.5%	30%	12.5%	20%	10%
Item 5	25%	32.5%	15%	7.5%	20%
Item 6	17.5%	37.5%	25%	5%	15%
Item 7	15%	35%	25%	12.5%	12.5%
Item 8	22.5%	30%	15%	10%	22.5%
Item 9	30%	27.5%	17.5%	22.5%	2.5%
Item 10	27.5%	27.5%	20%	17.5%	7.5%

Based on the data listed in Table 4, regarding Iraqi non-TEFL university students' AI literacy, the analysis of responses to the questionnaire items reveals a generally positive attitude towards AI literacy. For the first item, 9 participants (22.5%) strongly agreed, 9 (22.5%) agreed, 8 (20%) were undecided, 7 (17.5%) disagreed, and 7 (17.5%) strongly disagreed. The combined percentage of strongly agree and agree responses was 45%, indicating that nearly half of the respondents expressed a positive view on this aspect of AI literacy. In the second item, 13 participants (32.5%) strongly agreed, 14 (35%) agreed, 5 (12.5%) were undecided, 5 (12.5%) disagreed, and 3 (7.5%) strongly disagreed, with 67.5% showing a positive attitude. The third item saw 12 respondents (30%) strongly agree, 13 (32.5%) agree, 6 (15%) undecided, 2 (5%) disagree, and 7 (17.5%) strongly disagree, totaling 62.5% in favor. For the fourth item, 11 students (27.5%) strongly agreed, 12 (30%) agreed, 5 (12.5%) were undecided, 8 (20%) disagreed, and 4 (10%) strongly disagreed, with 57.5% expressing positive attitudes. The fifth item had 10 participants (25%) who strongly agree, 13 (32.5%) agree, 6 (15%) undecided, 3 (7.5%) disagreed, and 8 (20%) who strongly disagreed, resulting in 57.5% positive responses. Regarding the sixth item, 7 participants (17.5%) strongly agreed, 15 (37.5%) agreed, 10 (25%) undecided, 2 (5%) disagreed, and 6 (15%) strongly disagreed, with 55% favoring strongly agree and agree. The seventh item showed 6 participants (15%) strongly agreed, 14 (35%) agreed, 10 (25%) undecided, 5 (12.5%) disagreed, and 5 (12.5%) strongly disagreed, with 50% in agreement. For the eighth item, 9 participants (22.5%) strongly agreed, 12 (30%) agreed, 6 (15%) undecided, 4 (10%) disagreed, and 9 (22.5%) strongly disagreed, with 52.5% expressing positive attitudes. The ninth item responses included 12 students (30%) strongly agreeing, 11 (27.5%) agreeing, 7 (17.5%) undecided, 9 (22.5%) disagreed, and 1 (2.5%) strongly disagreed, totaling 57.5% in agreement. Finally, the tenth item showed 11 respondents (27.5%) strongly agreed, 11 (27.5%) agreed, 8 (20%) undecided, 7 (17.5%) disagreed, and 3 (7.5%) strongly disagreed, with 55% indicating positive attitudes. Overall, the analysis suggests a relatively high level of AI literacy among Iraqi non-TEFL university students based on the responses to these ten questionnaire items.

4.3. Findings Obtained for the Third Research Question

The third research question in the study explored the possible differences between Iranian and Iraqi non-TEFL students' AI-assistance literacy. Figure 1 shows the percentages obtained for Iranian and Iraqi students as regards the degree of AI literacy from different perspectives.

