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Artificial Intelligence Literacy Levels of Turkish as a Foreign Language Learners

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Abstract

The aim of this study is to measure the artificial intelligence literacy levels of students who learn Turkish as a foreign language in Turkey and to determine whether various variables have an effect on artificial intelligence literacy levels. In the first place, it was seen that it was necessary to determine the artificial intelligence levels of students who learn Turkish as a foreign language. The study group consists of 113 international students studying at the TÖMER unit of a foundation university in Istanbul. In the study, the relational survey model, one of the general survey models from quantitative research methods, is used. In the study, "Artificial Intelligence Literacy Scale" developed by Çelebi, Yılmaz, Demir, and Karakuş (2023) was selected and applied as a data collection tool. The data obtained were analyzed using SPSS, and a general evaluation was made regarding the artificial intelligence literacy of students learning Turkish as a foreign language. For this purpose, independent samples t-test, one-way variance analysis, Post-Hoc Test were conducted. As a result of the research, it was determined that students' AI literacy levels did not differ statistically in the awareness, evaluation and ethical sub-dimensions according to gender, but they differed in the usage sub-dimension.

Keywords: Artificial intelligence, artificial intelligence literacy, teaching Turkish as a foreign language, international students.



Introduction

Today, a foreign language has become a necessity to communicate in a globalizing world, to understand different cultures and to contribute to international cooperation. In recent years, the interaction between people and societies has increased with technological developments. This situation reveals the need for foreign language learning. To establish effective communication and cooperation in different fields, it is necessary to learn not only the mother tongue but also international common languages (Barin, 2004; Crystal, 2003; Phillipson, 1992). This indicates that individuals need language skills other than their mother tongue. Foreign language education has evolved from teacher-centered approaches to student/learning-centered environments (Moeller & Catalano, 2015). The main purpose of learning a foreign language is to acquire the ability to communicate effectively in the target language, to understand the culture of the spoken community and to stimulate the individual's learning process (Sun, 2013).

Foreign language has an objective and social value (Nazarov, 2022). In addition to the objective and social value of foreign language, the need for a new method for foreign language learning has emerged with technological changes. With classical methods, it does not seem possible to learn a foreign language permanently and to speak it in that society. Foreign language teaching based only on books is ineffective for a society entering the age of artificial intelligence. This necessitates the integration of artificial intelligence into education and training. At this point, it is essential to answer the following question: "What is artificial intelligence?" Artificial intelligence is defined as an information technology that can perceive human cognition, reason, comprehend, make sense, generalize, infer, learn, and successfully perform multiple tasks at the same time (Gondal, 2018). The concept of artificial intelligence was first introduced by John McCarthy at the Dortmund conference (Arslan, 2020). McCarthy (2004) explained artificial intelligence as "the science and engineering of making human-like intelligent machines, especially intelligent computer programs", while Slage described the concept of artificial intelligence as "intuitive programming" (Nabiyev, 2012). Artificial intelligence refers to the use of reasoning and prediction power, which are the characteristics of human intelligence, by machines in solving complex problems and making decisions by considering changing conditions (Obschonka & Audretsch, 2020). Gordon (2011) describes artificial intelligence as an analytical life set that aims to imitate life. Nilsson (1990) argued that artificial intelligence is a theory that aims to imitate natural intelligence. According to Muggleton (2014), Alan Turing, who is considered one of the pioneers of the applicability of artificial intelligence to machines, not only laid the foundations of computer science, but also explored the philosophical aspects of artificial intelligence developments.

