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Investigating Teachers' Awareness Levels of Artificial Intelligence Based on Different Variables

Mesut Ayaz[1], Hasan Karal[1], Ali Kürşat Erümit[1]

[1]Trabzon University, Fatih Faculty of Education, Department of Computer and Instructional Technologies Education, Trabzon

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Abstract

The main purpose of this study is to determine the artificial intelligence awareness levels of teachers working in Trabzon. In this study, the relational screening model, one of the quantitative research methods, was used. The sample of the study consists of 519 primary and secondary school teachers working in Trabzon. According to the data obtained, participants in the 24-30 age group have significantly higher scores than other age groups in all sub-dimensions and total self-efficacy score. In addition, the 31-40 age group also scored higher than older age groups in the Associative sub-dimension. It was also determined that the 31-40 age group had significantly higher scores than the 41-50 and 51 and above age groups in the Associative sub-dimension. The research results show that the professional experience of teachers significantly affects their scores in various sub-dimensions. In particular, teachers with 1-5 years of experience received higher scores in many dimensions, while those with 11-20 years of experience received lower scores in some dimensions. Participants with postgraduate education had significantly higher scores compared to undergraduate graduates in the sub-dimensions of Application Knowledge, Ability to Relate, and Theoretical Knowledge. Similarly, the Teachers' Artificial Intelligence Awareness Level Scale (AIALS) scores also showed a significant difference in favor of postgraduate graduates. It shows that the self-efficacy levels of teachers differ significantly according to their branches. Information Technologies teachers had statistically significantly higher scores in all sub-dimensions and total scores compared to other branches. The research findings show that the strength of the connection that teachers establish between their field knowledge and artificial intelligence technologies shapes their awareness levels. It was determined that the AIALS and sub-dimension scores of participants working in rural areas/villages were significantly lower than those working in provincial and district centers.

Keywords: teachers, artificial intelligence awareness, relational screening model

Öğretmenlerin Yapay Zeka Farkındalık Düzeylerinin Çeşitli Değişkenler Açısından İncelenmesi

Öz

Bu araştırmanın amacı, Trabzon ili özelinde görev yapan öğretmenlerin yapay zeka farkındalık düzeylerini belirlemektir. Bu çalışmada, nicel araştırma yöntemlerinden biri olan ilişkisel tarama modeli kullanılmıştır. Araştırmanın örneklemi, Trabzon ilinde görev yapan 519 ilkokul ve ortaokul öğretmenden oluşmaktadır. Elde edilen verilere göre, 24-30 yaş grubundaki katılımcılar tüm alt boyutlar ve toplam öz-yeterlilik puanında diğer yaş gruplarına kıyasla anlamlı düzeyde daha yüksek puanlara sahiptir. Ayrıca, 31-40 yaş grubu da İlişkilendirebilme boyutunda daha ileri yaş gruplarına göre daha yüksek puan almıştır. Ayrıca İlişkilendirebilme alt boyutunda 31-40 yaş grubunun, 41-50 ve 51 yaş ve üstü gruplara göre anlamlı düzeyde daha yüksek puanlara sahip olduğu da belirlenmiştir. Araştırma sonuçları, öğretmenlerin mesleki deneyim süresinin çeşitli alt boyutlardaki puanlarını anlamlı şekilde etkilediğini göstermektedir. Özellikle 1-5 yıl deneyime sahip öğretmenler, birçok boyutta daha yüksek puanlar alırken; 11-20 yıl deneyime sahip olanlar bazı boyutlarda daha düşük puanlara sahiptir. Uygulama Bilgisi, İlişkilendirebilme ve Teorik Bilgi alt boyutlarında lisansüstü eğitim almış katılımcılar, lisans mezunlarına kıyasla anlamlı düzeyde daha yüksek puanlara sahiptir. Öğretmenelerin Yapay Zeka Farkındalık Düzeyi Ölçeği (ÖYZFDÖ) puanları da lisansüstü mezunlar lehine anlamlı bir farklılık göstermektedir. Öğretmenlerin branşlarına göre öz-yeterlilik düzeylerinin anlamlı biçimde farklılaştığını göstermektedir. Bilişim Teknolojileri öğretmenleri, tüm alt boyutlar ve toplam puanda diğer branşlara kıyasla istatistiksel olarak anlamlı düzeyde daha yüksek puanlara sahiptir. Araştırma bulguları, öğretmenlerin alan bilgisiyle yapay zeka teknolojileri arasında kurdukları bağın gücünün, farkındalık düzeylerini şekillendirdiğini göstermektedir. Taşra/köyde görev yapan katılımcıların ÖYZFDÖ ve alt boyut puanları, il ve ilçe merkezinde görev yapanlara göre anlamlı düzeyde daha düşük olduğu belirlenmiştir.

Sorumlu Yazar / Corresponding Author: Ali Kürşat Erümit kerumit@trabzon.edu.tr

Anahtar Kelimeler: öğretmenler, yapay zekâ farkındalığı, ilişkisel tarama

Introduction

In today's world, artificial intelligence (AI) technologies have begun to exert influence not only in the industrial and service sectors but also in fields that lie at the heart of social transformation processes, such as education. Artificial intelligence is an interdisciplinary field of science that aims to enable computer-based systems to solve problems by thinking in ways similar to human cognitive abilities (Kış, 2019). AI systems are expected to perform cognitive skills such as reasoning, predicting, generalizing, and learning from experience (Akdeniz & Özdinç, 2021).