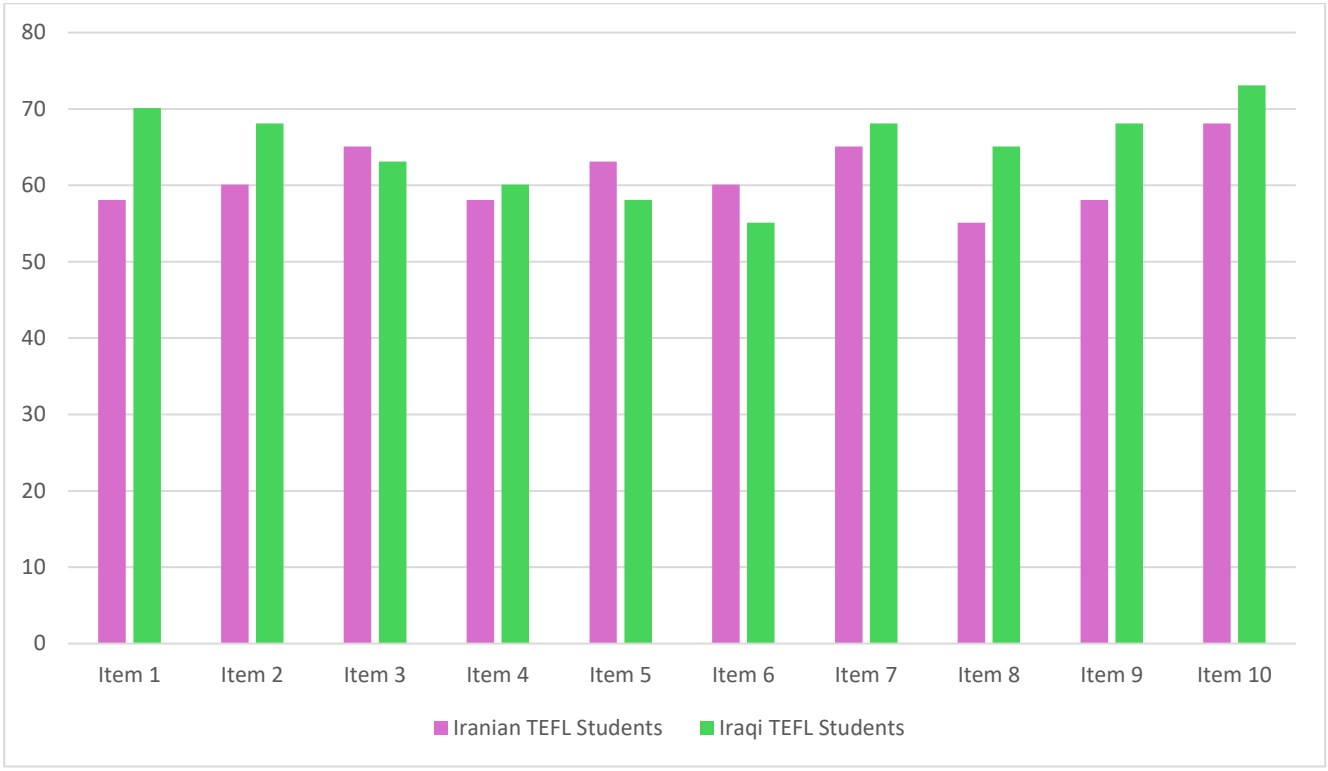

Figure 1.
Iranian and Iraqi TEFL Students' AI Literacy Profile.

According to Figure 1, regarding the first item on the questionnaire, Iraqi TEFL students (70%) are characterized by a higher degree of adroitness than their Iranian counterparts (57.5%) for the effective use of artificial intelligence applications. Additionally, in regard to the second item on the questionnaire, Iraqi TEFL students are again found to surpass their Iranian counterparts, as 67.5 percent of Iraqi students perceive their knowledge of AI tools to be at a high level, whereas 60 percent of Iranian students have disclosed their agreement with this aspect of AI literacy. Nevertheless, the condition is reversed for the third statement on the questionnaire, based on which more Iranian students (65%) compared to their Iraqi counterparts (62.5%) have judged their familiarity with the use of AI applications to be much better than their colleagues. However, in response to item 4 on the questionnaire, more Iraqi TEFL students (60%) than Iranians (57.5%) have rated their potential for effective use of AI applications as better than others. Next, regarding the degree of interest in pursuing advancements in AI technology (item 5), Iranian students hold the upper hand with 62.5 percent of them agreeing with the statement compared to Iraqi respondents, whose percentage amounts to 57.5. The higher percentage of Iranian students (60%) as opposed to Iraqi participants (55%) is also observable concerning the sixth item, which indicates a higher predisposition on the part of Iranian students to upgrade their AI implementation skills. Nonetheless, regarding the amount of value given to expanding the knowledge of AI applications (item 7), Iraqi students revealed a slightly higher degree of agreement (67.5%) vis-à-vis the Iranian respondents (65%). As to the next item on the AI literacy questionnaire, which inquires about the ease of learning about AI applications, Iraqi students have overrated their capability in this regard, with 65 percent of agreement, while Iranian respondents have a comparatively lower position (55%). The comparison of results for item 9 also depicts that Iraqi TEFL students have voiced a greater proclivity (67.5%) than Iranian participants (57.5%) for devoting their time to learning about AI applications. Finally, it is again Iraqi students (72.5%) who have outperformed their Iranian counterparts (67.5%) concerning their readiness for investing in AI skill enhancement. Though the results of the comparison between Iranian and Iraqi TEFL students indicate that Iraqi participants revealed a higher degree of self-perceived AI literacy, it can be contended that Iranian participants have been more cautious and, hence, more realistic in appraising their AI literacy level.