According to his work, artificial intelligence can provide support to school administration in areas such as curriculum planning, staffing programs, exam management, cybersecurity, facility management and security, and indirectly contributes to educational processes (Holmes et al., 2019). According to Presley, one of the first to use artificial intelligence in education, multiple-choice tests can be used both to measure students' achievement levels and to strengthen the teaching process. According to Sleeman and Brown (1982), from the 1980s to the 2000s, the applications of artificial intelligence in education were largely based on knowledge-based approaches. During this period, the research areas were generally grouped under the name of intelligent instructional systems and these systems focused on structures consisting of domain, student, and pedagogical modules (Woolf, 2009). The fact that artificial intelligence

allows students to receive education according to their learning pace is considered as one of the biggest advantages of these technologies. In addition, it can be stated that some artificial intelligence applications offer flexible working hours and provide the opportunity to teach when students feel motivated, thus maximizing the efficiency of teaching outputs (Popenici & Kerr, 2017).

It is noted that multimedia technologies integrated into educational processes improve the quality of foreign language teaching (Irkinovich, 2022). The use of e-mail in foreign language teaching brings together students and teachers from different cultures to create a virtual classroom environment (Fischer, 1988). Considering today's world and the competencies that students should acquire in the 21st century, the importance of artificial intelligence emerges. Among the first examples of the application of artificial intelligence in education is Sidney L. Pressey, who worked at Ohio University in 1920. In addition, artificial intelligence has also developed with machine learning since 1920 and its reflections in education have also expanded. One of the most important skills of today is artificial intelligence literacy.

In recent years, rapid developments in artificial intelligence technologies have led to significant changes in the field of education. One of these changes is the use of artificial intelligence in language teaching. Artificial intelligence is used to improve language skills, support language learning, and provide language learners with a more effective learning experience. Artificial intelligence provides great advantages to language learners with its potential to provide a personalized learning experience by further enriching the language learning process. One of these advantages is the ability to offer programs that are tailored to the individual learning needs of language learners. AI-assisted language teaching helps language learners improve their language skills by providing them with a more effective, personalized, and interactive learning experience. With the use of this technology, language teaching processes become more efficient and student-oriented, allowing individuals to improve their language skills faster and more effectively. Artificial intelligence is a rapidly evolving technology used in many sectors and has the potential to affect language learning processes. In this context, this study aims to evaluate the artificial intelligence literacy levels of Turkish as a foreign language learners. In this context, answers to the following questions were sought:

1. Do the artificial intelligence literacy levels of Turkish as a foreign language learners differ according to gender?
2. Do the artificial intelligence literacy levels of students who learn Turkish as a foreign language differ according to their age levels?
3. Do the artificial intelligence literacy levels of students who learn Turkish as a foreign language differ according to their nationalities?
4. Do the artificial intelligence literacy levels of students who learn Turkish as a foreign language differ according to their language levels?

Method

Research Model

In this study, the relational survey model, which is one of the general survey models among quantitative research methods, is used. The survey model is all the processes that describe a situation in the past or present as it exists and are applied for the realization of learning and the development of desired behaviours in individuals. In the general survey model, in a universe consisting of a large number of elements, a survey is conducted on the whole universe or a group of samples or samples to be taken from it in order to make a general judgment about the universe (Büyüköztürk et al., 2014; Can, 2014; Fraenkel, Wallen, & Hyun, 2012). In the relational survey model, it is

tried to determine whether the variables change together or not, and if there is a change, how it happens (Karasar, 2006).

Study Group

The study group consists of 113 international students studying at Istanbul Nişantaşı University Turkish Language Teaching Application and Research Center (TÖMER).

Gender of Language Users

113 students participated in the study. 47 of the students were male and 66 were female. The proportional equivalent of this was determined as 58.4% women and 41.6% men.

Table 1. Gender of Language Users

Gender	n
Female	66
Male	47

Age Range of Language Users

Of the 113 students who participated in the study, 66 were 17-25 years old, 35 were 26-35 years old and 6 were 35 years old and above. The proportional equivalent of this was 58.4% for the 17-25 age range, 31% for the 26-35 age range and 10.6% for the 35+ age range.