In this context, artificial intelligence can be defined as "the science and engineering of developing machines or computer programs with human-like intelligence." This definition encompasses the transfer of high-level cognitive skills unique to the human mind—such as reasoning, problem-solving, inference, and generalization—into a computational environment (Alpaydın, 2013).

Artificial intelligence offers individualized learning experiences with its capabilities such as decision-making, learning and analysis, reduces teachers' workload and makes teaching processes more efficient (Hasanov et al., 2019; Ünal, 2025). However, the effectiveness of this transformation depends on teachers' high awareness and competence levels regarding artificial intelligence (Alam, 2021; Karakose et al., 2023).

AI's capabilities in decision-making, learning, and analysis offer various opportunities, including the provision of personalized learning experiences, reduction of teachers' workloads, and enhancement of instructional processes (Hasanov et al., 2019; Ünal, 2025). While this transformation is reshaping teaching processes, it also profoundly affects the roles and functions of teachers.

Despite the growing prevalence of artificial intelligence in education, the literature contains only a limited number of studies on teachers' awareness levels regarding these technologies (Arık & Seferoğlu, 2020). However, teachers' attitudes, beliefs, and how they position these technologies in educational settings are critically important for the successful integration of AI into classroom environments (Alam, 2021; Karakose et al., 2023). While discussions continue about whether AI systems might replace teachers, there is a consensus that these technologies should be seen as tools that support teachers' pedagogical guidance roles (Nabiyev & Erümit, 2022). In this context, teachers' knowledge and competence levels regarding artificial intelligence technologies need to be examined multidimensionally.

The impact of AI technologies on education continues to grow each day, offering various opportunities such as personalized learning, reducing teacher workload, and improving instructional quality (Hasanov et al., 2019; Ünal, 2025). However, in this transformation process, teachers' awareness of AI technologies emerges as a critical factor in ensuring their effective and efficient use in classrooms (Alam, 2021; Karakose et al., 2023).

In this regard, it can be stated that teachers' knowledge levels about AI technologies determine the nature of their interaction with these tools. Specifically, identifying teachers' theoretical knowledge, practical experience, and competencies in integrating AI into pedagogical processes is essential for achieving a healthy digital transformation in education. Nonetheless, demographic variables such as age, field of teaching, seniority, and education level may also influence their awareness levels (Çam et al., 2021; Uyak et al., 2024).

An overall evaluation of national studies suggests that teachers in Türkiye generally exhibit a positive and increasing awareness of AI technologies. It is particularly noteworthy that teachers' practice-oriented knowledge levels are higher, and there are areas open to development in terms of theoretical knowledge and pedagogical integration (Ferikoğlu, 2021; İçöz & İçöz, 2024). Studies conducted with qualified samples show that teachers recognize the potential contributions of AI in education and have developed largely positive attitudes toward these technologies (Savaş, 2021;

Ünal, 2025). Comprehensive data have been obtained through developed scales and survey models regarding teachers' practical knowledge, theoretical understanding, attitudes, and levels of association with AI (Ferikoğlu & Akgün, 2022).

It is particularly noteworthy that teachers tend to have higher levels of practical knowledge, whereas theoretical knowledge and pedagogical integration remain areas open to improvement (Ferikoğlu, 2021; İçöz & İçöz, 2024). Some studies also highlight the influence of variables such as age, subject area, academic level, and duration of technology use on awareness levels, noting that younger teachers and those with graduate-level education (master's or doctoral degrees) tend to have higher awareness (Uygun et al., 2024; Ünal, 2025).

Metaphor analyses (Gölbaşı & Okul, 2024), pedagogical approaches (İçen, 2024), and thesis studies focusing on readiness levels (Tokatlı, 2024) have contributed to a deeper understanding of teachers' perceptions and professional intentions toward AI. On the other hand, some studies have revealed that while teachers believe AI technologies will be effective in education, they also feel inadequately informed about these tools (Seyrek et al., 2024).

International research indicates that the effects of AI technologies in education are multidimensional, offering both significant opportunities and challenges in teaching processes and educational administration. While the benefits of AI in areas such as personalized learning, administrative efficiency, and teacher support systems are emphasized, discussions continue regarding how these technologies should be used pedagogically and ethically (Chen et al., 2020; Igbokwe, 2023; Zawacki-Richter et al., 2019).

Many studies highlight that teachers have limited knowledge of AI technologies but still view them as opportunities in education (Chounta et al., 2022; Kalnina et al., 2024). Research involving pre-service teachers especially draws attention to the need to increase awareness and develop pedagogical integration skills (AlKanaan, 2022).

The main aim of this study is to determine the awareness levels of teachers working in the province of Trabzon regarding artificial intelligence, in relation to various variables. Within this scope, the study seeks to answer the following research questions:

1. Is there a significant difference in teachers' Artificial Intelligence Awareness Level Scale (AIALS) scores based on gender?
2. Is there a significant difference in teachers' AIALS scores based on age?
3. Is there a significant difference in teachers' AIALS scores based on years of professional experience?
4. Is there a significant difference in teachers' AIALS scores based on their educational background?
5. Is there a significant difference in teachers' AIALS scores based on their subject area?
6. Is there a significant difference in teachers' AIALS scores based on the location of the schools in which they work?

