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Determination of artificial intelligence literacy and attitudes towards artificial intelligence of teachers working with gifted students and examining them according to some variables

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Abstract

This research aimed to determine the level of artificial intelligence literacy and attitudes towards artificial intelligence of teachers working with gifted students and to examine the results according to some variables. The study was conducted with the participation of 107 science and art center (BİLSEM) teachers selected by convenience sampling method. Data were collected using the Artificial Intelligence Literacy Scale and the General Attitude Towards Artificial Intelligence Scale. The findings show that teachers generally have high levels of artificial intelligence literacy and attitudes towards artificial intelligence. In gender comparisons, it was found that male teachers had higher AI literacy and attitudes than female teachers. Other variables such as age, professional experience, working time in BİLSEM, education level and branch did not have a significant effect on artificial intelligence literacy and attitude. As a result, it was observed that the knowledge and attitudes of teachers working with gifted students towards artificial intelligence were generally positive, but there were gender differences. Therefore, it is recommended that teachers' access to artificial intelligence training and professional development opportunities should be increased and especially female teachers' knowledge and attitudes towards technology should be improved.

Keywords: Artificial intelligence, Artificial intelligence literacy, Attitude towards artificial intelligence, Teachers working with gifted students, BİLSEM

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Özel yetenekliler ile çalışan öğretmenlerin yapay zekâ okuryazarlığının ve yapay zekâya yönelik tutumlarının belirlenmesi ve bazı değişkenlere göre incelenmesi

Özet

Bu araştırma, özel yetenekli öğrencilerle çalışan öğretmenlerin yapay zekâ okuryazarlığı ve yapay zekâya yönelik tutumlarının ne düzeyde olduğunu belirlemeyi ve sonuçları bazı değişkenlere gore incelemeyi amaçlamıştır. Araştırma, kolayda örnekleme yöntemiyle seçilen 107 bilim ve sanat merkezi (BİLSEM) öğretmeninin katılımıyla gerçekleştirilmiştir. Veriler, Yapay Zekâ Okuryazarlığı Ölçeği ve Yapay Zekâya Yönelik Genel Tutum Ölçeği kullanılarak toplanmıştır. Bulgular, öğretmenlerin genel olarak yapay zekâ okuryazarlığı ve yapay zekâya yönelik tutumlarının yüksek olduğunu göstermektedir. Cinsiyet karşılaştırmalarında, erkek öğretmenlerin yapay zekâ okuryazarlığı ve tutumlarının kadın öğretmenlerden daha yüksek olduğu tespit edilmiştir. Yaş, mesleki deneyim, BİLSEM'de çalışma süresi, eğitim seviyesi ve branş gibi diğer değişkenlerin yapay zekâ okuryazarlığı ve tutum üzerinde anlamlı bir etkisi bulunmamıştır. Sonuç olarak, özel yetenekli öğrencilerle çalışan öğretmenlerin yapay zekâya ilişkin bilgi ve tutumlarının genel olarak olumlu olduğu, ancak cinsiyet farklılıklarının bulunduğu görülmüştür. Bu nedenle, öğretmenlerin yapay zekâ eğitimi ve profesyonel gelişim fırsatlarına erişimlerinin artırılması, özellikle kadın öğretmenlerin teknolojiye yönelik bilgi ve tutumlarının geliştirilmesi önerilmektedir.

Anahtar Kelimeler: Yapay zeka, Yapay zeka okuryazarlığı, Yapay zekaya yönelik tutum, Özel yeteneklilerle çalışan öğretmenler, BİLSEM

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1. Introduction

Artificial intelligence, as a rapidly developing technology, has started to gain an important place in education systems. Teachers need to have artificial intelligence literacy in order to adapt to this technology and use it effectively in the classroom environment. This is critical to ensure that teachers both understand the technology and transfer it to their students accurately and effectively.

AI literacy refers to the capability of individuals to comprehend the functioning of artificial intelligence technologies, their various applications, and the impact these technologies have (Long & Magerko, 2020). Artificial intelligence literacy involves understanding not just the technical aspects of AI, but also its social, ethical and educational dimensions (Tuomi, 2018). Teachers' having AI literacy in this context provides an important advantage in teaching students the potential and limitations of this technology.

Artificial intelligence in education holds the promise of enhancing student performance, offering personalized learning opportunities, and improving the efficiency of teaching methods (Holmes et al., 2019). However, the realisation of this potential depends on teachers' mastery of artificial intelligence technologies. AI literacy for teachers teaches them how to integrate these technologies correctly and at the same time helps them to develop students' digital literacy (Lynch, 2020). Another important aspect of teachers' AI literacy is its contribution to developing critical thinking skills. By grasping the role of AI in decision-making, educators can help students understand the functioning of these systems and prompt them to critically evaluate AI (Crompton, Burke, & Gregory, 2020).

