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VYTAUTO DIDŽIOJO
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AKADEMIJA

The Relationship Between Preschool Teachers' Professional Self-Efficacy and Attitudes Towards Artificial Intelligence

Yakup Yıldırım[1], Ece Arzum Güçlü[2]

[1] Akdeniz University, Faculty of Education, Department of Early Childhood Education, Main Campus, TR-07760 Pinarbasi, Konyaalti, Antalya, Turkey, yakupyildirim1986@gmail.com
[2] Akdeniz University, Faculty of Education, Department of Early Childhood Education, Main Campus, TR-07760 Pinarbasi, Konyaalti, Antalya, Turkey, ecearzu22@gmail.com

Annotation. This study surveyed 253 preschool teachers on their AI attitudes and self-efficacy. Findings show that teachers are cautiously positive, with higher AI knowledge linked to better attitudes. A weak positive correlation was found between self-efficacy and AI acceptance, and the study suggests a need for targeted AI training for educators to improve adoption.

Keywords: *lifelong learning, artificial intelligence, teacher professional self-efficacy, early childhood education.*

Introduction

Today, the use of technology is widespread, both professionally and as a tool that facilitates tasks, and it has become an integral part of our lives. Along with these technologies, artificial intelligence-supported applications have entered many areas of our lives. Advances in informatics have emerged because of artificial intelligence (Genç et al., 2023). Artificial intelligence has been used to mimic complex functions related to the human mind, such as perception, learning, and prediction (Russell & Norvig, 2021). This study focuses on the use of artificial intelligence in the preschool education context and its relationship with teachers' professional self-efficacy, addressing a significant gap in the literature regarding effective professional development design specifically for preschool teachers.

The Use of Artificial Intelligence in the Educational Process

Artificial intelligence was defined in the 1950s as the science and engineering of intelligent machines (McCarthy, 2007). AI is described as the science or engineering of intelligent machines capable of solving various problems, such as natural language processing, neural networks, and machine learning (Mondal, 2020). In preschool classrooms, AI applications provide children with fun and interactive experiences through game-based learning, increasing their motivation and ensuring active participation in the learning process. Simultaneously, these applications are effective in reducing teachers' workload and saving time (Zhan et al., 2024). With the help of artificial intelligence, teachers can provide more support to students through guidance and social interactions. Additionally, AI technology enables teachers to track children's progress and provide feedback (Jiang, 2022). It also helps identify subjects that children find difficult to grasp during the learning process, provides additional learning materials, and supports lesson planning (Akgun & Greenhow, 2022; Chiu et al., 2022). AI applications also facilitate the recognition of each child's unique needs, adaptation of education accordingly, and provision of targeted interventions (Chiu et al., 2022).

The use of artificial intelligence in preschool education environments has the potential to transform the physical spaces of kindergartens and preschool classrooms, as well as the materials used therein. AI-based interactive centers can enhance children's interest in learning through various applications. For example, voice assistants can aid language skill development, AI-supported game devices can develop math and problem-solving skills, and children interested in art can use AI for drawing and design applications or conduct scientific experiments and explorations. AI-supported toys and robotics kits can serve as modern 'playgrounds' for developing foundational computational thinking skills in young children, improving their AI literacy even at the preschool level (Bers, 2020). Interactive, game-based AI applications can support the development of foundational literacy skills in young learners, making learning more engaging (Neumann, 2018). Studies show that preschool teachers' integration of technology into specific subject teaching, such as language and mathematics, varies widely and is often dependent on access to resources and training (Nikolopoulou, 2020).

ChatGPT is the most popular application of artificial intelligence in education by teachers (Galindo-Domínguez et al., 2024). Trust and colleagues (2023) noted that teachers use ChatGPT for: 1) instructional support, 2) student assessment, 3) supporting student learning, 4) offering recommendations to improve teaching, and 5) ensuring and supporting teacher-parent communication and collaboration or supporting teacher-student communication.