In line with this aim, it is expected that the findings obtained from the study will contribute to the planning of digital transformation policies in education in Türkiye, the restructuring of teacher training programs, and the development of AI-supported learning environments.

Method

Research Design

In this study, the correlational survey model, one of the quantitative research methods, was employed. The correlational survey model is one of the research designs developed to examine the relationships between multiple variables (Şimşek, 2012). Through this model, the direction and

strength of the relationships between the variables were systematically analyzed. In this way, meaningful associations among the variables included in the research were revealed, and the impact of these relationships on teachers' levels of artificial intelligence awareness was evaluated.

Inclusion Criteria and Sample

The population of this study consists of a total of 5,950 teachers working in the province of Trabzon (primary school: 2,590; middle school: 3,360). The sample size was determined based on a 95% confidence level and a 5% margin of error. In this context, the sample size calculation formula used when the universe is known, "n= (N·z2·p·(1−p))/ ((N−1)·e2+z2·p·(1−p))", was used. Here, n represents the sample size, N represents the universe size, z represents 1.96 for a 95% confidence level, p represents the probability of success in sampling (taken as 0.5), and e represents the acceptable margin of error (%0.05). The sample of 361 reached in line with these calculations represents the minimum sample size sufficient to represent the universe. In this context, the sample of the research consists of 519 primary and secondary school teachers working in the province of Trabzon. A simple random sampling method was used to select the sample. This method is one of the probabilistic sampling techniques in which each individual in the population has an equal chance of being included in the sample. Information related to the sample is presented in Table 1.

Table 1. Demographic Characteristics

		n	%
Gender	Female	295	56,8
	Male	224	43,2
Age	24-30	68	13,1
	31-40	160	30,8
	41-50	192	37,0
	51 and above	99	19,1
Years of Professional Experience	1-5 year	71	13,7
	6-10 year	91	17,5
	11-20 year	182	35,1
	21-30 year	132	25,4
	31-41 year	43	8,3
Educational Level	Bachelor's Degree	419	80,7
	Master's Degree	100	19,3
Field of Teaching	Turkish	36	6,9
	Mathematics	56	10,8
	Science	39	7,5
	Social Studies	14	2,7
	Foreign Language	26	5,0
	Physical Education	23	4,4
	Guidance and Counseling	17	3,3
	Information Technologies (IT)	24	4,6
	Primary School Teacher	214	41,2
	Preschool Teacher	12	2,3
	Religious Culture and Ethics	18	3,5
	Other	40	7,7
School Location	City Center	262	50,5
	District Center	129	24,9
	Village	128	24,7

Based on the demographic data presented in Table 1, 56.8% of the 519 participants in the study are female, while 43.2% are male. Analysis of the age distribution reveals that the largest cohort, accounting for 37.0% of the sample, falls within the 41–50 age range, followed by the 31–40 age group at 30.8%. Participants aged 24–30 and those aged 51 and above constitute 13.1% and 19.1% of the sample, respectively. Regarding professional tenure, 35.1% of the respondents reported having 11–20 years of experience, followed by 25.4% with 21–30 years, 17.5% with 6–10 years, 13.7% with 1–5 years, and 8.3% with 31–41 years of service. These findings suggest that the sample

predominantly comprises experienced educators. In terms of educational attainment, a substantial majority (80.7%) hold a bachelor's degree, whereas 19.3% have pursued graduate studies. With respect to subject specialization, classroom teachers represent the largest group at 41.2%, succeeded by mathematics teachers (10.8%), science teachers (7.5%), those in other disciplines (7.7%), Turkish language teachers (6.9%), and foreign language teachers (5.0%). The proportions of social studies (2.7%), physical education (4.4%), guidance and counseling (3.3%), information technology (4.6%), preschool education (2.3%), and religious culture and ethics (3.5%) are comparatively lower. Finally, an examination of the geographical distribution of schools indicates that 50.5% of participants are employed in city centers, 24.9% in district centers, and 24.7% in rural or village settings.

Data Analysis and Research Procedures

In this study, a two-part data collection instrument was meticulously developed by the researcher, comprising a demographic information form and the "Teachers' Artificial Intelligence Awareness Level Scale." Data were collected via an online survey administered through Google Forms between April and May 2025. Participation was entirely voluntary, ensuring ethical compliance with informed consent principles. Although there were risks of bias due to the nature of the online application, such as access issues and voluntary participation, the form was sent to all teachers via official school email groups and administrators to reduce the impact of this situation. In addition, the participation process was widely announced to ensure inclusiveness. The Teachers' Artificial Intelligence Awareness Level Scale, originally developed by Ferikoğlu and Akgün (2022), encompasses four distinct subscales: Practical Knowledge, Beliefs and Attitudes, Relational Competence, and Theoretical Knowledge. The instrument employs a five-point Likert scale format and contains no reverse-scored items. The original validation study reported a Cronbach's Alpha coefficient of 0.986, indicative of excellent internal consistency and reliability. Data were analyzed using SPSS 23 program. T-test and ANOVA tests were used to analyze the data. In this context, since multiple group comparisons were made in the study, Bonferroni correction was applied to reduce the risk of false positivity and the significance level was adapted according to the number of relevant tests.