In order to improve teachers' AI literacy, continuous professional development programmes and certification programmes that provide AI training should be established (Xu & Zhang, 2020). These programs help educators gain a deeper understanding of AI's role in education and provide them with guidance on how to effectively integrate these technologies into their teaching practices.

Moreover, integrating content related to artificial intelligence into education programmes enables pre-service teachers to get to know artificial intelligence at an early stage and gain the necessary skills in this regard. Such training encourages teachers to have a more positive view of technology and develop innovative teaching strategies (Luckin, 2017).

Artificial intelligence is becoming more prevalent in the education sector, and the perspectives of teachers regarding this technology are crucial. Their attitudes significantly influence the adoption and effectiveness of AI in educational settings. AI is viewed as a tool that could enhance student performance, offer customized learning experiences, and reduce teachers' workloads (Holmes, Bialik, & Fadel, 2019). However, in order to integrate this technology effectively, teachers' attitudes towards AI should be positive and supportive.

Artificial intelligence is used in different fields in education and offers various advantages. Learning analytics, adaptive learning systems, automated assessment tools and virtual classroom assistants are the main examples of artificial intelligence applications (Zawacki-Richter et al., 2019). These applications enable personalized learning experiences tailored to each student's needs while also easing teachers' workloads. To fully leverage the potential of artificial intelligence, it is essential for teachers to have a high level of trust and acceptance of these technologies.

Teachers' attitudes towards AI are often shaped by several key factors: trust in the technology, perceived usefulness, perception of occupational threat, and sense of competence in using the technology (Teo, 2011). Teachers' positive attitudes towards these technologies may encourage the wider and effective use of AI in education, while negative attitudes may complicate the integration processes.

Teachers' trust in AI depends on their beliefs about the extent to which this technology will benefit the educational process. If teachers believe that AI will provide significant added value in education, they will adopt this technology more willingly (Scherer et al., 2019). Moreover, offering training and professional development is crucial for boosting teachers' confidence in these technologies.

The growing presence of artificial intelligence in education could potentially lead some teachers to perceive it as a threat to their profession. In particular, teachers' concerns that their jobs are threatened by AI may cause them to develop negative attitudes towards these technologies (Van der Spoel et al., 2020). In order to prevent this situation, it is necessary to establish a clear understanding that AI will be used to support teachers' work rather than replace them. Simultaneously, it is essential to enhance teachers' confidence in their ability to effectively utilize this technology by ensuring they have the requisite knowledge and skills.

Based on existing research and literature, it is evident that teachers' literacy in artificial intelligence and their attitudes toward it are of utmost importance. This study aims to assess the level of AI literacy and attitudes among teachers. Additionally, it investigates whether these factors vary based on gender, age, years of experience in the profession, tenure at BİLSEM, educational background, and teaching subjects. To address these objectives, the study seeks to answer the following question:

1) What is the level of AI literacy and attitudes toward AI among teachers who work with gifted students?
2) Is there a significant difference in the artificial intelligence literacy and attitude towards artificial intelligence scores of teachers working with gifted students according to their gender?
3) Is there a significant difference in the scores of artificial intelligence literacy and attitude towards artificial intelligence of teachers working with gifted students according to their ages?
4) Is there a significant difference in the artificial intelligence literacy and attitude towards artificial intelligence scores of teachers working with gifted students according to their working time in the profession?
5) Is there a significant difference in artificial intelligence literacy and attitude towards artificial intelligence scores of teachers working with gifted students according to their working time in BİLSEM?
6) Is there a notable variation in the artificial intelligence literacy scores and attitudes towards AI among teachers working with gifted students based on their educational level?
7) Is there a significant difference in artificial intelligence literacy and attitude towards artificial intelligence scores of teachers working with gifted students according to their branches?

2. Method

This research was designed with the survey model, one of the quantitative research types. In survey models, the aims are usually expressed with question sentences. These are; "What was it? What is it? What is it related to?" questions. While answering these questions, it is not so powerful in finding the real answers to the question "Why?" (Büyüköztürk, 2016). In survey research, information is usually collected from a large population by using answer options determined by the researcher. Generally, in survey research, researchers are interested in how opinions and characteristics are distributed in terms of individuals in the sample rather than why they originate (Fraenkel & Wallen, 2006).

