International Journal of Education & Literacy Studies
ISSN: 2202-9478
www.ijels.aiac.org.au

Pre-Service Turkish Language Teachers' Anxiety and Attitudes Toward Artificial Intelligence

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ARTICLE INFO

Article history
Received: June 28, 2023
Accepted: September 01, 2023
Published: October 31, 2023
Volume: 11 Issue: 4

Conflicts of interest: None
Funding: None

ABSTRACT

The present study aims to determine the anxiety and attitudes of pre-service Turkish language teachers towards artificial intelligence and to examine the relationship between the two. The sample group of the study, which was based on a correlational survey design, consisted of 232 pre-service Turkish language teachers studying at 14 different universities in different provinces of Türkiye. The study data were collected using the 'Personal Information Form', the 'Artificial Intelligence Anxiety Scale' and the 'General Attitudes toward Artificial Intelligence Scale'. SPSS 23.0 package program was used for data analysis. Based on the findings, it was determined that the pre-service Turkish language teachers' positive and negative attitudes towards artificial intelligence were at moderate levels while their anxiety was below moderate levels in the learning dimension, but above moderate levels in the dimensions of job replacement, sociotechnical blindness and artificial intelligence configuration. The relationship between anxiety and attitudes towards artificial intelligence was found to be negatively significant. It was determined that the variables of gender and time spent on the internet did not make a significant difference on the pre-service teachers' anxiety and attitudes towards artificial intelligence. However, although there was no difference between the pre-service language teachers' attitudes towards artificial intelligence in terms of grade level, differences were observed in the job replacement and sociotechnical blindness dimensions of anxiety.

Key words: Artificial Intelligence, Artificial Intelligence Anxiety, Attitude Towards Artificial Intelligence, Pre-Service Turkish Language Teachers, Language Education.

INTRODUCTION

While the acceleration of technological developments significantly alters the functioning of societies, it also highlights modern technologies in education and increases the interest in Artificial Intelligence (AI) (Li & Wang, 2023). AI, which has started to be used in many fields ranging from preschool (Su & Yang, 2023; Yang, 2022) to higher education (McGrath et al., 2023; Popenici & Kerr, 2017), from mathematics (Hwang & Tu, 2021; Mohamed et al., 2022) to science (Darayseh, 2023), is also increasing its popularity in the field of language education (Liang et al., 2021). The skills of accurate self-expression in native and foreign languages (Fadel, 2008), which are emphasized within the scope of 21st century skills, reveal the importance of language education in today's world and lead to the widespread use of AI in this field. However, the increase and diversification of communication technologies (Zheng et al., 2016) and the vital importance of language and literacy skills necessitates language education to be supported by the latest technological developments. Nevertheless, when the literature is examined, it is known that studies investigating AI in language education are limited although there has been a worldwide increase in recent years and that these studies mainly focus on the use and application of AI tools (Ali, 2020; Chen et al., 2018; Chen et al., 2021; Huang et al., 2023; Liang et al., 2021).

AI offers great opportunities in language education such as acquiring and developing language and literacy skills and learning and teaching new languages (Akkaya & Çıvğın, 2021; Bozkurt et al., 2023; Huang et al., 2023). Teachers assume the most critical role in the effective implementation of these opportunities in schools. However, previous studies have revealed that, in general, a significant number of teachers do not have sufficient knowledge about AI and do not utilize it extensively in their lessons (Ahmad et al., 2021; Sanusi, 2021; Şanlı et al., 2023; Zawacki Richter et al., 2019). This suggests that teachers are not yet ready to use AI effectively in their classrooms. It is known that the reasons for teachers' lack of readiness include not only their lack of knowledge but also their beliefs, interests, trust, and concerns regarding technological developments (Ayanwale et al., 2022; Chai et al., 2020) and their consequent anxiety (Şanlı et al., 2023) and attitudes towards AI (Darayseh, 2023). This situation reveals the importance of faculties of education in increasing the readiness of teachers and pre-service teachers towards AI.

Published by Australian International Academic Centre PTY.LTD.

http://dx.doi.org/10.7575/aiac.ijels.v.11n.4p.43

When the literature was examined, it was determined that there were a limited number of studies on the pre-service teachers in the context of AI. A significant number of these studies have focused on AI applications for pre-service teachers (Ariawan et al., 2016; Bayram & Çelik, 2023; Kelleci & Aksoy, 2020; Tapan Broutin, 2023; Vlasova et al., 2019; Zhang et al., 2021) and the opinions of pre-service teachers about AI (Çam et al., 2021; Haseski, 2019). Although language education is emphasized in the 21st century, it has been determined that there are very few studies on pre-service Turkish language teachers who will teach Turkish as a native or foreign language (Arıcı & Karacı, 2013; Haseski, 2019). However, studies investigating the attitudes and anxieties of pre-service Turkish language teachers towards AI, which would affect both their professional motivation and classroom practices, were not found in the literature review conducted within the scope of the present study. However, in today's world where AI-supported language education is gaining increasing importance (Chen et al., 2022), the level of attitudes and anxieties of pre-service teachers who will work in this field in the future and the nature of the relationship between them is a significant question. In addition to all these, Zawacki Richter et al. (2019) systematically analyzed the publications on AI between 2007-2018 and found that Türkiye ranked 4th after the USA, China and Taiwan in terms of the number of publications. Despite this, it is noteworthy that the anxiety and attitudes of pre-service Turkish language teachers towards AI in terms of their readiness to become language teachers in Türkiye have not been examined.