4.4. Findings Obtained for the Fourth Research Question

The fourth research question explored the possible differences between Iranian and Iraqi non-TEFL students' AI-assistance literacy. Figure 2 shows the percentages obtained for Iranian and Iraqi students as regards the degree of AI literacy from different perspectives.

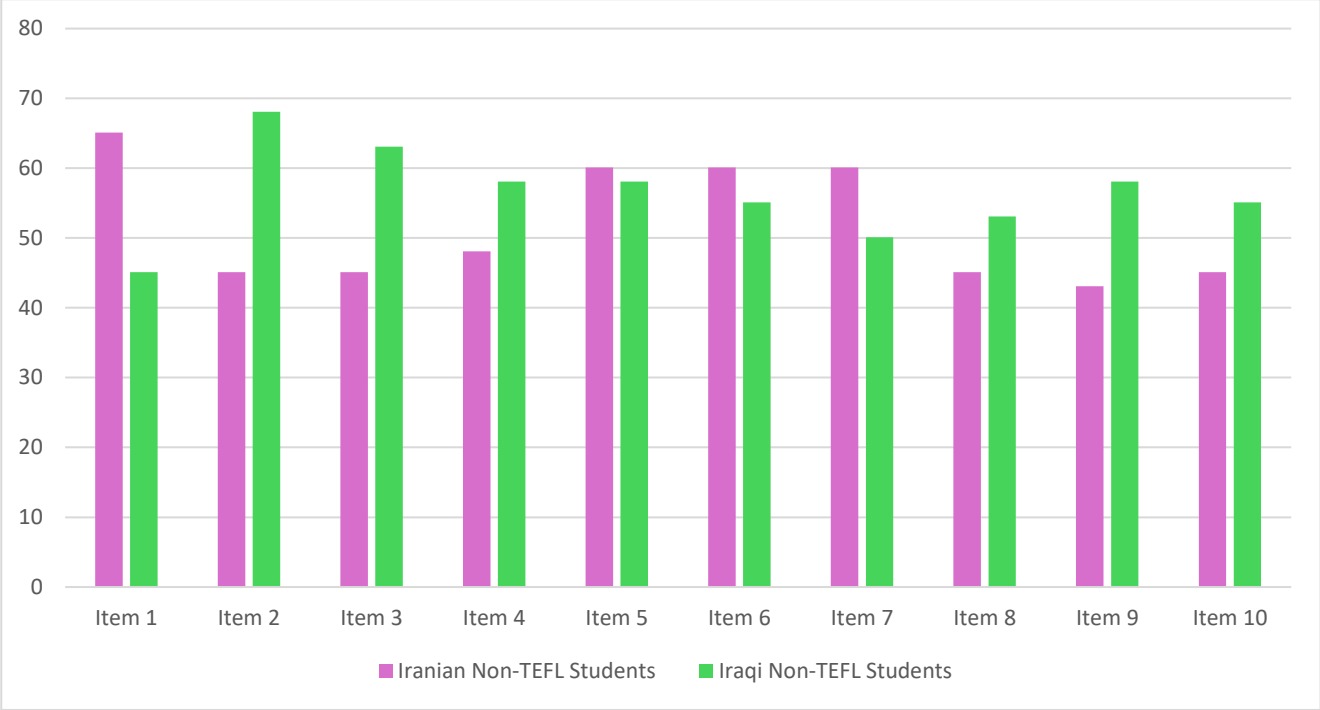

Figure 2.
Iranian and Iraqi Non-TEFL Students' AI Literacy Profile.