2.1. Sample

The focus of this study is teachers working in science and art centres. In the process of sample selection for the research, convenience sampling method was used. Convenience sampling is a method that allows the researcher to create a sample that is easily accessible from the available resources and includes a sufficient number of participants (Singleton et al., 2005, pp. 155-160). This approach provides the opportunity to collect samples quickly and economically based on the subjective evaluations of the researcher (Aaker et al., 2007, p. 394; Malhotra, 2004, p. 321; Zikmund, 1997, p. 428; as cited in Haşıloğlu et al., 2015, p. 20). In convenience sampling, it is also possible to have a prior acquaintance or relationship between the researcher and the participants, which eliminates the randomness of the sample (Baştürk & Taştepe, 2013, p. 145).

The study group consisted of 107 teachers working in BİLSEMs across Turkey in the 2023-2024 academic year. According to the demographic information of the BİLSEM teachers participating in the study, 41% of the teachers were male and 59% were female.

2.2. Data Collection and Analysis

In order to collect data in line with the sub-problems of the study, the "Artificial Intelligence Literacy Scale (AILS)" adapted by Polatgil and Güler (2023) and the "General Attitude Towards Artificial Intelligence Scale" adapted by Kaya *et al*. (2022) were used. The relevant scales were delivered to the teachers via digital form on the BİLSEM coordinators and BİLSEM directors sharing platform established by the Ministry of National Education and data were collected.

Quantitative data analysis methods were employed to address the research sub-problems. To assess teachers' levels of artificial intelligence literacy and their attitudes towards AI, the arithmetic mean from descriptive statistics was utilized. For comparison analyses, the 'Independent Samples t-Test' and 'One-Way ANOVA' were applied, as the data were found to be normally distributed.

3. Result

This section examines the level of attitudes among teachers working with gifted students towards both artificial intelligence literacy and AI itself. It also investigates whether there are significant differences in attitude levels based on factors such as gender, age, years of experience, time spent at BİLSEM, educational background, and teaching subjects, with the results displayed in tables.

In the initial phase of the study, Table 1 presents the findings from the artificial intelligence literacy scale for teachers working with gifted students.

Table 1.

Results of Teachers' Artificial Intelligence Literacy Scale

	N	Mean	Std, Deviation
M1	107	4,63	0,622
M2	107	3,56	1,312
M3	107	3,79	0,798
M4	107	3,73	0,937
M5	107	4,05	0,873
M6	107	4,32	0,722
M7	107	4,03	0,770
M8	107	3,96	0,764
M9	107	4,02	0,789
M10	107	4,42	0,659
M11	107	4,41	1,000
M12	107	4,05	1,119
Total	107	4,08	0,46608

As seen in Table 1, the participants' mean agreement with the items ranged between 3,56 and 4,63. The item with the highest level of agreement (X=4,63) is item 1 (M1: I can distinguish between smart devices and non-smart devices). The least agreed (X=3,56) with item 2 (M2: I do not know how artificial intelligence technology can help me). According to the artificial intelligence literacy scale data of the teachers working with gifted students, their total

arithmetic mean was calculated as X=4,08. This finding indicates that the participants' artificial intelligence literacy levels are notably high.

Table 2 displays the results concerning the overall attitudes of teachers working with gifted students towards artificial intelligence.

Table 2.

Results of Teachers' General Attitude Scale towards Artificial Intelligence

	N	Mean	Std, Deviation
M1	107	4,55	0,662
M2	107	4,64	0,554
M3	107	4,65	0,600
M4	107	4,59	0,700
M5	107	4,63	0,771
M6	107	3,82	1,062
M7	107	4,56	0,675
M8	107	4,07	0,918
M9	107	3,86	0,995
M10	107	3,71	1,028
M11	107	4,21	0,877
M12	107	3,66	1,055
M13	107	3,14	1,136
M14	107	3,04	0,931
M15	107	4,07	0,924
M16	107	3,35	1,158
M17	107	4,08	0,992
M18	107	3,62	1,043
M19	107	3,42	0,912
M20	107	3,85	1,062
Total	107	3,55	0,54984

Table 2 shows that the participants' average scores for general attitudes towards artificial intelligence range from 3,04 to 4,65. The one they agree with the most (X=4,65) is item 3 (M3: Artificial intelligence is exciting). The least agreement (X=3,04) is item 14 (M14: Organisations use artificial intelligence in an unethical way). The total arithmetic mean of the general attitudes of teachers working with gifted students towards artificial intelligence was calculated as X=3,55. This result indicates that the participants had a high level of general attitudes towards artificial intelligence.

In the second stage, normality test was performed to determine whether the data of the artificial intelligence literacy and general attitude towards artificial intelligence scales of

teachers working with gifted students for comparison analyses showed normal distribution. The results are presented in Table 3.

Table 3.