Based on all these, the present study aims to determine the attitudes and anxieties of pre-service Turkish language teachers towards artificial intelligence (AI) and to determine the relationship between the two. This study is important in terms of determining the attitudes and anxieties of future Turkish language teachers towards AI, which has become indispensable in education and especially in the teaching of language skills and is predicted to become more prominent in the future (Liang et al., 2021), revealing the relationship between these two affective factors, and investigating these factors in the context of variables such as gender, grade level and time spent on the internet, contributing to fill the gap in the literature. It is thought that the findings of the study will provide an idea in evaluating the teaching competencies of pre-service Turkish language teachers towards AI and provide guidance for the trainings to be given to pre-service teachers in order to meet their future teaching needs. In this sense, the study may contribute to the revision and development of the content of the training programs for pre-service teachers, particularly the development of programs and course contents for the introduction and use of technologies such as AI. Additionally, it is thought that understanding the attitudes and anxiety of pre-service teachers towards AI can also raise awareness on what can be done to ensure their professional motivation during the education process.

Artificial Intelligence in Language Education

The importance of AI, whose usage area is expanding day by day, has increased tremendously, especially with the transition to remote education at all levels from preschool to university in most countries during the COVID-19 pandemic. The most frequently used applications of AI in education, which includes various technologies and acts as an umbrella concept, include intelligent teaching systems, adaptive learning systems and recommendation systems (Akdeniz & Özdinç, 2021). These and many similar AI applications offer many conveniences and opportunities to the field of education. Among these, the most important ones are: providing personalized learning for each student, providing enriched and inclusive learning and teaching materials in terms of gender, culture, different countries and languages, enabling strong collaboration among the stakeholders of the learning and teaching processes, enabling automatic and rapid evaluation of student assignments, providing quick and easy accessibility to rich learning environments (alternative means of access such as voice-over, subtitles, etc.) tailored for each student, saving time and labor, enabling rapid content creation with different materials on various subjects, having no space constraints, and improving language skills (Bozkurt et al., 2023; Bozkurt & Sharma, 2023; Coşkun & Gülleroğlu, 2021; Çetin & Aktaş, 2021; Lameras & Arnab, 2022; Owoc et al., 2021; Taşçı & Çelebi, 2020). However, in addition to these conveniences, there are also various difficulties such as inequality in access to technology, technology addiction, the questionable reliability of the information sources accessed, violation of confidentiality and ethics regarding students' data, standardization of students due to a lack of creativity and critical thinking, the difficulty of supervision, the possibility of making ground for various prejudices in students' decision-making processes and manipulating certain information, the directive nature of the system that has a deep knowledge of the student in situations such as making choices and decisions, preventing the socialization of students, which is one of the main purposes of education, and the replacement of teachers by humanoid robots and models (Bozkurt, 2023; Bozkurt et al., 2023; Bozkurt & Sharma, 2023; Lameras & Arnab, 2022; Owoc et al., 2021; Popenici & Kerr, 2017; Schiff, 2021). Despite these difficulties, the continuous development and improvement of the opportunities and conveniences offered by AI can be considered as a harbinger of great transformations in education in the near future.

It can be said that AI, which is widely used in the field of language education, will make significant progress in language teaching and learning thanks to the many opportunities mentioned above (Liang et al., 2021). The use of AI applications in literacy education can help students develop these skills. Today, in many studies conducted in the field of language teaching, it has already been determined that AI is "frequently used in writing, reading, vocabulary, grammar, speaking and listening activities, and widely applied to develop natural language processing, automatic speech recognition and learner profiling, automatic writing assessment, personalized learning and intelligent tutoring systems" (Huang et al., 2023, p. 112). Considering that technology brings motivation and efficiency to education (Temizyürek & Ünlü, 2015), it is thought that the use of applications blended with technology in language teaching will contribute even

more to the process. In most of the studies conducted today, it has been determined that AI applications contribute positively to the development of students' language and literacy skills (Ai, 2017; Broda & Frank, 2015; Divekar et al., 2022; Dizon, 2020; Nini & Kong, 2021; Rad et al., 2023; Utami et al., 2023). In their systematic literature review, Woo and Choi (20021 also found that artificial intelligence applications developed for four basic language skills, pronunciation, grammar and vocabulary had a positive impact on students' language skills. In Turkish language as a mother tongue education, there has been an increase in the use of artificial intelligence applications in the acquisition and development of language skills (Babayiğit, 2019). It makes important contributions to mother tongue teaching, especially in finding spelling and punctuation errors, grammar, writing assignments, reading activities, summarizing and accessing information, fluent reading, understanding speech presented with voice interaction and question-answer strings (Akkaya & Çıvğın, 2021). In addition to these, studies show that students have a positive attitude towards the use of artificial intelligence applications in foreign language teaching (Chen et al., 2023; Jeon, 2022). Similarly, it is known that students generally have positive attitudes towards the use of technology in mother tongue education (Yaşar Sağlık & Yıldız, 2021). All this makes it imperative for students and teachers to have knowledge of these applications (Woo & Choi, 2021).

These developments today make us wonder and worry about what awaits us in the near future in language learning and teaching. However, while all these developments are taking place in language education, the importance of teachers, one of the important components of the system, becomes more important. In this direction, the present study aims to focus on the attitudes and anxiety of pre-service Turkish language teachers, who will be the language teachers of the future, towards AI since it is decisive in the transfer of AI to educational environments and in their motivation towards the profession.