Scale Reliability Analysis

Cronbach's alpha coefficient is a widely accepted indicator of internal consistency reliability for measurement instruments, with values ranging from 0 to 1. According to Tavşancıl (2005), alpha values between 0.00 and 0.40 denote insufficient reliability, values between 0.40 and 0.60 indicate low reliability, values within the range of 0.60 to 0.80 reflect moderate to acceptable reliability, and values from 0.80 to 1.00 are indicative of high internal consistency reliability.

Table 2. Scale Reliability Assessment

	Item Count	Cronbach's Alfa
Practical Knowledge	16	0,935
Beliefs and Attitudes	14	0,934
Relational Competence	10	0,898
Theoretical Knowledge	11	0,903
AIALS	51	0,973

Table 2 presents the results of the reliability analysis of the Teachers' Artificial Intelligence Awareness Level Scale (AIALS) and its sub-dimensions, including the obtained Cronbach's alpha coefficients. According to the Cronbach's alpha values, the scale demonstrates a high level of internal consistency reliability.

Findings

This section presents the findings obtained from the conducted analysis. Descriptive statistics are provided in Table 3.

Table 3. Descriptive Statistics

	$\bar{X}$	SS.	Min.	Maks.	Skewness	Kurtosis
Practical Knowledge	3,73	0,63	1,81	5	-0,202	-0,292
Beliefs and Attitudes	3,38	0,72	1,21	5	0,111	0,026
Relational Competence	3,46	0,68	1,00	5	0,269	0,431
Theoretical Knowledge	3,57	0,64	1,91	5	0,257	-0,078
AIALS	3,55	0,60	1,73	5	0,287	-0,043

To assess the normality of the data obtained from the Teachers' Artificial Intelligence Awareness Level Scale (AIALS) and its subscales, skewness and kurtosis values were computed. According to the literature, skewness and kurtosis values within the range of ±1 indicate an acceptable approximation to normal distribution (De Carlo, 1997; Hopkins & Weeks, 1990). The results reveal that both the overall scale and its subscales meet the assumptions of normality. Consequently, parametric statistical techniques were employed in subsequent analyses. Table 4 displays the comparative results of AIALS and its subscale scores based on participants' gender.

Table 4. Comparison of Participants' Scores on the Teachers' Artificial Intelligence Awareness Level Scale (AIALS) and Its Subscales by Gender

	Female		Male		t	*p*
	$\bar{X}$	SS.	$\bar{X}$	SS.		
Practical Knowledge	3,73	0,55	3,74	0,73	-0,125	0,900
Beliefs and Attitudes	3,29	0,68	3,51	0,75	-3,445	0,001*
Relational Competence	3,39	0,60	3,55	0,75	-2,614	0,009*
Theoretical Knowledge	3,54	0,57	3,62	0,72	-1,349	0,178
AIALS	3,50	0,53	3,61	0,68	-2,021	0,044*

The table presents the results of the independent samples t-test conducted to compare the scores on the AIALS for Teachers and its sub-dimensions based on participants' gender. The findings indicate that there are statistically significant differences in the sub-dimensions of Belief-Attitude, Ability to Relate, and the overall AIALS scores with respect to gender.

More specifically, male participants obtained significantly higher scores than female participants in both the Belief-Attitude and Ability to Relate sub-dimensions. Likewise, the total score on the AIALS was significantly higher for male participants compared to their female counterparts. In contrast, no statistically significant gender differences were observed in the Practical Knowledge and Theoretical Knowledge sub-dimensions.

Table 5 presents the results regarding the comparison of AIALS and its sub-dimension scores based on participants' age.

Table 5. Comparison of AIALS and Its Sub-Dimension Scores in Terms of Participants' Age

	24-30		31-40		41-50		51 and above		*f*	*p*
	$\bar{X}$	SS.	$\bar{X}$	SS.	$\bar{X}$	SS.	$\bar{X}$	SS.		
Practical Knowledge	4,12	0,69	3,75	0,60	3,59	0,60	3,72	0,60	12,839	0,000*
Beliefs and Attitudes	3,95	0,91	3,39	0,74	3,25	0,57	3,23	0,61	12,937	0,000*
Relational Competence	3,98	0,89	3,51	0,70	3,33	0,55	3,29	0,49	13,374	0,000*
Theoretical Knowledge	4,02	0,81	3,56	0,63	3,46	0,58	3,51	0,49	9,497	0,000*
AIALS	4,03	0,77	3,56	0,60	3,42	0,51	3,45	0,46	13,063	0,000*

The table presents the results of the ANOVA test conducted to compare the scores on the AIALS for teachers and its sub-dimensions across different age groups. The analysis revealed that there were statistically significant differences in all sub-dimensions and in the total AIALS score based on participants' age.

Specifically, participants in the 24–30 age group scored significantly higher than those in the 31–40, 41–50, and 51+ age groups in the sub-dimensions of Practical Knowledge, Belief-Attitude, Ability to Relate, Theoretical Knowledge, and in the total AIALS score. Furthermore, within the Ability to Relate sub-dimension, participants aged 31–40 also had significantly higher scores than those in the 41–50 and 51+ age groups. Table 6 presents the results of the comparison of AIALS and its sub-dimension scores based on participants' years of professional experience.