Normality Test Results of Artificial Intelligence Literacy and General Attitude Towards Artificial Intelligence Scales

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Artificial intelligence Literacy	0,072	107	0,200	0,982	107	0,159
General Attitude towards artificial intelligence	0,060	107	0,200	0,980	107	0,103

According to the Shapiro-Wilk test, since the significance level of artificial intelligence literacy and general attitude towards artificial intelligence scale of teachers working with gifted students was greater than 0.05, it was shown to have a normal distribution.

Skewness and kurtosis coefficients were checked for the normal distribution assumption and the results are presented in Table 4.

Table 4.

Examination of Normality Assumption for the Scales

Artificial Intelligence Literacy		General Attitude towards Artificial Intelligence	
Skewness	kurtosis	Skewness	kurtosis
-0,126	-0,533	-0,369	0,058

Table 4 shows that the skewness value for the artificial intelligence literacy scale is -0,126, and the kurtosis value is -0,533. For the general attitude towards artificial intelligence scale, the skewness is -0,369 and the kurtosis is 0,058. Since the skewness and kurtosis values fall within the range of -1 to +1, the data are considered to be normally distributed (Tabachnick & Fidell, 2015).

Given that the data exhibit a normal distribution, an independent samples t-test was conducted to examine whether there were significant differences between male and female participants on the artificial intelligence literacy and general attitude towards artificial intelligence scales. The independent samples t-test assesses whether the means of two groups differ significantly (Smith & Brown, 2020). Levene's Test was used to verify the equality of variances between the groups. The results of the independent samples t-test concerning the

significance of differences in scores on the artificial intelligence literacy and general attitude towards artificial intelligence scales by gender are presented in Table 5.

Table 5.

Independent Sample t-Test Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Artificial Intelligence Literacy Scale	Male	44	4,1894	0,50908	0,07675
	Woman	63	4,0040	0,42106	0,05305
General Attitude Scale towards Artificial Intelligence	Male	44	4,0943	0,63275	0,09539
	Woman	63	3,8937	0,47157	0,05941

When Table 5 is analysed, the mean score of male participants in the artificial intelligence literacy scale was found as 4,1894, standard deviation 0,50908 and standard error 0,07675; the mean score of female participants was found as 4,0040, standard deviation 0,42106 and standard error 0,05305. In the general attitude towards artificial intelligence scale, the mean score of male participants was 4,0943, standard deviation 0,63275 and standard error 0,09539; the mean score of female participants was 3,8937, standard deviation 0,47157 and standard error 0,05941.

Independent sample t test results regarding the significance between the scores of artificial intelligence literacy and general attitude towards artificial intelligence scales according to gender are given in Table 6.

Table 6.

Independent Sample t-Test Results

	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Artificial Intelligence Literacy Scale	3,238	0,075	2,056	105	0,021	0,18543
General Attitude Scale towards Artificial Intelligence	4,751	0,032	1,786	75,004	0.039	0.20067

In the artificial intelligence literacy scale, Levene's Test result (F = 3,238, Sig. = 0,075) shows that the variances are equal. t-test result (t = 2,056, df = 105, Sig. = 0,021) shows that there is a significant difference between men and women. In the general attitude towards artificial intelligence scale, Levene's Test result (F = 4,751, Sig. = 0,032) shows that the variances are not equal. Therefore, the "Equal variances not assumed" line was checked. t-test result (t = 1,786, df = 75,004, Sig. = 0,039) shows that there is a significant difference between men and women.

According to these results, it is concluded that men's artificial intelligence literacy and general attitudes towards artificial intelligence are higher than women.

One-way anova analysis for unrelated samples was performed to examine the differences between the values of artificial intelligence literacy and general attitude towards artificial intelligence scales in three different groups of different age groups (31-40 years old, 41-50 years old, 51 years old and above) of teachers working with gifted students. In Table 7 below, descriptive statistical results of artificial intelligence literacy and general attitude towards artificial intelligence scales for each age group are given.

Table 7.

Descriptive Statistics Results of One-Way Anova Analysis for Unrelated Samples According to Different Age Groups

	Groups	N	Mean	Std. Deviation	95% CI for Mean Lower Bound	95% CI for Mean Upper Bound
Artificial Intelligence Literacy Scale	31-40	34	4,0588	0,47785	3,8921	4,2256
	41-50	60	4,1097	0,44587	3,9945	4,2249
	51 and above	13	4,0000	0,54857	3,6685	4,3315
General Attitude Scale towards Artificial Intelligence	31-40	34	3,8500	0,49175	3,6784	4,0216
	41-50	60	4,0508	0,55453	3,9076	4,1941
	51 and above	13	3,9615	0,64844	3,5697	4,3534

Levene's Test statistics and significance values are given in Table 8 to check whether the variances between the groups are homogenous.