Artificial Intelligence Anxiety

One of the concepts that has come to the forefront with the widespread use of AI is AI anxiety. Johnson and Verdicchio (2017) define AI anxiety as the feelings of fear and uneasiness that occur in individuals towards out-of-control AI. Wang and Wang (2019, p. 621) define it as "a general, emotional response of anxiety or fear that prevents an individual from interacting with AI". It is stated that various concerns such as the fact that AI, which is considered as an existential risk (Yukdowsky, 2008), loss of labor force, violation of privacy and transparency, more human casualties in wars (Fast & Horvitz, 2017) and that it will be uncontrollable over time (Scherer, 2015) cause AI anxiety in individuals. Wang and Wang (2019) addressed AI anxiety in four dimensions. These are: job replacement anxiety, sociotechnical blindness (anxiety regarding a lack of full understanding of the dependence of AI on humans), AI configuration anxiety (anxiety towards humanoid AI), and AI learning anxiety (anxiety towards learning technological products developed in the field of AI) (Kaya et al., 2022, p. 3). It is known that a significant part of these anxieties is also experienced by educators in the field of education. Recent studies have revealed that teachers have concerns about AI applications replacing teachers in the near future (Aslan, 2014; Bozkurt, 2023), not being able to adapt to the developed applications and not being able to transfer them to the classroom (McGrath et al., 2023). These concerns of teachers will affect their attitudes, intentions and actions towards AI in the future or whether they use AI products and applications (Wang & Wang, 2019). For this reason, it is thought that determining the AI anxiety of pre-service teachers today is important in terms of providing ideas for the future.

Attitude Towards Artificial Intelligence

With the rapid spread and use of AI in daily life, individuals have started to develop various attitudes towards AI (Bergdahl et al., 2023). These attitudes can be positive or negative based on the situations encountered, sensations and information about AI (Kaya et al., 2023). These attitudes formed in individuals play an important role in their acceptance or non-acceptance of AI (Schepman & Rodway, 2020, p. 1).

When the international literature is examined, it is seen that many studies have been conducted in various countries to determine the attitudes of individuals studying, working, or receiving services in different fields such as health (Pinto dos Santos et al., 2019), economy (Waliszewski & Warchlewska, 2020), and tourism (Martin et al., 2020) or the residents of a country in general (Example: USA, Zhang & Dafoe, 2019) towards artificial intelligence. However, when Türkiye in particular is examined, it is seen that such studies are quite limited (Kaya et al., 2022). Likewise, the situation is not very different in the field of education. However, in the studies conducted, it has been revealed that some of the teachers and pre-service teachers think that AI is necessary and benefit from its opportunities, but some of them do not want to live in a world where AI is dominant (Haseki, 2019; Şanlı et al., 2023). In this respect, it can be said that teachers and pre-service teachers possess both positive and negative attitudes towards the concept. On the other hand, is observed that the number of studies conducted is very insufficient and these studies are not directly aimed at determining attitudes. Yet, investigating the behaviors, attitudes and perceptions of individuals towards AI, which has started to cover every aspect of life, also contains clues about the path that the society will follow in the future. As a matter of fact, the same is the case for teachers, one of the most important components of education, and for the teachers of the future. In the present study, the attitudes of pre-service Turkish language teachers, which plays an important role in language teaching and the development of literacy skills, towards AI are thought to be significant in terms of showing the place of AI in the classroom environments of tomorrow.

Objective and Research Questions

In the present study, it was aimed to determine the anxiety and attitudes of pre-service Turkish language teachers

towards artificial intelligence and to examine the relationship between them. In this direction, answers to the following questions were sought:

1. What are the attitudes of the pre-service Turkish language teachers towards artificial intelligence?
2. What is the status of the pre-service Turkish language teachers' anxiety towards artificial intelligence?
3. What is the relationship between the pre-service Turkish language teachers' anxiety and attitudes towards artificial intelligence?
4. Is there a significant difference in the anxiety and attitudes of the pre-service Turkish language teachers towards artificial intelligence in terms of gender, grade level and time spent on the internet?

METHOD

Design

In this study, quantitative research method was used. The study was designed according to the relational survey model, one of the general survey models. In the relational survey model, it is investigated whether there is a change between two or more variables and the degree of this change (Karasar, 2010, p. 81). In this study, it was aimed to determine the pre-service Turkish language teachers' anxiety and attitudes towards AI and to examine the relationship between them.

Study Group

232 pre-service Turkish language teachers (Female= 68.1%, Male= 31.5%) studying at 14 different universities in various provinces of Türkiye in the 2022-2023 academic year participated in the study. Since universities in Türkiye switched to remote education in the spring semester, the study group was formed according to the convenience sampling method. This method is based on collecting data from easily accessible samples in cases where it is not possible to use different sampling methods and provides researchers with the opportunity to save time and labor (Frankel et al., 1990; Kılıç, 2013). Personal and demographic information of the study group is summarized in Table 1.

Table 1. Descriptive results of pre-service teachers

Variables	n	%
Gender		
Female	158	68.1
Male	73	31.5
Other	1	0.4
Year of Study		
1st Year	28	12.1
2nd Year	39	16.8
3rd Year	64	27.6
4th Year and more	101	43.5
Time spent on the internet per day		
0-2 hours	33	14.2
2-5 hours	132	56.9
5-10 hours	62	26.7
10 hours and over	5	2.2

Data Collection Tools

Personal information form

This form was prepared by the researchers to obtain information about the pre-service teachers' gender, grade level and the time they spend on the internet per the day.

General attitude scale towards artificial intelligence

The scale developed by Schepman and Rodway (2020) to measure individuals' general attitudes towards AI was adapted into Turkish by Kaya et al. (2022). There are a total of 20 items, 12 items in the positive sub-dimension and 8 items in the negative sub-dimension. The scale is prepared in 5-point Likert type and the items are scored between strongly disagree (1) and strongly agree (5). The fit indices of the scale were calculated as $\chi^2 = 255.38$, df = 169, $\chi^2/df = 1.51$, CFI = 0.974, NNFI = 0.971, SRMR = 0.066, RMSEA = 0.038, 90% CI [0.028, 0.048]. In the study, the Cronbach Alpha coefficient was found to be 0.82 for the positive subscale and 0.84 for the negative subscale. Since the items of the negative attitude sub-factor were reverse coded in the analyses, negative attitudes decreased as the score increased, and negative attitudes increased as the scores decreased (Kaya et al., 2022).