Table 6. Comparison of AIALS and Its Sub-Dimension Scores Based on Participants' Years of Professional Experience

	1-5 year		6-10 year		11-20 year		21-30 year		31-41 year		*f*	*p*
	$\bar{X}$	SS.	$\bar{X}$	SS.	$\bar{X}$	SS.	$\bar{X}$	SS.	$\bar{X}$	SS.		
Practical Knowledge	3,95	0,73	3,75	0,73	3,58	0,62	3,83	0,51	3,69	0,49	5,713	0,000*
Beliefs and Attitudes	3,84	0,85	3,48	0,84	3,21	0,64	3,31	0,61	3,35	0,47	8,511	0,000*
Relational Competence	3,85	0,81	3,60	0,83	3,31	0,64	3,41	0,47	3,33	0,46	7,662	0,000*
Theoretical Knowledge	3,89	0,78	3,64	0,76	3,38	0,60	3,62	0,49	3,58	0,39	7,742	0,000*
AIALS	3,89	0,75	3,62	0,73	3,38	0,55	3,56	0,44	3,50	0,36	7,630	0,000*

The table presents the results of the ANOVA test conducted to compare participants' scores on the AIALS for teachers and its sub-dimensions according to their years of professional experience. The analysis revealed statistically significant differences in all sub-dimensions and in the total AIALS score based on professional seniority.

A significant difference was found in the Practical Knowledge sub-dimension scores according to years of experience. Participants with 11–20 years of experience scored significantly lower than those with 1–5 years and 21–30 years of experience. In the Belief-Attitude sub-dimension, participants with 1–5 years of experience scored significantly higher than those with 11–20, 21–30, and 31–41 years of experience. Similarly, in the Ability to Relate sub-dimension, participants with 1–5 years of experience scored significantly higher than those with 11–20, 21–30, and 31–41 years of experience. Additionally, participants with 6–10 years of experience scored significantly higher than those with 11–20 years of experience.

In the Theoretical Knowledge sub-dimension, participants with 11–20 years of experience scored significantly lower than those with 1–5 and 21–30 years of experience. Significant differences were also observed in the total AIALS scores. Participants with 1–5 years of experience obtained significantly higher total scores compared to those with 11–20, 21–30, and 31–41 years of experience. Moreover, participants with 11–20 years of experience scored significantly lower than those with 21–30 years of experience.

Table 7 presents the results of the comparison of AIALS and its sub-dimension scores based on participants' educational levels.

Table 7. Comparison of AIALS and Its Sub-Dimension Scores Based on Participants' Educational Levels

	Bachelor's Degree		Master's Degree		t	*p*
	$\bar{X}$	SS.	$\bar{X}$	SS.		
Practical Knowledge	3,68	0,65	3,95	0,52	-4,337	0,000*
Beliefs and Attitudes	3,35	0,72	3,50	0,73	-1,768	0,078
Relational Competence	3,43	0,68	3,60	0,64	-2,318	0,021*
Theoretical Knowledge	3,55	0,64	3,69	0,61	-1,980	0,048*
AIALS	3,51	0,61	3,70	0,55	-2,792	0,005*

The table presents the results of an independent samples t-test comparing participants' scores on the AIALS for teachers and its sub-dimensions based on their educational levels. The analysis revealed significant differences in some dimensions according to education level.

Participants with postgraduate education scored significantly higher than those with a bachelor's degree in the *Practical Knowledge* sub-dimension. A significant difference favoring the postgraduate group was also observed in the *Ability to Relate* and *Theoretical Knowledge* sub-dimensions. Similarly, the total AIALS scores of postgraduate participants were significantly higher compared to bachelor's degree holders. However, no statistically significant difference was found between the groups in the *Belief-Attitude* sub-dimension.

Table 8 presents the results of the comparison of AIALS and its sub-dimension scores based on participants' subject areas.

Table 8. Comparison of AIALS and Its Sub-Dimension Scores Based on Participants' Subject Areas

		Practical Knowledge	Beliefs and Attitudes	Relational Competence	Theoretical Knowledge	AIALS
Turkish	$\bar{X}$	3,56	3,35	3,33	3,46	3,43
	SS.	0,52	0,54	0,49	0,50	0,43
Mathematics	$\bar{X}$	3,86	3,42	3,49	3,63	3,62
	SS.	0,61	0,85	0,72	0,64	0,64
Science	$\bar{X}$	3,85	3,48	3,58	3,70	3,66
	SS.	0,61	0,82	0,78	0,67	0,66
Social Studies	$\bar{X}$	3,91	3,65	3,76	3,79	3,78
	SS.	0,83	0,82	0,86	0,78	0,80
Foreign Language	$\bar{X}$	3,85	3,49	3,47	3,58	3,62
	SS.	0,45	0,72	0,67	0,61	0,56
Physical Education	$\bar{X}$	3,58	3,30	3,52	3,45	3,46
	SS.	0,50	0,44	0,35	0,51	0,36
Guidance and Counseling	$\bar{X}$	3,63	3,27	3,38	3,55	3,46
	SS.	0,57	0,79	0,71	0,71	0,65
Information Technologies (IT)	$\bar{X}$	4,46	3,97	4,28	4,16	4,23
	SS.	0,44	0,82	0,56	0,56	0,54
Primary School Teacher	$\bar{X}$	3,59	3,25	3,37	3,51	3,44
	SS.	0,67	0,69	0,65	0,67	0,60
Preschool Teacher	$\bar{X}$	3,70	3,09	3,18	3,53	3,39
	SS.	0,47	0,80	0,83	0,42	0,56
Religious Culture and Ethics	$\bar{X}$	3,92	3,46	3,36	3,49	3,59
	SS.	0,50	0,54	0,62	0,52	0,45
Other	$\bar{X}$	3,82	3,57	3,49	3,51	3,62
	SS.	0,54	0,56	0,57	0,55	0,49
	f	7,657	3,031	4,710	2,663	4,611
	p	0,000*	0,001*	0,000*	0,003*	0,000*

The table presents the results of the ANOVA test comparing participants' scores on the AIALS for teachers and its sub-dimensions according to their subject areas. The analysis revealed statistically significant differences across all sub-dimensions and the total AIALS score based on subject area.