Table 8.

Levene's Test Statistic Results According to Different Age Groups

	Levene Statistic	df1	df2	Sig.
Artificial Intelligence Literacy Scale	0,312	2	104	0,733
General Attitude Scale towards Artificial Intelligence	0,749	2	104	0,475

When Table 8 is analysed, since the p values are greater than 0,05, the variances are homogeneously distributed. Anova table evaluates whether the mean differences between groups are statistically significant (Öztürk, 2018). Table 9 shows the Anova results of the scales according to different age groups.

Table 9.

Anova Results According to Different Age Groups

		Sum of Squares	df	Mean Square	F	Sig.
Artificial Intelligence Literacy Scale	Between Groups	0,151	2	0,076	0,344	0,710
	In Group	22,875	104	0,220		
	Total	23,027	106			
General Attitude Scale towards Artificial Intelligence	Between Groups	0,879	2	0,439	1,466	0,236
	In Group	31,168	104	0,300		
	Total	32,047	106			

When Table 9 is examined, since p values are greater than 0,05, there is no statistically significant difference between the values of artificial intelligence literacy and general attitude towards artificial intelligence scale according to age groups. This shows that there is no significant difference between the groups.

One-way anova analysis for unrelated samples was performed to examine the differences between the values of artificial intelligence literacy and general attitude towards artificial intelligence scales in four different groups according to the duration of teachers working with gifted students (6-10 years, 11-15 years, 16-20 years, 21 years and above). In Table 10 below, descriptive statistics results of artificial intelligence literacy and general attitude towards artificial intelligence scales for each age group are given.

Table 10.

Descriptive Statistical Results of One-Way Anova Analysis for Unrelated Samples According to Working Hours in the Profession

	Groups	N	Mean	Std. Deviation	95% CI for Mean Lower Bound	95% CI for Mean Upper Bound
Artificial Intelligence Literacy Scale	6-10 Years	5	4,3167	0,45795	3,7480	4,8853
	11-15 Years	27	3,9753	0,48855	3,7820	4,1686
	16-20 Years	25	4,0967	0,42606	3,9208	4,2725
	21 Years and above	50	4,3167	0,47405	3,9703	4,2397
Attitude Scale towards Artificial Intelligence	6-10 Years	5	3,9800	0,60889	3,2240	4,7360
	11-15 Years	27	3,8037	0,53004	3,5940	4,0134
	16-20 Years	25	4,0020	0,42044	3,8285	4,1755
	21 Years and above	50	4,0560	0,60404	3,8843	4,2277

Levene's Test statistics and significance values are given in Table 11 to check whether the variances between the groups are homogenous.

Table 11.

Levene's Test Statistical Results According to Working Period in the Profession

	Levene Statistic	df1	df2	Sig.
Artificial Intelligence Literacy Scale	0,242	3	103	0,867

General Attitude Scale towards Artificial Intelligence	1,631	3	103	0,187	

When Table 11 is analysed, since the p values are greater than 0,05, the variances are homogeneously distributed. Table 12 shows the Anova results of the scales according to the working hours in the profession.

Table 12.

Anova Results According to Working Period in the Profession

		Sum of Squares	df	Mean Square	F	Sig.
Artificial Intelligence Literacy Scale	Between Groups	0,614	3	0,205	0,941	0,424
	In Group	22,413	103	0,218		
	Total	23,027	106			
General Attitude Scale towards Artificial Intelligence	Between Groups	1,138	3	0,379	1,265	0,290
	In Group	30,908	103	0,300		
	Total	32,047	106			

Upon examining Table 12, it can be observed that the p-values exceed 0.05, indicating that there is no statistically significant difference in artificial intelligence literacy and general attitudes towards artificial intelligence based on years of experience in the profession. This suggests that the differences between the groups are not significant.

To further investigate potential differences in artificial intelligence literacy and attitudes towards artificial intelligence among teachers working with gifted students at BİLSEM, a one-way ANOVA was conducted. This analysis compared four distinct groups based on their years of experience (1-5 years, 5-10 years, 10-15 years, and 16 years or more). In Table 13 below, the descriptive statistical results of the artificial intelligence literacy and general attitude towards artificial intelligence scales for the working time in each BİLSEM are given.

Table 13.