Artificial intelligence anxiety scale

The AI Anxiety Scale developed by Wang and Wang (2019) was adapted into Turkish by Akkaya et al. (2021). The scale consists of 16 items and 4 dimensions. In the 5-point Likert-type scale, the items are graded between strongly disagree (1) and strongly agree (5). Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were conducted to determine the construct validity of the scale. The KMO was found to be 0.892 and Barlett's test χ^2 value was 2847.749 (p=.000). Goodness of fit values ($\Delta\chi^2 = 260.120$. SD= 99 χ^2/SD=2.627, NFI=.923, CFI=.950. RFI=.906, IFI=.951, TLI=.940. RMSEA=.078, p=.000) were found to be within acceptable ranges. The internal consistency coefficient of the scale was.937. In terms of sub-factors, the following values were found: α=.948 for the Learning dimension, α=.895 for the Job Replacement dimension, α=.875 for the Sociotechnical Blindness dimension and α=.950 for the Artificial Intelligence (AI) Configuration dimension (Akkaya et al., 2021).

Research Procedure

Firstly, research and ethical approval were obtained from Trabzon University Social and Human Sciences Research and Ethics Committee (Issue Number: E-81614018-000-2300033122, 02.06.2023). After the approval was obtained, online questionnaires were prepared for data collection. Since remote education was started in universities after the

earthquakes in Türkiye on February 6, 2023, the researchers had to collect data on online platforms in order to reach pre-service teachers. During the data collection process, the guidelines and principles regarding human subjects stated in the Declaration of Helsinki were observed (World Medical Association, 2013). The prepared forms were delivered to the pre-service teachers via e-mail or other social media platforms. The pre-service teachers who participated in the study were first asked to read the 'Informed Consent Form' and give their consent, and then the pre-service teachers who gave their consent answered the questions. All pre-service teachers participated in the study on a voluntary basis. The pre-service teachers who participated in the study did not receive any educational benefit from this situation, such as getting high grades or being considered to have attended a course. The purpose of the study and the points to be considered were stated in the form. In addition, the contact information of the researcher, whom they could contact in case of any unclear situation or any question they wanted to ask, was included in the form.

Data Analysis

The data were analyzed using the IBM SPSS 23.0 (Statistical Packet for Social Sciences) program. The analyses in the study were carried out using the Pearson Product Moment Correlation Coefficient, Unpaired Samples t-Test and One-Way ANOVA, Kruskal-Wallis H Test, Mann Whitney U Test, Tukey Test and Dunnett's T3. Firstly, it was determined whether the collected data were normally distributed by examining the kurtosis and skewness coefficients. For a normal distribution, kurtosis and skewness values should be between +1 and -1 (Çokluk et al., 2021). In the present study, kurtosis values ranged between -.996 and.435 and skewness values ranged between -.439 and.515, indicating that the normality of the data was ensured. Information regarding the kurtosis and skewness coefficients of the data set is summarized in Table 2.

FINDINGS

Table 3 shows the mean values of the study group's general attitudes towards artificial intelligence.

Table 3 shows that the mean of the participants' positive attitude towards AI is 3.63 (*SD*=.54) and the mean of their negative attitude is 3.01 (*SD*=.64). This finding shows that the participants' positive and negative attitudes towards AI are at a moderate level.

Table 4 shows the mean values of the study group's anxiety towards artificial intelligence.

Table 4 shows that the mean values of the participants' anxiety towards AI are 2.44 (*SD*=.79) in the learning sub-dimension, 3.44 (*SD*=.86) in the job replacement sub-dimension, 3.54 (*SD*=.81) in the sociotechnical blindness sub-dimension and 3.08 (*SD*=1.12) in the artificial intelligence configuration sub-dimension (*SD*=.46). This finding shows that the participants' anxiety towards AI is below the moderate level in the learning sub-dimension, and above the moderate level in the sub-dimensions of job replacement, sociotechnical blindness and artificial intelligence configuration.

The relationships between the study group's general attitudes towards AI and their anxiety were tested through Pearson Product Moment Correlation Analysis. Table 5 shows the findings obtained.

When Table 5 is examined, it is found that there are significant negative correlations between positive attitudes towards AI and sub-factors of AI anxiety such as learning (r= -.31, p<.01), job replacement (r= -.21, p<.01), sociotechnical blindness (r= -.23, p<.01) and artificial intelligence configuration (r= -.22, p<.01). Accordingly, as the positive attitude towards AI score increases, the scores of learning, job replacement, sociotechnical blindness and artificial intelligence configuration, which are sub-factors of AI anxiety, decrease. Negative attitudes towards AI are significantly and negatively correlated with learning (r= -.60, p<.01), job replacement (r= -.61, p<.01), sociotechnical blindness (r= -.58, p<.01) and artificial intelligence configuration (r= -.58, p<.01). Accordingly, as the score of negative attitudes towards AI increases, the scores of learning, job replacement, sociotechnical blindness and artificial intelligence configuration, which are sub-factors of AI anxiety, also increase due to the reverse scoring of the items.

Table 6 shows that the participants' general attitudes towards AI did not differ significantly according to gender (p>.05). In the sub-dimensions of AI anxiety, only artificial intelligence structuring scores showed a significant difference according to gender (p<.05). It was determined that this difference was in favor of females; the scores of the female students (M=3.20) were higher than the scores of the male students (M=2.80). Cohen's d value was examined to determine the effect size (d=.35) and it was found to have a moderate effect according to Cohen et al. (2021).