In the *Practical Knowledge* sub-dimension, participants teaching in the Information Technology (IT) branch scored significantly higher than those in Turkish, Mathematics, Science, Foreign Language, Physical Education, Guidance Counseling, Classroom Teaching, Preschool Teaching, and other subject areas. Similarly, in the *Belief-Attitude* sub-dimension, IT teachers obtained significantly higher scores compared to those in Turkish, Classroom Teaching, and Preschool Teaching.

Regarding the *Ability to Relate* sub-dimension, IT teachers scored significantly higher than teachers in Turkish, Mathematics, Science, Foreign Language, Physical Education, Guidance Counseling, Classroom Teaching, Preschool Teaching, Religious Culture and Moral Knowledge, and other branches. In the *Theoretical Knowledge* sub-dimension, IT teachers' scores were also significantly higher compared to those in Turkish, Mathematics, Physical Education, Classroom Teaching, Religious Culture and Moral Knowledge, and other subject areas.

Significant differences were also found in the total AIALS scores, with IT teachers scoring significantly higher than teachers in Turkish, Mathematics, Science, Foreign Language, Physical Education, Guidance Counseling, Classroom Teaching, Preschool Teaching, Religious Culture and Moral Knowledge, and other branches. Table 9 presents the results of the comparison of AIALS and its sub-dimension scores based on the geographical location of participants' schools.

Table 9. Comparison of AIALS and Its Sub-Dimension Scores Based on the Geographical Location of Participants' Schools

	City Center		District Center		Village		f	p
	$\bar{X}$	SS.	$\bar{X}$	SS.	$\bar{X}$	SS.		
Practical Knowledge	SS.	0,55	3,84	0,58	3,29	0,64	43,451	0,000*
Beliefs and Attitudes	3,47	0,71	3,42	0,74	3,15	0,66	9,045	0,000*
Relational Competence	3,54	0,67	3,55	0,66	3,22	0,64	11,299	0,000*
Theoretical Knowledge	3,70	0,60	3,64	0,63	3,25	0,62	24,162	0,000*
AIALS	3,67	0,56	3,62	0,58	3,23	0,59	26,363	0,000*

The table presents the results of the ANOVA test comparing participants' scores on the AIALS for teachers and its sub-dimensions based on the geographical location of their schools. The findings indicate statistically significant differences in all sub-dimensions and the total AIALS scores according to the location of the school.

In the Practical Knowledge sub-dimension, participants working in rural/village schools scored significantly lower than those working in provincial and district centers. Similarly, in the Belief-Attitude sub-dimension, participants in rural/village locations had significantly lower scores compared to those in provincial and district centers. The Ability to Relate sub-dimension also showed significantly lower scores for rural/village participants relative to their counterparts in provincial and district centers. In the Theoretical Knowledge sub-dimension, the rural/village group scored significantly lower than participants from provincial and district centers. Likewise, total AIALS scores were significantly lower among teachers working in rural/village schools compared to those in provincial and district centers.

Conclusions and Suggestions

In this study, teachers' levels of artificial intelligence (AI) awareness were examined. According to the data obtained, male participants had significantly higher scores than female participants in the sub-dimensions of Belief-Attitude, Ability to Relate, and the overall AI Awareness Scale for Teachers (AIWST). This finding is consistent with some studies, while contradicting others. For instance, in a study conducted by İçöz and İçöz (2024), it was found that male pre-service Turkish language teachers had higher levels of awareness regarding AI applications in relation to gender, supporting the current study's finding in favor of male participants. Similarly, studies by Aksoğan and Özek (2020) and Şahin and Namlı (2019) also reported significant differences favoring male teachers in terms of gender. These studies indicate that male teachers tend to have higher levels of awareness and ability to relate to technological innovations. However, there is limited discussion in the literature on the reasons for these differences; it is thought that gender-based differences may be related to individuals' opportunities to access technology, social roles shaping attitudes towards technology, or differences in self-efficacy perception. In this context, it is important to consider the current findings together with contextual and cultural dynamics.

On the other hand, researchers such as Selwyn (2019) and Yılmaz (2014) have reported that female pre-service teachers demonstrate more innovative attitudes in professional contexts, indicating a higher potential for openness to innovation. Additionally, studies by Süer and Oral (2021) and Ünal (2025) found no significant differences in AI awareness levels between male and female teachers. These discrepancies may be attributed to factors such as the measurement tools used, participant profiles, and the diversity of sample groups. Therefore, the findings of the current study suggest that gender may have an impact on AI awareness and attitudes, but the generalizability of this relationship should be evaluated carefully.