Descriptive Statistical Results of One-Way Anova Analysis for Unrelated Samples According to Working Period in BİLSEM

	Groups	N	Mean	Std. Deviation	95% CI for Mean Lower Bound	95% CI for Mean Upper Bound
Artificial Intelligence Literacy Scale	1-5 Years	69	4,0725	0,47805	3,9576	4,1873
	5-10 Years	28	4,1101	0,43982	3,9396	4,2807
	10-15 Years	4	3,7500	0,62731	2,7518	4,7482
	16 Years and above	6	4,2500	0,29814	3,9371	4,5629
General Attitude Scale	1-5 Years	69	3,9870	0,51311	3,8637	4,1102
	5-10 Years	28	3,9464	0,59316	3,7164	4,1764

towards Artificial Intelligence	10-15 Years	4	3,8875	0,79517	2,6222	5,1528
	16 Years and above	6	4,0500	0,72801	3,2860	4,8140

Levene's Test statistics and significance values are given in Table 14 to check whether the variances between the groups are homogenous.

Table 14.

Levene's Test Statistical Results According to Working Period in BİLSEM

	Levene Statistic	df1	df2	Sig.
Artificial Intelligence Literacy Scale	1,494	3	103	0,221
General Attitude Scale towards Artificial Intelligence	1,014	3	103	0,390

When Table 14 is analysed, since the p values are greater than 0,05, the variances are homogeneously distributed. Table 15 shows the Anova results of the scales according to the working hours in BİLSEM.

Table 15.

Anova Results According to Working Period in BİLSEM

		Sum of Squares	df	Mean Square	F	Sig.
Artificial Intelligence Literacy Scale	Between Groups	0,638	3	0,213	0,979	0,406
	In Group	22,388	103	0,217		
	Total	23,027	106			
General Attitude Scale towards Artificial Intelligence	Between Groups	0,097	3	0,032	0,104	0,957
	In Group	31,950	103	0,310		
	Total	32,047	106			

Table 15 reveals that the p-values are above 0,05, indicating no statistically significant differences in artificial intelligence literacy and general attitudes towards artificial intelligence based on the number of years worked at BİLSEM. This implies that there are no significant differences between the groups.

One-way anova analysis for unrelated samples was performed to examine the differences between the values of artificial intelligence literacy and general attitude towards artificial intelligence scales in three different groups according to the education levels (Bachelor's, Master's and Doctorate) of teachers working with gifted students. In Table 16 below, descriptive statistics results of artificial intelligence literacy and general attitude towards artificial intelligence scales for each education level are given.

Table 16.

Anova Results According to Working Period in BİLSEM

	Groups	N	Mean	Std. Deviation	95% CI for Mean Lower Bound	95% CI for Mean Upper Bound
Artificial Intelligence Literacy Scale	Licence	32	4,1641	0,46349	3,9970	4,3312
	Master's Degree	57	4,0512	0,49068	3,9210	4,1814
	PhD	18	4,0231	0,38752	3,8304	4,2159
General Attitude Scale towards Artificial Intelligence	Licence	32	4,0375	0,58833	3,8254	4,2496
	Master's Degree	57	3,9377	0,57533	3,7851	4,0904
	PhD	18	3,9889	0,38902	3,7954	4,1823

Levene's Test statistics and significance values are given in Table 17 to check whether the variances between the groups are homogenous.

Table 17.

Levene's Test Statistical Results According to Educational Background

	Levene Statistic	df1	df2	Sig.
Artificial Intelligence Literacy Scale	1,182	2	104	0,311
General Attitude Scale towards Artificial Intelligence	1,134	2	104	0,326

Analysis of Table 17 indicates that the p-values exceed 0,05, suggesting that the variances are homogeneously distributed. Table 18 presents the ANOVA results for the scales based on educational background.

Table 18.

Anova Results According to Educational Background

		Sum of Squares	df	Mean Square	F	Sig.
Artificial Intelligence Literacy Scale	Between Groups	0,332	2	0,166	0,760	0,470
	In Group	22,695	104	0,218		
	Total	23,027	106			
General Attitude Scale towards Artificial Intelligence	Between Groups	0,208	2	0,104	0,339	0,713
	In Group	31,839	104	0,306		
	Total	32,047	106			

When Table 18 is analysed, since the p values are greater than 0,05, there is no statistically significant difference between the values of artificial intelligence literacy and general attitude towards artificial intelligence scale according to educational status. This shows that there is no significant difference between the groups.

One-way anova analysis for unrelated samples was performed to examine the differences between the values of artificial intelligence literacy and general attitude towards artificial intelligence scales in nineteen different groups according to the branches of teachers working with gifted students (Physics, Chemistry, Biology, Science, Primary Mathematics, High School Mathematics, Philosophy, Geography, History, Turkish, Literature, Music, Visual Arts, Foreign Language, Social Sciences, Information Technologies, Technology and Design, Classroom Teaching, Psychological Counselling and Guidance). In Table 19 below, descriptive statistics results of artificial intelligence literacy and general attitude towards artificial intelligence scales for each branch are given.