When Table 7 is analyzed, it is seen that the general attitude towards AI does not differ significantly according to

Table 2. Skewness and kurtosis values for variables

Variables	Min.	Max.	*M*	*SD*	Skewness	Kurtosis
Positive attitude[a]	2.17	5.00	3.63	0.54	0.083	0.095
Negative attitude[a]	1.00	4.63	3.01	0.64	-0.342	0.085
Learning[b]	1.00	5.00	2.44	0.79	0.515	0.435
Job replacement[b]	1.00	5.00	3.44	0.86	-0.261	-0.529
Sociotechnical blindness[b]	1.00	5.00	3.54	0.81	-0.439	0.267
Artificial intelligence configuration[b]	1.00	5.00	3.07	1.12	0.004	-0.996

a=Sub-dimensions of the attitude scale; b=Sub-dimensions of the anxiety scale

the grade level (p>.05). In the sub-dimensions of AI anxiety, it was determined that learning and artificial intelligence configuration scores did not differ significantly according to grade level (p>.05). Among the sub-dimensions of artificial intelligence anxiety, job replacement ($F_{(3.231)}$= 3.46, p<.05) and sociotechnical blindness ($F_{(3.231)}$= 2.93, p<.05) were found to differ significantly according to the grade level. The eta-square (η2) coefficient calculated to determine the effect size showed that this difference was at a moderate level (η2=.04) in both sub-dimensions (Büyüköztürk et al., 2020).

In order to determine the source of the difference, the homogeneity of variances was first tested with Levene's Test and it was seen that the homogeneity of variances hypothesis was met in the job replacement dimension, but not in the sociotechnical blindness dimension. As a result of the Tukey test for the job replacement dimension, it was found that there was a significant difference between the first-fourth and higher grades. Accordingly, it was determined that the first-grade students' scores on the dimension of job replacement (M=3.79 SD=.77) were higher than the fourth and higher-grade students (M=3.27 SD=.91). As a result of Dunnett's T3 test for the sociotechnical blindness dimension, it was determined that the significant difference was between the second-third grades. Accordingly, it was determined that the sociotechnical blindness dimension scores of second-grade students (M=3.74 SD=.55) were higher than those of third-grade students (M=3.43 SD=.75).

Table 8 shows that as a result of the analysis, it was observed that the general attitude towards AI and anxiety did not differ significantly according to the time spent on the Internet per day (p>.05). Accordingly, the range of hours spent on the Internet per day is not effective on the general attitude towards AI and anxiety scores.

Table 3. Mean attitude towards artificial intelligence

Factors	Min.	Max.	*M*	*SD*
Positive attitude[a]	2.17	5.00	3.63	0.54
Negative attitude[a]	1.00	4.63	3.01	0.64

a=Sub-dimensions of the attitude scale

Table 4. Mean anxiety towards artificial intelligence

Factors	Min.	Max.	*M*	*SD*
Learning[a]	1.00	5.00	2.44	0.79
Job replacement[a]	1.00	5.00	3.44	0.86
Sociotechnical blindness[a]	1.00	5.00	3.54	0.81
Artificial intelligence configuration[a]	1.00	5.00	3.08	1.12

a=Sub-dimensions of the anxiety scale

DISCUSSION

The increasing importance of AI due to its contribution to language learning processes, development of language skills and literacy (Huang et al., 2023; Liang et al., 2021) has raised the question of whether language teachers and pre-service teachers are ready to use AI applications (Ayanwal et al., 2022). Studies based on this question generally focus on the

Table 5. Relationships between variables

Factors	1	2	3	4	5	6
Positive attitude[a]	1					
Negative attitude[a]	0.29**	1				
Learning[b]	-0.31**	-0.60**	1			
Job replacement[b]	-0.21**	-0.61**	0.43**	1		
Sociotechnical blindness[b]	-0.23**	-0.58**	0.39**	0.73**	1	
Artificial intelligence configuration[b]	-0.22**	-0.58**	0.54**	0.61**	0.67**	1

** p= <.01 a=Sub-dimensions of the attitude scale; b=Sub-dimensions of the anxiety scale

Table 6. *t*-Test results regarding differentiation of variables according to gender

Factors	Gender	n	*M*	*SD*	*t*	*p*	*d*
Positive attitude[a]	Female	158	3.60	0.50	-1.14	0.258	-
	Male	73	3.69	0.62			
Negative attitude[a]	Female	158	3.05	0.57	1.21	0.228	-
	Male	73	2.92	0.77			
Learning[b]	Female	158	2.44	0.70	0.01	0.996	-
	Male	73	2.44	0.96			
Job replacement[b]	Female	158	3.47	0.81	0.89	0.375	-
	Male	73	3.36	0.96			
Sociotechnical blindness[b]	Female	158	3.60	0.77	1.47	0.143	-
	Male	73	3.42	0.89			
Artificial intelligence configuration[b]	Female	158	3.20	1.06	2.53	0.012	0.35
	Male	73	2.80	1.22			

a=Sub-dimensions of the attitude scale; b=Sub-dimensions of the anxiety scale

Table 7. One-way ANOVA results regarding differentiation of variables according to grade level