Participants aged 24–30 were found to have significantly higher scores in the sub-dimensions of Practical Knowledge, Belief-Attitude, Ability to Relate, Theoretical Knowledge, and overall AIWST scores compared to those in the 31–40, 41–50, and 51+ age groups. This indicates that individuals in younger age groups possess stronger perceptions of both theoretical and practical competencies and more positive attitudes towards instruction. Additionally, the 31–40 age group also scored significantly higher than the 41–50 and 51+ age groups in the Ability to Relate sub-dimension. These findings align with those of Uygun et al. (2024), who found that younger and academically more qualified teachers had higher levels of AI awareness. This may be explained by the fact that younger individuals are more immersed in digital technologies and show less resistance to integration. Moreover, the increased emphasis on technological competencies in current teacher education programs may also contribute to this difference.

However, the literature also includes studies reporting different results regarding the age variable. For example, Ünal (2025) reported no significant differences in teachers' AI awareness levels based on age. Selwyn (2008) stated that although older teachers may have less favorable attitudes toward technology compared to younger colleagues, all age groups can reach similar levels of technological awareness over time in professional contexts. It is thought that such contradictory findings may be due to various contextual factors such as the digital infrastructure facilities of the institutions where the participants work, the frequency of in-service training, the level of technological experience and individual motivation differences. Therefore, when the findings of the current study regarding the age variable are evaluated together with other studies in the literature, it can be said that age plays a role in interaction with other factors rather than being a sole determinant.

The findings also suggest that the duration of professional experience significantly affects teachers' scores in various sub-dimensions. In particular, participants with 11–20 years of experience had significantly lower scores in Practical Knowledge and Theoretical Knowledge sub-dimensions compared to those with 1–5 and 21–30 years of experience. In the Belief-Attitude and Ability to Relate sub-dimensions, those with 1–5 years of experience had significantly higher scores than those with longer professional experience. Similarly, participants with 6–10 years of experience scored higher than those with 11–20 years of experience in the Ability to Relate sub-dimension. In terms of AIWST scores, teachers with 1–5 years of experience scored significantly higher than those with 11–20, 21–30, and 31–41 years of experience. Furthermore, teachers with 11–20 years of experience also had lower overall scores compared to those with 21–30 years of experience. These findings suggest that teachers with intermediate levels of experience may exhibit decreased levels of professional satisfaction and openness to innovation.

These results are consistent with the study by Şengür and Anagün (2021), which also reported significant differences in teachers' use of information technologies based on professional seniority, indicating a tendency toward traditional approaches with increasing seniority. Similarly, Haenlein and Kaplan (2019) noted that teachers with less professional experience are more open to technological innovations. This view supports the current study's findings, which reveal that early-career teachers possess higher levels of awareness and practical competence. It is thought that dynamics such as professional routinization, decrease in the willingness to participate in in-service training and the weakening of motivation to follow technological developments over time may be effective in the basis of these differences. In this context, it can be said that the effect of professional seniority on

attitudes and perceptions of competence towards technology is directly related not only to the length of experience but also to the in-service learning practices of teachers.

Nonetheless, there are studies that do not support a significant relationship between professional experience and AI awareness. For example, research by Süer and Oral (2021) and Ünal (2025) reported no significant differences in AI awareness levels based on years of service. These results suggest that factors such as institutional culture, availability of in-service training, individual attitudes, and motivation may play a mediating role in the relationship between experience and awareness.

Participants with postgraduate education had significantly higher scores in the sub-dimensions of Practical Knowledge, Ability to Relate, and Theoretical Knowledge, as well as in the overall AIWST scores, compared to those with only undergraduate education. However, no significant difference was found in the Belief-Attitude sub-dimension based on educational level. These findings indicate that postgraduate education contributes positively to professional competence. They suggest that postgraduate education enhances not only theoretical knowledge but also the ability to apply and relate this knowledge to digital technologies.

These results align with findings from the literature. For instance, Zawacki-Richter et al. (2019) reported that teachers with postgraduate academic backgrounds had higher levels of AI awareness. Similarly, Hwang and Tu (2021) emphasized that as educational level increases, individuals' awareness of technology and their tendency to integrate these technologies into teaching practices also increase. These findings support the notion that postgraduate education enhances individuals' critical thinking, research-based learning, and interaction with digital tools, thus contributing positively to AI awareness.

However, not all studies support this relationship. For example, Süer and Oral (2021) and Ünal (2025) found no significant differences in teachers' AI awareness levels based on educational level. Such findings show that the level of education is not the only determinant; many factors such as the individual's personal interest in technology, motivation to learn, the digital infrastructure adequacy of the institution where he/she works, and the level of participation in in-service training can be determinants in this relationship. Therefore, in the evaluation of awareness levels based on the level of education, not only the academic degree but also the quality of this education and the active participation of the teacher in technological developments should be taken into account.

The research findings reveal that teachers' self-efficacy levels differ significantly according to their field of expertise. In particular, teachers of Information Technologies had significantly higher scores in all sub-dimensions and overall AIWST scores compared to other subject areas. In the sub-dimensions of Practical Knowledge, Ability to Relate, Theoretical Knowledge, and Belief-Attitude, Information Technologies teachers scored significantly higher than teachers of Turkish, Mathematics, Classroom Teaching, Preschool Education, Science, Foreign Languages, Physical Education, and Religious Culture. These results suggest that technological proficiency and digital skills positively influence teachers' levels of AI awareness. The high levels of technological literacy and familiarity with AI applications among these teachers likely contribute positively to their awareness levels. These results show that technological competence and digital skills can positively affect teachers' AI awareness levels. The high technological literacy levels of the subject teachers and their familiarity with AI applications stand out as an important factor supporting their awareness levels.