Table 19.

Descriptive Statistics Results of One-Way Anova Analysis for Unrelated Samples According to Branches

	Groups	N	Mean	Std, Deviation	95% CI for Mean Lower Bound	95% CI for Mean Upper Bound
Artificial Intelligence Literacy Scale	Physics	6	4,4444	0,32347	4,1050	4,7839
	Chemistry	3	3,4167	0,36324	2,5143	4,3190
	Biology	6	3,9583	0,44954	3,4866	4,4301
	Science	7	4,4643	0,43795	4,0593	4,8693
	Primary Mathematics	8	3,8021	0,49988	3,3842	4,2200
	High School Maths	7	4,0833	0,37577	3,7358	4,4309
	Philosophy	3	4,0833	0,22048	3,5356	4,6310
	Geography	3	4,3056	0,37577	3,3721	5,2390
	History	7	4,0952	0,65692	3,4877	4,7028
	Turkish	9	4,0833	0,49652	3,7017	4,4650
	Literature	4	3,9792	0,45833	3,2499	4,7085
	Music	3	4,1389	0,19245	3,6608	4,6170
	Visual Arts	7	4,0000	0,68211	3,3692	4,6308
	Foreign Language	3	3,7222	0,29266	2,9952	4,4492
	Social Sciences	4	4,1667	0,44618	3,4567	4,8766
	Information Technology	3	3,7500	0,71200	1,9813	5,5187
	Technology and Design	8	4,1667	0,30861	3,9087	4,4247
	Classroom Teaching	7	4,2619	0,38917	3,9020	4,6218
	PDR	9	4,0556	0,26021	3,8555	4,2556
General Attitude Scale towards Artificial Intelligence	Physics	6	4,4917	0,21311	4,2680	4,7153
	Chemistry	3	3,3667	0,70946	1,6043	5,1291
	Biology	6	3,9667	0,42032	3,5256	4,4078
	Science and Technology	7	4,2000	0,42230	3,8094	4,5906
	Primary Mathematics	8	3,8313	0,60589	3,3247	4,3378
	High School Maths	7	3,5643	0,51778	3,0854	4,0432
	Philosophy	3	4,0500	0,88459	1,8526	6,2474
	Geography	3	4,5000	0,45000	3,3821	5,6179
	History	7	4,0929	0,45955	3,6678	4,5179
	Turkish	9	3,8278	0,45833	3,4755	4,1801
	Literature	4	4,3125	0,54218	3,4498	5,1752

Music	3	4,2000	0,69462	2,4745	5,9255
Visual Arts	7	3,6857	0,65174	3,0830	4,2885
Foreign Language	3	3,7833	0,75719	1,9024	5,6643
Social Sciences	4	3,8125	0,41908	3,1457	4,4793
Information Technology	3	3,6167	1,08666	0,9172	6,3161
Technology and Design	8	4,1563	0,36296	3,8528	4,4597
Classroom Teaching	7	4,0143	0,38157	3,6614	4,3672
PDR	9	4,0444	0,48441	3,6721	4,4168

Levene's Test statistics and significance values are given in Table 20 to check whether the variances between the groups are homogenous.

Table 20.

Levene's Test Statistic Results According to Branches

	Levene Statistic	df1	df2	Sig.
Artificial Intelligence Literacy Scale	1,697	18	88	0,055
General Attitude Scale towards Artificial Intelligence	1,137	18	88	0,332

Table 20 shows that the p-values are greater than 0,05, indicating that the variances are uniformly distributed. Table 21 presents the ANOVA results for the scales based on different teaching subjects.

Table 21.

Anova Results According to Branches

		Sum of Squares	df	Mean Square	F	Sig.
Artificial Intelligence Literacy Scale	Between Groups	5,146	18	0,286	1,407	0,149
	In Group	17,881	88	0,203		
	Total	23,027	106			
General Attitude Scale towards Artificial Intelligence	Between Groups	7,660	18	0,426	1,536	0,097
	In Group	24,387	88	0,277		
	Total	32,047	106			

When Table 21 is examined, since the p values are greater than 0.05, there is no statistically significant difference between the values of artificial intelligence literacy and general attitude towards artificial intelligence scale according to the branches. This shows that there is no significant difference between the groups.

4. Discussion and Conclusion

In this study, the general levels of artificial intelligence literacy and total scores towards artificial intelligence of teachers working with gifted students were revealed. In addition, it was evaluated in terms of variables such as gender, age, working time in the profession, working time in BİLSEM, education level and branch. The results revealed that these variables did not have significant effects on teachers' knowledge levels and attitudes towards artificial intelligence except for the gender variable.