Factors	Sum of Squares	df	Mean Squares	*F*	*p*	η^2	Significant Difference
Positive attitude[a]							
Between Groups	1.34	3	0.45	1.56	0.200	-	-
Within Groups	65.14	228	0.29				
Total	66.47	231					
Negative attitude[a]							
Between Groups	0.76	3	0.25	0.62	0.604	-	-
Within Groups	92.90	228	0.41				
Total	93.66	231					
Learning[b]							
Between Groups	2.90	3	0.97	1.56	0.199	-	-
Within Groups	141.13	228	0.62				
Total	144.04	231					
Job replacement[b]							
Between Groups	7.39	3	2.46	3.46	0.017	0.04	First-Fourth and Higher Grades
Within Groups	162.18	228	0.71				
Total	169.56	231					
Sociotechnical blindness[b]							
Between Groups	5.66	3	1.89	2.93	0.035	0.04	Second-Third Grade
Within Groups	146.83	228	0.64				
Total	152.48	231					
Artificial intelligence configuration[b]							
Between Groups	9.61	3	3.20	2.61	0.053	-	-
Within Groups	280.43	228	1.23				
Total	290.04	231					

a=Sub-dimensions of the attitude scale; b=Sub-dimensions of the anxiety scale

opinions and tendencies of teachers and pre-service teachers towards AI (Çam et al., 2021; Darayseh, 2023; Haseski, 2019; Şanlı et al., 2023) while affective factors that would provide information about their readiness are not emphasized extensively (Ayanwale et al., 2022). Accordingly, the present study contributes to the literature on anxiety and attitude among the factors affecting the readiness of pre-service Turkish language teachers towards AI. In addition, the study contributes to the literature by examining pre-service language teachers' attitudes and anxiety towards AI in terms of gender, grade level and time spent on the internet.

According to the first finding of the study, the pre-service Turkish language teachers' positive and negative attitudes towards AI are at moderate levels. In this respect, it can be said that the pre-service teachers do not completely embrace AI, but they do not completely reject it either (Schepman & Rodway, 2020). Educators' attitudes towards AI play a decisive role in the effectiveness and efficiency of using AI in education (Darayseh, 2023; Zhai et al., 2021). In this context, the moderate positive and negative attitudes of the pre-service teachers are significant in terms of providing an idea about how their attitudes towards AI will be both in their daily and professional lives. It is thought that the fact that pre-service Turkish language teachers' positive attitudes towards artificial intelligence are at a moderate level will also be determinative on their use of artificial intelligence applications in Turkish language courses in the future. Considering that integrating technology into language teaching has positive outcomes in mother tongue education, future Turkish language teachers are expected to have positive attitudes towards using artificial intelligence applications. Although there are many studies in the literature investigating the attitudes towards AI of individuals working in fields such as health and finance or students undergoing training (Bhandari et al., 2021; Waliszewski & Warchlewska, 2020), it has been determined that there are very few studies directly examining the attitudes of educators (McGrath et al., 2023). It was seen that the studies in the literature generally examined the perceptions and thoughts of teachers and pre-service teachers about AI. Although there are a few studies determining that teachers and pre-service teachers have more negative perceptions (Chounta et al., 2021; Ural Keleş & Aydın, 2021), it was determined that teachers and pre-service teachers generally have positive opinions towards AI (Çam et al., 2021; Darayseh, 2023; Haseski, 2019; Şanlı et al., 2023). It was determined that these positive attitudes towards AI were mostly due to its contribution to learning and teaching processes in terms of professional aspects as well as making

Table 8. Kruskal-wallis test results regarding the differentiation of variables according to the time spent on the internet daily

Factors	Time Spent on the Internet per Day	N	*M*	*SD*	Mean Rank	*df*	X^2	*p*
Positive attitude[a]	0-2 hours	33	3.66	0.55	119.36	3	4.56	0.207
	2-5 hours	132	3.57	0.54	109.63			
	5-10 hours	62	3.70	0.52	126.41			
	10 hours and over	5	3.88	0.39	156.20			
	Total	232	3.63	0.54				
Negative attitude[a]	0-2 hours	33	2.71	0.70	88.09	3	7.17	0.067
	2-5 hours	132	3.04	0.63	119.53			
	5-10 hours	62	3.08	0.59	124.44			
	10 hours and over	5	3.10	0.16	125.40			
	Total	232	3.01	0.64				
Learning[b]	0-2 hours	33	2.70	0.87	137.38	3	4.35	0.226
	2-5 hours	132	2.39	0.81	112.16			
	5-10 hours	62	2.43	0.70	116.30			
	10 hours and over	5	2.24	0.55	95.90			
	Total	232	2.44	0.79				
Job replacement[b]	0-2 hours	33	3.60	0.89	130.03	3	2.05	0.562
	2-5 hours	132	3.41	0.84	114.77			
	5-10 hours	62	3.40	0.88	111.70			
	10 hours and over	5	3.60	0.80	132.50			
	Total	232	3.44	0.86				
Sociotechnical blindness[b]	0-2 hours	33	3.69	0.92	131.17	3	3.42	0.331
	2-5 hours	132	3.52	0.84	116.28			
	5-10 hours	62	3.52	0.70	112.15			
	10 hours and over	5	3.20	0.48	79.40			
	Total	232	3.54	0.81				
Artificial intelligence configuration[b]	0-2 hours	33	3.22	1.25	123.27	3	2.84	0.418
	2-5 hours	132	3.02	1.07	113.46			
	5-10 hours	62	3.20	1.15	122.48			
	10 hours and over	5	2.40	1.14	77.90			
	Total	232	3.07	1.12				