Table 2. Age Range of Language Users

Age Range	n
17-25	66
26-35	35
35+	12

Nationality of Language Users

Of the 113 students who participated in the study, 65 were Iranian, 8 were Russian, 12 were Kazakh, 4 were Egyptian, 4 were Palestinian, 3 were Syrian, 3 were Moroccan, 3 were Moroccan, 3 were Algerian, 2 were Libyan, 2 were Afghan, 2 were Tajik, 2 were Kyrgyz, 2 were Iraqi and 1 was Somali.

Table 3. Nationality of Language Users

Nationality	n
Iran	65
Russia	8
Palestine	4
Egypt	4
Kazakhstan	12
Syria	3
Morocco	3
Algeria	3
Libya	2
Afghanistan	2
Tajikistan	2
Kyrgyzstan	2
Iraq	2

Data Collection Tool

Within the scope of the study, a scale was used to determine the Artificial Intelligence literacy levels of students who learn Turkish as a foreign language. "Artificial Intelligence Literacy Scale" developed by Çelebi, Yılmaz, Demir and Karakuş (2023) was selected and applied as a scale. In the scale, 1=Strongly disagree, 2=Disagree, 3=Somewhat disagree, 4=Obstable, 5=Somewhat agree, 6=Agree, 7=Strongly agree. Cronbach's alpha reliability, composite reliability (CR), average variance extraction (AVE) and heterotrait-monotrait ratio (HTMT) were used to test the scale. The alpha coefficients of the scale ranged between 0.83-0.73. CR values ranged between 0.88-0.73. AVE values range between 0.48-0.55. HTMT values range between 0.30-0.78. All reliability coefficients indicate that the scale is reliable (Çelebi et al., 2023).

Data Analysis

The data collected with the scale in question were analyzed with SPSS and a general evaluation was made regarding the Artificial Intelligence literacy of Turkish as a foreign language learners. For this purpose, independent samples t test, one-way variance analysis and Post-Hoc Test were conducted. Independent samples t test was used to determine whether the mean values of two different groups are significantly different. This test plays an important role in comparing the AI literacy levels of student groups with different demographic characteristics.

One-way analysis of variance (ANOVA) was used to compare the mean values of more than one group and is an analysis that helps to determine whether there is a significant difference between groups. This analysis was used to understand the effects of various subgroups (e.g. age, education level or experience) on AI literacy. Post-Hoc tests were used to determine between which groups when a significant difference was found as a result of a one-way analysis of variance. These tests allowed the researchers to interpret their findings in more detail by revealing which groups showed the differences between certain groups.

Findings

Findings Related to the First Research Question

Table 4: Independent samples t test analysis of artificial intelligence literacy levels of international students studying in Turkey by gender

Variables	Gender	N	X	Ss	Sd	t	p
Awareness	Male	47	14,57	3.658	-1.234	-1.234	.220
	Female	66	15,42	3.574			
Usage	Male	47	13,85	4.620	-2.504	-2.504	.014
	Female	66	15,95	4.241			
Evaluation	Male	47	14,83	4.701	-1.490	-1.490	.139
	Female	66	16,09	4.234			
Ethics	Male	47	14,04	3.822	-1.269	-1.269	.207
	Female	66	14,98	3.936			
	Male	47	57,30	11.819	-2.288	-2.288	.024
	Female	66	62,45	11.800			

When Table 4 is examined, it is understood that the artificial intelligence literacy levels of international students studying in Turkey do not differ statistically in the sub-dimensions of awareness ($t=-1.234$, $p>0.05$), evaluation ($t=-1.490$, $p>0.05$) and ethics ($t=-1.269$, $p>0.05$), but they differ in the sub-dimension of use ($t=-2.504$, $p<0.05$). It is noteworthy that this significant difference in the use sub-dimension of the scale is in favor of women with an average score of $X= 15.95$. In addition, it is seen that the artificial intelligence literacy levels of international students differ statistically significantly according to the total score of the scale ($t=-2.288$, $p<0.05$). As in the usage sub-dimension, it is understood that the artificial intelligence literacy levels of international students are in favour of women with an average score of $x= 62.45$.