Based on Figure 2, regarding the first item on the questionnaire, Iranian non-TEFL students (65%) are characterized by a higher degree of ability than their Iranian counterparts (50%) for the effective use of artificial intelligence applications. However, in regard to the second item on the questionnaire, Iraqi non-TEFL students are found to surpass their Iranian counterparts as 67.5 percent of Iraqi students have perceived their knowledge of AI tools to be at a high level, whereas 45 percent of Iranian students have disclosed their agreement with this aspect of AI literacy. The same holds true for the third statement on the questionnaire, based on which more Iraqi students (62.5%) compared to their Iranian counterparts (45%) have judged their familiarity with the use of AI applications much better than their peers. In like manner, in response to item 4 on the questionnaire, more Iraqi non-TEFL students (57.5%) than Iranians (47.5%) have rated their potential for effective use of AI applications to be better than the others. Nevertheless, as regards the degree of interest in pursuing advancements in AI technology (item 5), Iranian students hold the upper hand, with 60 percent of them agreeing with the statement compared to Iraqi respondents, whose percentage amounts to 57.5. The higher percentage of Iranian students (60%) as opposed to Iraqi participants (55%) is also observable concerning the sixth item, which indicates the higher predisposition on the part of Iranian students to upgrade their AI implementation skills. Moreover, as it comes to the amount of value given to expanding the knowledge of AI applications (item 7), once more, Iranian students have revealed a slightly higher degree of agreement (60%) vis-à-vis the Iranian respondents (50%). However, as to the next item on AI literacy questionnaire, which inquires the ease of learning about AI applications, Iraqi students have reported their capability in this regard with 52.5 percent of agreement, while Iranian respondents have a comparatively lower position in this regard (45%). The comparison of results for item 9 also depicts that Iraqi TEFL students have voiced a greater proclivity (57.5%) than Iranian participants (42.5%) for devoting their time to learning about AI applications. Finally, it is again Iraqi students (55%) who have outperformed their Iranian counterparts (45%) concerning their readiness for investing on AI skill enhancement. It must be again noted that despite the higher status of Iraqi students on most components of AI literacy scale, it can't be definitely concluded that Iraqi students are at an advantageous position in this regard, since Iraqi participants may have simply overjudged their AI literacy to present a more positive picture of themselves, and for that matter, the Iranian participants are thought to have submitted a more realistic picture of themselves in appraising their AI literacy.

4.5. Findings Obtained for the Fifth Research Question

The semi-structured interview protocol implemented in the current study relied on three questions. The first question aimed to determine the purposes for which Iranian and Iraqi TEFL and non-TEFL students used AI assistance tools. In response to this interview question, the participants pointed to various uses of AI tools, including the provision of proper feedback, personalized, self-regulated learning, and assistance with research-related issues and academic requirements. Regarding the efficacy of AI-generated feedback, for instance, one of the respondents (a non-TEFL Iranian student) stated:

Extract 1.

AI tools like ChatGPT can help me identify my problems and mistakes. In other words, they provide me with appropriate feedback and assist me in achieving better performance.

Another student (a TEFL student from Iraq) believed that AI could provide him with useful feedback, particularly regarding grammar and writing:

Extract 2.
AI is an important source of feedback for me. It can specifically help me with my writing and grammar. When I use AI, I feel more confident in using English.

Also, regarding the contribution of AI tools to self-regulation and personalized learning, one of the Iranian interviewees (a non-TEFL student) expressed her view as follows:

Extract 3.
To me, AI can provide a suitable means of individual learning and self-study. With the help of AI tools, I am able to improve my vocabulary knowledge.