a=Sub-dimensions of the attitude scale; b=Sub-dimensions of the anxiety scale

daily life easier (Çam et al., 2021; Şanlı et al., 2023; Ural Keleş & Aydın, 2021). This is important in terms of showing that the convenience and opportunities offered by AI to education and daily life (Bozkurt, 2023; Owoc et al., 2021)) are generally welcomed positively by teachers and pre-service teachers. From this point of view, it shows that it is possible for pre-service teachers to have more positive attitudes towards AI with the increase in their level of knowledge towards AI (Kaya et al., 2022). In addition, the attitudes of teachers have an important effect on the formation of consciousness and awareness towards AI in students (Ng et al., 2021). Tartuk (2023) examined the metaphorical perceptions of middle school students about AI and found that "students approached the concept of artificial intelligence from a high-level perspective and explained artificial intelligence by perfecting it to a certain extent" (p. 114). In this respect, it can be said that the results obtained in this study are promising for the future. Because the attitudes of pre-service teachers towards AI today cannot be evaluated in a way that will turn this positive perspective of students into a negative one in the future. However, it was seen that their negative attitudes were mostly due to thoughts such as the future effects of AI, causing ethical violations and replacing humans. In the literature, it has been observed that teachers and pre-service teachers have similar thoughts (Chounta et al., 2021). It is thought that this situation may cause the emergence of AI anxiety in pre-service teachers and may cause them not to utilize AI applications effectively in the classroom. From the perspective of language teaching, the fact that pre-service Turkish language teachers have moderate negative attitudes may also negatively affect their utilization of AI applications in Turkish language courses. In their study, Yürektürk and Coşkun (2020) determined that Turkish language teachers considered themselves inadequate in terms of using technology in their courses and that they benefited from technology at a moderate level. For this reason, providing pre-service teachers with positive characteristics may allow them to benefit more from AI applications in the future.

As the second finding of the study, it was revealed that the pre-service Turkish language teachers' AI anxiety was generally at moderate levels. According to the four dimensions of AI anxiety (Wang & Wang, 2019), the pre-service teachers had moderate levels of anxiety in the dimensions of job replacement, sociotechnical blindness and artificial intelligence configuration, while they had less anxiety in the learning dimension. As a matter of fact, it is known in the literature that the most common concern about AI among teachers and pre-service teachers in different branches is the concern that AI will replace teachers in the future (Akkaya et al., 2021; Aslan, 2014; Chounta et al., 2021). In the present study, it was determined that the pre-service Turkish language teachers also had concerns about their jobs being replaced or losing their jobs due to AI, but these concerns were not at very high levels. This finding that they do not experience very intense anxiety is considered significant in terms of giving a small clue that pre-service teachers do not despair about their future professions. In the dimension of sociotechnical blindness, it was seen that the pre-service teachers held the belief that AI would be out of human control in the future (Johnson & Verdicchio, 2017) albeit partially, and this caused a moderate level of anxiety among the pre-service teachers. Takıl et al. (2022), who examined the AI anxiety of university students studying in different faculties, found that students studying in the faculty of education had a high level of anxiety in the sociotechnical blindness dimension. Haseski (2019) also determined that pre-service teachers had intense concerns that AI would get out of control. Although there are many discussions in the literature on this issue, it is thought that this anxiety is mostly due to insufficient understanding of AI and lack of knowledge (Akkaya et al., 2021; Fast & Horvitz, 2017; Johnson & Verdicchio, 2017). It was determined that the pre-service Turkish language teachers had moderate levels of anxiety towards the artificial intelligence configuration dimension. In other words, it is observed that the pre-service teachers have concerns due to the fact that AI carries human-like characteristics (Kaya et al., 2022; Wang & Wang, 2019). It is known that robots and other AI applications increase concerns about the level they will reach in the future, especially in terms of having many human characteristics (Aslan, 2014). This is also in line with the concerns that AI will get out of control in the future and will put many people out of work. It was observed that the pre-service teachers experienced less anxiety only in the learning dimension, which may be related to the fact that they were receiving education. As a matter of fact, the finding obtained in the present study that the pre-service teachers have positive attitudes towards AI due to its contribution to the learning-teaching processes also supports this finding. In general, it is observed that the pre-service Turkish language teachers' anxiety towards AI is at moderate levels, but they have less anxiety in the learning dimension because it is more familiar to them and perhaps because they have utilized it during their education. This situation can be evaluated that as the pre-service teachers get to know and learn AI, their anxiety is likely to decrease. In addition, the low level of anxiety, especially in the learning dimension, is important in terms of showing that they are more likely to use AI in their classroom practices in the future (Almaiah et al., 2022; Celik & Yesilyurt, 2013). When analyzed from the perspective of language teaching, the increase in the knowledge of pre-service Turkish language teachers about AI applications may make them eager to utilize these applications in classroom and out-of-class activities in the future. However, when the literature is examined, Darayseh (2023) found that anxiety did not have a significant effect on teachers' perceptions of the factors affecting their preferences for using AI applications in science education and Ayanwale et al. (2022) found that anxiety did not have a significant effect on teachers' intentions to implement AI applications in their classrooms. The fact that there are not enough studies on this issue in the literature requires this situation to be investigated in much more detail.

Teachers' attitudes and anxieties have a determining role in the effective use of AI applications in the classroom environment. There are many technological opportunities for language teachers to use in classroom activities (Kessler, 2017). The perspectives of Turkish language teachers are effective in utilizing these applications. In the formation of teachers' attitudes and concerns, the education received in education faculties and the gains acquired are of great importance (Celik & Yesilyurt, 2013). In this study, when the relationship between the pre-service teachers' attitudes and anxiety towards AI was examined, it was found that there were generally significant relationships in the negative direction. In other words, as their positive attitudes increase, their anxiety decreases, and as their negative attitudes increase, their anxiety increases. It was observed that this situation was valid for all four dimensions of AI anxiety. As a matter of fact, AI anxiety is an important predictor of individuals' attitudes towards AI (Kaya et al., 2022). In summary, as pre-service teachers develop positive attitudes towards AI, they will start to overcome their AI anxiety. This can be possible by using more AI applications and getting to know AI better.