Findings Related to the Second Research Question

Table 5. One-way analysis of variance results of artificial intelligence literacy levels of international students studying in Turkey according to age level

Variables	Source	SS	Sd	MS	F	p	Diff
Awareness	Between groups	48,732	2	24,366	1.892	.156	No
	Within group	1416,702	110	12,879			
	Total	1465,434	112				
Usage	Between groups	184,781	2	92,391	4.868	.009*	1-2
	Within group	2087,502	110	18,977			
	Total	2272,283	112				
Evaluation	Between groups	83,702	2	41,851	2.149	.121	No
	Within group	2142,050	110	19,473			
	Total	2225,752	112				
Ethics	Between groups	33,474	2	16,737	1.103	.336	No
	Within group	1669,800	110	15,180			
	Total	1703,274	112				
General	Between groups	1134,721	2	567,361	4.141	.018*	1-2
	Within group	15071,438	110	137,013			
	Total	16206,159	112				

Note: SS = Sum of Squares, Sd = Standard Deviation, MS = Mean Square, F = F-statistic, Diff = Difference.

When Table 5 is examined, it is understood that the artificial intelligence literacy levels of international students studying in Turkey do not differ statistically in the sub-dimensions of awareness ($F(2, 110)$, 1.892, $p>0.05$), evaluation ($F(2, 110)$, 2.149, $p>0.05$), and ethics ($F(2, 110)$, 1.103, $p>0.05$), but in the sub-dimension of use ($F(2, 110)$, 4.141, $p<0.05$). According to the result of the Post-Hoc Test (TukeyHSD) analysis, which was conducted by taking into account that the variances were equal in order to understand this significant difference in the use sub-dimension of the scale, it was determined that the significant difference originated from the ages 17-25 and 26-25. It is seen that the total score of the scale of artificial intelligence literacy levels of international students statistically differed according to the age variable. According to the results of the Post-Hoc Test (TukeyHSD) analysis, it was understood that the age range of 17-25 and 26-35 was effective in this differentiation.

Findings Related to the Third Research Question

Table 6. One-way analysis of variance results of artificial intelligence literacy levels of international students studying in Turkey according to nationalities

<i>Variables</i>	<i>Source</i>	<i>SS</i>	<i>Sd</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Awareness	Between Groups	248,037	21	11.811	.883	.612
	Within Group	1217,396	91	13.378		
	Total	1465,434	112			
Usage	Between Groups	566,845	21	26.993	1.440	.121
	Within Group	1705,438	91	18.741		
	Total	2272,283	112			
Evaluation	Between Groups	555,706	21	26.462	1.442	.120
	Within Group	1670,046	91	18.352		
	Total	2225,752	112			
Ethics	Between Groups	272,878	21	12.994	.827	.681
	Within Group	1430,396	91	15.719		
	Total	1703,274	112			
General	Between Groups	3672,911	21	174.901	1.270	.217
	Within Group	12533,249	91	137.728		
	Total	16206,159	112			

When Table 6 is examined, it is seen that the artificial intelligence literacy levels of international students studying in Turkey are divided into awareness ($F(21, 91)$, .883, $p>0.05$), usage ($F(21, 91)$, 1.440, $p>0.05$), evaluation ($F(21, 91)$, 1.442, $p>0.05$) and ethics ($F(21, 91)$, .827, $p>0.05$) sub-dimensions and the overall scale ($F(21, 91)$, 1.270, $p>0.05$).