In the analyses, it was observed that the scores of teachers working with gifted students on AI literacy and attitudes towards AI were positively high. Similar studies have also examined teachers' attitudes towards AI-based educational tools. According to the results, most of the teachers stated that AI tools can be useful in classroom applications. However, some teachers expressed concerns that AI could reduce the role of teachers or that over-dependence on these technologies could harm pedagogical approaches (Zawacki-Richter et al., 2019).

In the study conducted by Johnson et al. (2017), the advantages of artificial intelligence tools for teachers in classroom management were examined in detail. The study revealed that teachers improved classroom management processes such as lesson planning and student engagement by using artificial intelligence technologies.

The study by Seyrek et al. (2024) indicates that teachers generally have a positive outlook on incorporating artificial intelligence into their lessons. The findings suggest that teachers recognize the potential benefits of AI in education and believe that this technology has the capability to enhance students' learning experiences. It is seen that teachers have an opinion that AI-supported tools can make significant contributions in areas such as preparing course materials, evaluating student performance and providing individualised feedback.

In the analyses, it was found that male teachers were more knowledgeable about artificial intelligence than female teachers and had a more positive approach to these technologies. This result shows that men tend to show more interest in technology and adopt new technologies faster. Different studies similar to this one show that men develop more positive attitudes towards the use of artificial intelligence and technology and have higher self-confidence. However, it should be taken into consideration that these differences may vary depending on variables such as education, cultural factors and level of exposure to

technology. Several studies suggest that men have higher self-confidence in the use of technology and therefore their attitudes towards advanced technologies such as artificial intelligence may be more positive. For example, studies on STEM (science, technology, engineering and maths) fields in education reveal that males have more interest and motivation in these fields (Stoet, & Geary, 2018). Gender differences play an important role in self-confidence and attitudes towards technology. Men exhibit higher self-confidence because they are generally more exposed to technology. This may also manifest itself in attitudes towards new technologies such as artificial intelligence (Cassell, 2002).

In the age-based evaluations, there is no significant difference in the age factor in both scales. However, it was observed that younger teachers had higher AI literacy levels, but older teachers had a more positive attitude towards AI. It is thought that younger teachers' better knowledge of technology makes them have a higher level of knowledge, while the positive attitudes of more experienced teachers stem from their professional experience.

Although there was no direct relationship between the time spent in the profession and artificial intelligence literacy, it was revealed that teachers with longer professional experience had a more positive attitude towards artificial intelligence. This situation suggests that experienced teachers are more open to innovations.

Although there was no direct relationship between the time spent in BİLSEM and artificial intelligence literacy, it was observed that the artificial intelligence literacy and attitudes of teachers who worked longer were more positive. This finding indicates that experiences in BİLSEM enable teachers to use artificial intelligence technologies more effectively.

In the evaluations made depending on the level of education, there is no significant difference in the education level factor in both scales. However, it is seen that bachelor's degree graduates draw a slightly more positive picture about artificial intelligence.

In the evaluations made depending on the branches, there is no significant difference in the branches factor in both scales. However, it was determined that teachers working in science and technology approached artificial intelligence more positively than their colleagues in other branches. This can be explained by the fact that these branches are more prone to technology by nature. It is emphasised that the technological competencies of teachers in other branches should be increased.

The findings of the study show that teachers' AI literacy and attitudes are not significantly affected by factors other than gender. It has been observed that gender has a significant effect on technological knowledge and attitudes, and male teachers are more open and predisposed to technology. This situation reveals that female teachers should be supported more in accessing and using technology. Although young teachers have a higher level of knowledge, experienced teachers have more positive attitudes. These findings draw attention to the importance of professional development programmes for teachers to use artificial intelligence technologies more effectively. It shows that the additional courses and experiences that teachers receive during in-service training processes contribute to their being more open to technological innovations.

Artificial intelligence has a great potential in the field of education. However, in order to realise this potential, teachers need to have artificial intelligence literacy. This literacy allows teachers to both improve their own pedagogical approaches and provide a more qualified education to their students. Therefore, it is of great importance to develop programmes and strategies that focus on teachers' AI literacy.

Teachers' attitudes towards artificial intelligence is a factor that directly affects the success of this technology in education. While positive attitudes facilitate the adoption and effective use of artificial intelligence by teachers, negative attitudes can create significant obstacles in integration processes. Therefore, providing the necessary training and support programmes for teachers to develop a positive attitude towards artificial intelligence is of great importance for the full realisation of the potential of artificial intelligence in education.

5. References

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