In this respect, another respondent (an Iraqi non-TEFL student) averred:

Extract 4.
AI can facilitate my language learning process by providing me with opportunities for independent learning. I think AI has mainly helped me with my oral proficiency.

Furthermore, regarding the efficacy of AI tools for research-related purposes, one of the interviewees (an Iranian TEFL student) stated:

Extract 5.
AI is like a savior for me when it comes to completing my term projects. It can help me, like an expert, to find the required information. I also use AI for finding good research topics.

An Iraqi TEFL student also voiced a similar attitude, holding that:

Extract 6.
The main use of AI for me is for research and term projects. As you know, it's hard to read and summarize so many articles, but ChatGPT can easily do it for me.

The second interview question queried the main AI-related needs and requirements in the eyes of the participating students. As most respondents reported, easy and unbiased access to AI tools and proper training with the technical uses of AI were among the most overarching needs of participants. Concerning the need for equitable access for everyone, one of the interviewees (an Iraqi TEFL student) declared:

Extract 7.
Universities must provide proper access to AI technology like ChatGPT for all students. Students must also be offered some instruction regarding the appropriate use of AI.

Moreover, regarding the need for AI-oriented instruction and training, another participant (an Iranian non-TEFL student) maintained:

Extract 8.
All students are not equally familiar with the applications of AI. Therefore, university instructors must hold sessions and meetings to increase students' familiarity with the academic uses of AI.

Another respondent (an Iranian TEFL student) put her perspective in the following manner:

Extract 9.
Easy access to and familiarity with AI tools relevant to language learning are highly important to me. Although I am partly familiar with some uses of AI, I still feel the need to learn more about AI and its academic services.

Finally, the third interview question sought to find the challenges and concerns felt by the students around the use of AI tools. Three main themes were extracted from the students' responses to this question, namely the unethical use of AI tools, difficulty in accessing AI tools, and culturally insensitive use of AI tools. Regarding the unethical use of AI, one of the respondents (an Iranian TEFL student) raised her concern in the following way:

Extract 10.
Students use AI tools in a deceitful manner for their term projects, and some professors do not take this seriously. I think rules should be developed for the ethical and responsible use of AI tools.

Also, regarding the difficulty of accessing AI, which was primarily mentioned by the Iranian students, one of the non-TEFL students stated:

Extract 11.

One of the major problems I face is the limited access to AI tools, particularly because of the filtering issues and issues related to internet speed.

Additionally, with respect to the culturally insensitive use of AI tools, one of the participants (an Iraqi non-TEFL student) voiced his preoccupation as follows:

Extract 12.

Since AI technology was first developed by Western culture, AI tools are sometimes inappropriate for non-native speakers of English. I think AI tools must be more sensitive to linguistic and cultural differences.

Altogether, based on the analysis of interview responses presented in this section, it can be concluded that while the students affirm the paramountcy of AI tools as a source of feedback and assistance with their tasks and assignments, they also raise some concerns regarding issues such as unethical implementation of AI tools, their unequal accessibility, and culturally insensitive use.

5. Discussion

The researchers in the current study aimed to identify the extent of AI literacy among Iranian and Iraqi TEFL and non-TEFL university students. The study also involved making comparisons across the two nationalities and disciplines. Additionally, in the qualitative phase, participants' perspectives regarding AI-related purposes, needs, and challenges were examined. Concerning the first and third research questions, the results revealed a relatively high level of AI literacy among both Iranian and Iraqi TEFL students, with Iraqi students slightly outperforming their Iranian counterparts in terms of self-perceived AI literacy. Specifically, Iraqi TEFL students rated themselves higher in their ability to learn about AI and their knowledge of AI (items 1 and 2). They also reported a higher degree of AI literacy than Iranian students in areas such as effective use of AI tools (item 4), perceived value of AI applications (item 7), ease of learning about AI (item 8), interest in dedicating time to AI learning (item 9), and readiness to invest in AI skill development (item 10). Overall, the comparison indicates that Iraqi TEFL students are in a more advantageous position regarding AI literacy. However, it appears that Iraqi students tend to present a more positive view of their AI status compared to Iranians, which may be rooted in cultural differences between the two nations.