Several studies in the literature support these findings. For example, in a study conducted by Çam et al. (2021), pre-service teachers in Science Education and Computer Education and Instructional Technology programs were found to have higher levels of awareness regarding AI technologies compared to other branches. Similarly, studies using the awareness scale developed by Ferikoğlu (2021) reported significant differences in AI awareness levels based on subject area, highlighting that teachers in fields directly related to technology exhibit higher awareness levels. This shows that the

technology-based pedagogical knowledge acquired during the professional formation process shapes teachers' integration skills into innovative practices.

Although İçöz and İçöz (2024) noted that pre-service Turkish teachers had above-average awareness levels of AI applications, their scores were not as prominent as those of Information Technologies teachers. Yılmaz (2014) stated that Social Studies pre-service teachers displayed higher tendencies toward professional innovation compared to some teachers in numerically oriented fields. This finding reveals that each branch develops different approaches to technological innovations in line with its own pedagogical and epistemological dynamics.

Furthermore, studies by Ünal (2025) and Seyrek et al. (2024) also showed that teachers' awareness levels of AI differ by subject area. These findings support the conclusion of the present study, affirming that teachers' subject areas are a significant factor in technological awareness. However, it should not be ignored that these differences cannot be explained only by the content of the branch-based education; other factors such as individual interest in technology, faculty-level education programs and the quality of application opportunities may also reinforce this difference. In this context, it can be said that a multidimensional approach should be adopted in the evaluation of branch-based awareness levels.

The findings suggest that the strength of the connection teachers establish between their subject matter and AI technologies shapes their level of awareness. In this context, the higher AI awareness levels among teachers in numerically and technologically oriented fields highlight the need for subject-specific strategies in integrating educational technologies. As a matter of fact, artificial intelligence-supported applications are redefining teachers not only as transmitters of knowledge, but also as professionals who guide, facilitate and manage the learning process.

It was also found that teachers working in rural areas (village/small town) had significantly lower scores in the AIWST and its sub-dimensions compared to those working in provincial or district centers. This suggests that teachers in rural areas have lower levels of AI awareness and reduced capacity to integrate these technologies into instructional processes. The Early Childhood Education Needs Analysis Report (2023) emphasized the existence of economic, social, and technological inequalities between urban and rural areas (erkencocuklukegitimi.org). The report noted that teachers working in rural regions have limited access to technological resources, which may adversely affect their professional development and technological awareness.

In light of the findings obtained from the study, the following recommendations are proposed:

- In-service training programs aimed at enhancing artificial intelligence (AI) literacy should be expanded. The lower AI awareness scores and subdimension scores of teachers working in rural areas indicate a pressing need for specialized training programs that aim to improve technological awareness in these regions.
- Policies to increase professional motivation should be developed for teachers with mid-level experience. The study revealed that teachers with 11–20 years of experience exhibit significantly lower AI awareness levels. This finding may suggest a plateau in openness to educational innovation. Therefore, it is recommended to design professional development programs that incorporate updated content focused on innovative teaching methods tailored to this group.
- AI integration guides specific to teaching branches should be developed. The higher awareness levels observed among Information Technology teachers compared to other branches suggest that awareness levels vary by subject area. Accordingly, AI usage manuals tailored to the needs of different disciplines and aligned with subject-specific content should

be prepared. Teachers should be provided with exemplary AI applications that are relevant to their fields.

- Technology-focused content should be increased in undergraduate teacher education programs. The higher AI awareness levels observed among postgraduate degree holders underscore the value of advanced academic training. In this regard, it is recommended that courses emphasizing the role of AI technologies in education be incorporated into undergraduate teacher education curricula.
- The innovative potential of younger teachers should be supported, and knowledge-sharing environments should be established with more experienced colleagues. Considering that teachers aged 24–30 have significantly higher AI awareness levels, it is important to promote professional collaboration platforms—such as professional learning communities—that enable younger teachers to share their technological experiences with more senior colleagues.
- The higher awareness levels among male teachers may be associated with societal gender roles or expectations regarding technology use. To better understand the underlying causes of this difference, qualitative studies are recommended. Such investigations may contribute to the development of gender-sensitive approaches in teacher education and training programs.
- Artificial intelligence technologies require teachers to be repositioned not only as transmitters of information but also as professionals who direct learning processes, analyze student needs, and guide with digital tools. In this context, teacher training programs should include content aimed at developing skills in designing, evaluating, and ethically using artificial intelligence-supported learning environments.

Author Contribution

The article was derived from the master's thesis of *the Mesut Ayaz,* conducted under the supervision of *the Hasan Karal* (Thesis No: 967030).

Author Contribution

The authors co-wrote, read and approved the manuscript.

Ethic

This study received ethical approval from the Ethics Committee for Scientific Research and Publication of the Faculty of Social and Human Sciences at Trabzon University with the decision dated 17/01/2025 and numbered 2025-1/2.15.

Conflict of Interest

The authors declare that they have no conflict of interest.

ORCID

Mesut Ayaz https://orcid.org/0009-0009-1765-4549

Hasan Karal https://orcid.org/0000-0002-3555-050X

Ali Kürşat Erümit https://orcid.org/0000-0003-4910-4989

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