Findings Related to the Fourth Research Question

Table 7. One-way analysis of variance results of artificial intelligence literacy levels of international students studying in Turkey according to their language levels

<i>Variables</i>	<i>Source</i>	<i>SS</i>	<i>Sd</i>	<i>MS</i>	<i>F</i>	<i>p</i>	<i>Diff</i>
Awareness	Between Groups	223,322	2	111.661	9.889	.000*	1-3
	Within Group	1242,112	110	11.292			
	Total	1465,434	112				
Usage	Between Groups	21,104	2	10.552	.516	.599	No
	Within Group	2251,179	110	20.465			
	Total	2272,283	112				
Evaluation	Between Groups	266,246	2	133.123	7.473	.001*	1-3
	Within Group	1959,506	110	17.814			
	Total	2225,752	112				
Ethics	Between Groups	3,726	2	1.863	.121	.887	No
	Within Group	1699,549	110	15.450			
	Total	1703,274	112				
General	Between Groups	1144,631	2	572.316	4.180	.018*	1-3
	Within Group	15061,528	110	136.923			
	Total	16206,159	112				

When Table 7 is examined, it is seen that there is no significant difference in the use ($F_{2, 110}$, .516, $p > 0.05$) and ethics ($F_{2, 110}$, .121, $p > 0.05$) sub-dimensions of the artificial intelligence literacy levels of international students studying in Turkey according to their language levels. However, it is understood that there is a significant difference in the awareness ($F_{2, 110}$, 9.889, $p < 0.05$) and evaluation sub-dimensions ($F_{2, 110}$, 7.473, $p < 0.05$) and in general ($F_{2, 110}$, 4.180, $p < 0.05$). In order to understand this significant difference in the sub-dimensions and total scores of the language levels of the scale, Post-Hoc tests (TukeyHSD, LSD, Bonferroni) were examined considering that the variances were equal. According to the results of the Post-Hoc test (TukeyHSD, LSD, Bonferroni) analysis, it was understood that the significant difference in the sub-dimensions and the overall scale was due to the difference between B1 and C1 language levels.

Discussion and Conclusion

In this study, it was aimed to measure the AI literacy levels of international students learning Turkish in Turkey and to determine whether various variables have an effect on AI literacy levels. When the literature is reviewed, there are studies on the AI literacy levels of university students, but there is no study on the AI literacy levels of international students learning Turkish in Turkey. The reason for conducting the research on the axis of AI literacy is that in recent contemporary approaches, one of the 21st century competencies is seen as AI literacy. In particular, the launch of ChatGPT, developed by OpenAI under the leadership of technology leaders such as Elon Musk and Sam Altman, has significantly increased the popularity of artificial intelligence and made it an integral part of people's daily lives (Wiredu, 2023). AI's potential to simplify daily routines, solve complex problems and improve the quality of life without the need for much technical and theoretical knowledge has made it popular among large masses of users (Ng et al., 2021). However, in order to benefit from the advantages and avoid the disadvantages of AI applications, it is necessary to understand its concepts and working principles at a basic level (González-Calatayud et al., 2021; Verganti et al., 2020). At this point, the concept of artificial intelligence emerges.

Understanding the capabilities and limitations of artificial intelligence, its ethical dimensions, its possible effects on society and its basic concepts is called artificial intelligence literacy (Kong et al., 2023; Laupichler et al., 2022). In all areas from the health sector to education, a new era integrated with artificial intelligence has begun and methods and techniques have started to transform with it. At the same time, it is necessary to be a conscious AI reader in order to understand how many AI-supported products work and to learn their potential risks and benefits. In addition, AI literacy is also necessary to question the accuracy of AI-generated information. Indeed, AI literacy involves looking at basic AI concepts from a critical perspective, understanding the contexts of these concepts, comprehending their implications, and being able to do all these with confidence (Farrelly & Baker, 2023; Hornberger et al., 2023).