Additionally, regarding the findings for the second and fourth research questions, which examined the level of AI literacy among Iranian and Iraqi non-TEFL students, while the self-assessed AI literacy of Iranian students sometimes fell below average for certain items, Iraqi students generally demonstrated a higher level of AI literacy across most questionnaire items. The superior status of Iraqi non-TEFL students compared to their Iranian counterparts was evident in item 2 (perceived AI knowledge), item 3 (degree of AI familiarity), item 4 (effective use of AI), item 8 (ease of learning about AI), item 9 (tendency to allocate time for AI learning), and item 10 (investing time in AI skills). However, as previously mentioned, the higher perceived AI literacy reported by Iraqi students does not necessarily indicate they are more AI-literate, as they might have overestimated their AI literacy level and aimed to present themselves more positively.

Altogether, the findings attained for research questions one to four have pointed to two principal issues, namely the positive perceptions of participants about their AI literacy and the potential cultural differences underlying self-perceived AI literacy. As regards the first aspect, the findings are comparable to the work of Torun and Sanal [24] who came up with academics' positive impressions regarding the efficacy and use of AI tools. This is also in keeping with what Otermans et al. [23] encountered. Akin to the present study, they found that positive AI perceptions predispose more efficient AI usage and awareness. It's also worth noting that, like the present probe, their study benefited from questionnaires for data collection, but they did not complement the results by employing interview analysis Agca and Korkmaz [30]. Unlike the present study, their research culminated in reporting negative perceptions of AI, which was claimed by the participants to be a source of augmenting anxiety and declining creativity levels. Next, concerning the culture-bound nature of AI, a claim made in the current study based on the obtained findings, the result is found to be consistent with the argument raised in Barnes et al. [31] paper. In accordance with the current findings, they also maintain that responses to AI are culture-sensitive. Despite the partial evidence found for this claim, however, establishing more robust support for such a contention requires more systematic scrutiny.

Moreover, in the second phase of the research, which was qualitative and interview-based, the researchers aimed to explore more deeply the participants' perspectives on AI use purposes, needs, and challenges. Based on the findings, one of the primary purposes mentioned by the participants was obtaining proper feedback. The effectiveness of AI as a feedback source is also supported by other researchers' findings. This finding, for instance, aligns with the one reported in Özdere [21] probe, which indicated the effectiveness of AI-based feedback for improving university students' writing skills. Consistent with the current findings, their study also pointed toward the positive attitudes of academics concerning the efficacious role of AI-generated feedback for writing improvement. The finding is also corroborated by the one obtained by Fan et al. [22]. Like the present study, they also claimed the practical role of AI-supported feedback for enhancing writing ability among university learners.

Additionally, in regard to the call for AI training and instruction, which was highlighted by the participants as one of the most overarching needs, evidence can be gathered from previous research (e.g., [9, 12-14, 24, 25, 30]) indicated. To put it more clearly, like the current study, their research underscored the key role of AI-directed training in assisting learners to feel more composed and less concerned about using AI tools. Similarly, in accordance with the current findings, Pourbahram and Sadeghi [25] concluded that AI training can play a fundamental role in boosting the learners' knowledge regarding the proper use of AI tools. The finding gains further support from the conclusion reached in Torun and Sanal [24] study, which underscored the vital contribution of AI training to better AI implementation.