When the attitudes and anxieties of the pre-service Turkish language teachers towards AI were examined in terms of gender, no significant difference was found between the anxiety and attitudes of male and female students. Eyüp (2022) found that Turkish language teachers' use of Web 2.0 tools did not differ according to gender. Darayseh (2023) found that attitude was an important predictor of teachers' intentions to use AI in science teaching, but anxiety had no effect on teachers' intentions to use AI and there was no significant difference between male and female teachers' intentions to use AI. However, the findings of a limited number of studies examining AI anxiety in terms of gender in the literature support the results of the present study (Filiz et al., 2022; Kaya et al., 2022; Vasiljeva et al., 2021). However, there are also studies in the literature that found that males have both more positive attitudes towards AI (Pinto dos Santos et al., 2019) and higher AI anxiety (Karabınar & Çarıkçı, 2022). The findings of this study contradict the results of the said studies. It is thought that the contrast between the studies may be due to differences in occupational groups. However, it can be said that more intensive studies are needed in this regard since the findings cannot fully explain the reasons.

No significant difference was discovered among the attitudes of pre-service Turkish language teachers towards AI

in relation to their grade level. Similarly, Dargut and Çelik (2014) found that the technology use of pre-service Turkish language teachers did not differ significantly according to their grade level. However, when the dimensions of AI anxiety were examined, no significant difference was found between learning and artificial intelligence configuration anxiety, while significant differences were found in the dimensions of job replacement and sociotechnical blindness. A significant difference was found between the first-year students and the students studying in the fourth and higher grades in terms of anxiety about job replacement. Accordingly, first-year students experience more intense anxiety about job replacement. This was not an expected result in this study because it was thought that senior students might have more anxiety about job replacement since they will start their duties from next year, but the results were in the opposite direction. This may be due to the fact that the concrete results of AI on professions have not yet emerged, and that senior students have less anxiety about this issue, while first-year students think that this possibility will be higher in the long term until their graduation (Çetin & Aktaş, 2021). In the dimension of sociotechnical blindness, that is, the anxiety that AI cannot be controlled, also caused a significant difference between the grades and this difference was found between the second and third grades in favor of the second grades. In other words, it was observed that the second-grade students had more anxiety that AI would not be controlled in the future than third-grade students. It seems possible to make an evaluation about why this situation arises within the scope of the present study. It is seen that more detailed studies are needed to explain this situation. However, in general, it was expected that instructional technology and other technological courses that pre-service teachers took during their education would have more positive effects on their attitudes and anxieties towards AI. This is because in these courses, the candidates themselves prepare various activities by utilizing technology. In this respect, increasing the content or number of such courses would contribute positively to this direction.

No significant difference was found between the time the pre-service Turkish language teachers spent on the internet and their attitudes and anxiety towards AI. Since the probability of being exposed to AI applications increases as the time spent by the candidates on the internet increases, it was thought that their attitudes and anxieties towards AI would change to this extent, but the results are not in this direction. This situation calls into question the purpose of the pre-service teachers' use of the Internet. As a matter of fact, Akbaş Coşar and Gedik (2021) found in their study that as the time that pre-service teachers spend on the internet increases, their social media addiction increases, and they spend a significant amount of their time on social media. Similarly, Durmuş et al. (2018) determined that the most common purposes of university students to use the internet are social media, watching videos and surfing the internet aimlessly. However, studies have also revealed that the social media platforms that university students use have an impact on the development of their digital competencies (Perifanou et al., 2021). In this case, it can be said that the purpose for which students use the internet rather than the time they spend on the internet is more important in the formation of their awareness towards AI.

CONCLUSION

In conclusion, the present study revealed that the positive and negative attitudes of pre-service Turkish language teachers, who are the language teachers and literacy improvers of the future, towards AI are at moderate levels. However, it was also found that they generally had moderate levels of AI anxiety. These concerns are in parallel with the concerns that AI will eliminate many professions in the future and get out of control, which is the most common in the society (Fast & Horvitz, 2017; Scherer, 2015). In addition, it was revealed that the pre-service teachers experienced anxiety towards AI due to its human characteristics. However, in addition to these, the fact that the pre-service teachers experienced much less anxiety in the learning dimension and their positive attitudes in this direction were considered to play an important role in carrying AI applications to classroom environments in the future. In addition to these, there was no significant difference in the pre-service teachers' attitudes and anxiety towards AI in terms of gender, grade level and time spent on the internet. The relationship between anxiety and attitudes towards AI was found to be negatively significant. Based on all these, considering the 21st century competencies and technological advances in language education, it is seen that pre-service language teachers in faculties of education need to be more exposed to AI applications and to be encouraged to use these applications. As a matter of fact, it is thought that as the pre-service teachers' level of knowledge about AI increases and they realize misinterpretations, they will have more positive attitudes and their anxiety will decrease.

Although the present study was conducted with care, it has some limitations. First of all, it was very difficult to reach the pre-service teachers due to remote education; therefore, the study group consists of a limited number of pre-service teachers. It is important to study with a larger study group by reaching the pre-service teachers personally during the face-to-face education period in order to provide more generalizable results. In addition, only scale forms were used in the study; it would be better to support findings with interviews in future studies in order to diversify the results obtained. The present study was conducted only with pre-service Turkish language teachers; however, if the anxiety and attitudes of academicians working in this field towards AI were also examined, the anxiety and attitudes of the pre-service teachers could be explained from a broader perspective. At the same time, investigating teachers' use of AI in their classroom practices may contribute more to the literature in terms of providing a general picture of AI. In this direction, there is a need to examine the knowledge levels, attitudes and concerns of educators regarding AI, which is predicted to fulfill an important part of language teaching and literacy in the future, with more extensive studies.

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