While artificial intelligence is expected to play an important role in individuals' daily decision-making processes and become widespread in wider areas, it is predicted that its misuse can have serious negative impacts on both individuals and society (Dwivedi et al., 2021). Therefore, individuals are expected to become AI literate to minimize these negative effects and to use AI more efficiently in their social and business lives. Recently, studies on artificial intelligence applications have increased rapidly in the field of education, as in many other fields (Popenici & Kerr, 2017; Taşçı & Çelebi, 2020). The rapid development of artificial intelligence applications by facilitating information communication has significantly increased the opportunities for students to access and use these technologies (Akgun & Greenhow, 2022; He et al., 2020; Panigrahi, 2020).

The results of the study reveal how the artificial intelligence literacy levels of international students studying in Turkey differ according to gender in various sub-dimensions. According to the findings, there is no significant gender-based difference in awareness, evaluation and ethics sub-dimensions. However, a statistically significant difference was observed in the use sub-dimension. This difference between averages was found to be in favor of women. It was concluded that the artificial intelligence literacy levels of international students differed statistically significantly by gender according to the scale total score.

It was determined that students' artificial intelligence literacy levels did not differ statistically in the awareness, evaluation and ethical sub-dimensions according to gender, but they differed in the use sub-dimension. While this result of the study related to the gender variable coincides with the result of a similar study conducted by Wang et al. (2023), it differs from Sanusi et al. (2022). It is understood that there is no statistical difference in the awareness, evaluation and ethical sub-dimensions according to age level, but there is a difference in the use sub-dimension. It is understood that literacy levels do not differ according to nationalities in terms of awareness, use, evaluation and ethics. It is seen that there is no significant difference in the use and ethics sub-dimensions according to language levels. However, it is understood that there is a significant difference in the awareness and evaluation sub-dimensions of the scale and in general. When the literature is examined, it is noteworthy that the number of studies on artificial intelligence literacy in English is high. The study results show that studies in the field of education include more studies compared to fields such as information and information processing, human resources and industrial relations (Çelebi, Demir, & Karakuş, 2023b). In a study conducted by Elçiçek (2024) on the artificial intelligence literacy of high school, associate degree and undergraduate students, it was found that the variable "educational status" did not cause a significant difference in the artificial intelligence literacy levels of the students and that their artificial intelligence literacy levels were low.

The results of this study revealed how the artificial intelligence (AI) literacy levels of international students learning Turkish in Turkey differ according to various variables such as gender, age, language level and nationality. According to the findings, the difference in terms of gender was found to be significant only in the usage dimension, and a difference was observed in favor of women. In other dimensions, no significant difference was found due to factors such as gender, age, nationality and language level. It was determined that the level of education did not have a significant effect on students' AI literacy levels. These findings show that students have a similar level of literacy in terms of their awareness, evaluation skills and ethical understanding of artificial intelligence (AI) technologies, while female students have a higher level of literacy in terms of usage. As a result, it can be said that artificial intelligence (AI) literacy has an important place in education and more training should be provided to students in this field.

Suggestions

- ✓ Considering that the awareness and evaluation sub-dimensions of artificial intelligence literacy do not differ according to gender and age, workshops and seminars can be organized to increase general awareness in these areas.
- ✓ Considering that AI literacy levels differ according to age groups, training contents can be customized according to the needs and interests of age groups. More innovative and interactive learning methods can be adopted for younger age groups.
- ✓ It is understood that especially students aged 26-35 should be supported more in the use of artificial intelligence. Special support

programs and educational materials can be developed for this group.

- ✓ According to the research findings, there is no significant difference between international students from different nationalities in their artificial intelligence literacy levels. This suggests that international students show a general success in adapting to artificial intelligence education. However, special programs and support services that take into account cultural and linguistic differences can be provided to further increase this adaptation.
- ✓ It was found that there were differences between B1 and C1 language levels in the awareness and evaluation sub-dimensions. This shows that customized educational materials and resources should be created according to language levels. Simpler and clearer materials can be provided for B1 level students, while more complex and advanced content can be provided for C1 level students.
- ✓ Additional support programs and trainings to improve language skills can be organized to increase AI literacy levels according to language levels.

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