In addition, with respect to challenges underlying AI use, the main themes referred to by the participants were unethical and irresponsible use of, inequitable access to, and culturally insensitive application of AI tools. Substantiation for this finding, as regards the unethical use of AI tools, can be obtained from other studies, including Vaezi et al. [32] and Zhao et al. [26]. Consistent with the current finding, Vaezi et al. [32] raised serious concerns about the unethical use of AI tools by the students, which, based on their contention, ensued from the prevalence of online exams. Likewise, the finding is corroborated by Zhao et al. [26], who warned against academically dishonest behavior on the part of students, which, based on their conclusion, emanated from inappropriate AI use. Furthermore, concerning the unjust distribution of AI facilities, the finding is in accordance with the one reported by Pourbahram and Sadeghi [25] that voiced serious concerns regarding the danger of social injustice surrounding AI use. Finally, the last issue highlighted by the participants is the culturally sensitive implementation of AI, which resonates with Barnes et al. [31] claim, holding that responses to AI are culture-driven. All in all, the current study reappraised a number of key issues surrounding AI, including AI literacy, the purposes of using AI, as well as AI-related requirements and challenges. Though the findings were considered in light of previous literature on the issue, further attempts to shed more light on the findings are required to come up with more conclusive claims about the concepts probed in the study.

6. Conclusion

The present investigation sought to probe the status of AI literacy among Iranian and Iraqi TEFL and non-TEFL university students. The findings disclosed notable differences between the Iranian and Iraqi academic communities in terms of different components of the AI literacy scale employed in the study. Though it was discussed that the observed differences could be attributed to cultural differences, more precise conclusions in this regard can be reached only through further research into the issue. The qualitative findings also demonstrated the participants' perceptions regarding the importance of AI as a source of feedback, a facilitator of self-regulated learning, as well as a resource for conducting research. The findings in the qualitative phase also depicted the perceived need for unbiased access to AI tools and proper AI training. Furthermore, unethical and irresponsible use of AI tools, inequitable access to them, and culturally insensitive application of AI tools were mentioned as the main challenges hindering the proper implementation of AI technology.

The findings thus obtained offer fruitful implications for university students as well as instructors in the contexts of Iran and Iraq and even beyond these studied milieus. Inspired by the findings, the students may decide to make further endeavors to upgrade their AI literacy. They might also be encouraged to be more realistic in judging their AI skills and attempting to ameliorate them. Moreover, drawing on the findings of the present research, the university students are likely to be sensitized to rethink the possible role of cultural differences in shaping AI literacy. University professors may also benefit from the findings by reflecting more on the concepts of AI literacy, cultural sensitivity, academic (dis)honesty, social (in)justice, and (in)equitable access, and try to make a more appropriate use of AI tools to reach the academic goals. They might also be persuaded to brush up on their AI knowledge and skills by attending AI training sessions and conveying their knowledge to their students in workshops and problem-solving sessions. At the macro level, higher education administrators and policymakers may be assisted in using the findings to create better conditions for university students to utilize AI technology in an equitable and responsible way. After all, the authorities and decision-makers in the academic context might be alerted to prepare the infrastructure in a better way for the more appropriate use of AI tools as a source of feedback for students and an assistant for fair and honest academic research.

Finally, it must be acknowledged that despite the attempts made by the current researchers to conduct the study in an accurate and consistent manner, the research at hand is not void of limitations. One of the primary limitations encountered was the difficulty in finding the required number of participants. Though the researchers could finally reach the desirable sample size, more participants could have been included if all the individuals to whom the questionnaires were sent had responded and revealed their willingness to participate in the study. Thus, future investigators are advised to opt for larger samples for their research. The second limitation of the present study was related to its focus on non-TEFL participants recruited solely from hard sciences due to their easier access. Therefore, further research might explore a broader community of non-TEFL students, including other academic disciplines.

Furthermore, though the current researchers tried to triangulate the data collection via utilizing a follow-up interview, further studies on the issue might benefit from other means of gathering data, such as observations, narratives, and journals. Finally, as the role of some other potential factors like individual differences and demographic features in determining the degree of AI literacy was not scrutinized in the current study, future researchers are recommended to delve more deeply into such facets by considering the possible effect of individual characteristics (e.g., motivation, learning styles, and cognitive styles), personality traits (e.g., extroversion/introversion and judging vs. perceiving tendencies), and demographic factors (e.g., gender, language background, and proficiency level) on the extent of individuals' AI literacy. Ultimately, though the current probe made an attempt to push the frontiers of research on AI a bit further, researching within the fledgling field of AI looks like sailing within uncharted waters, and much more scrutiny is required to shed light on different unknown facets of AI.

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