With the development of artificial intelligence, there are ongoing discussions regarding its benefits and ethical issues (Halaweh, 2023; Perkins, 2023; Stahl & Eke, 2024; Sun & Ye, 2023). Issues such as privacy concerns related to AI and its compatibility with societal values have emerged (Balbaa & Abdurashidova, 2024). The ethical integration of AI in early childhood settings must also critically consider the narratives and promises embedded in these technologies to avoid reinforcing stereotypical roles and unrealistic expectations (Mertala, 2019). Matters such as children's data privacy or its impact on the learning process must be handled with care. Therefore, it is beneficial to adhere to ethical standards and data privacy in the development of AI-related applications (Temur, 2025). Significant issues arise in terms of data security and privacy, particularly in AI-supported applications used in early childhood education. It is emphasized that children's data must be protected, and the use of data must continue in an ethical manner, making this an integral part of professional development content for preschool teachers (Temur, 2025).

Professional Self-Efficacy of Preschool Teachers

Effective classroom use of AI depends on teachers' knowledge and confidence. In this context, preschool teachers' self-efficacy perceptions regarding artificial intelligence determine their beliefs in their capacity to use it in age-appropriate classroom activities. Self-efficacy is defined as individuals' judgments about whether they can perform the actions necessary to cope with challenges or to what extent they are able to do so (Bandura, 1982). Four sources determine beliefs in self-efficacy: knowledge gained through personal experiences, observations made by modeling others, verbal persuasion by society, and an individual's emotional or physiological state related to task expectations (Bandura, 1994).

Teachers' self-efficacy directly affects the educational process and is a critical point for successful education (Bandura, 1997; Şişman & Turhan, 2004). High self-efficacy influences teachers' decision-making processes, increases their family engagement with the school, and contributes to the development of a positive school and classroom climate. Teachers with high self-efficacy spend more time supporting children's learning and use a variety of teaching methods. When selecting teaching methods, they focus on students and use materials that enhance creativity (Billheimer, 2006; Lewandowski, 2005). Teachers with high self-efficacy beliefs are less likely to give up in the face of challenges, which positively influences students' learning processes (Aşkar & Umay, 2001).

Teachers' self-efficacy in using technology is influenced by a combination of internal beliefs and external support structures (Blackwell et al., 2014). Various findings indicate that factors such as gender, having received AI-related training, and teachers' experiences using AI in daily life influence technology-related self-efficacy perceptions. Some studies indicate that men's technology-related self-efficacy perceptions are higher than women's, while others suggest that this gap is gradually decreasing (Kay, 2006; Cai et al., 2017). Individuals who have received AI-related training have also been observed to have higher self-efficacy perceptions as their technological knowledge improves (Chen et al., 2025; Holmes et al., 2019).

It should be kept in mind that artificial intelligence cannot replace teachers and that teachers can utilize AI to make education more efficient; education remains fundamentally human-centered (Popenici & Kerr, 2017). As artificial intelligence (AI) becomes integrated with education, teachers must have the necessary knowledge and skills to use AI effectively in their classrooms (Selwyn, 2019). Effective professional development programs should emphasize both theoretical knowledge and practical application opportunities, allowing teachers to gain firsthand experience with AI tools that are specifically tailored for early childhood education settings. Additionally, such programs should include collaborative learning communities in which teachers can share experiences, discuss ethical considerations, and develop classroom implementation strategies.

Problem Statement

The integration of artificial intelligence (AI) in preschool education is receiving increasing attention; however, there remains a significant gap in the literature regarding how to design effective professional development (PD) programs specifically for preschool teachers (Ajalo et al., 2025; Chiu et al., 2022). Many preschool teachers still lack sufficient knowledge and skills related to AI, which limits the potential benefits of AI integration in early childhood educational settings (Ajalo et al., 2025; Jiang, 2022). For example, in this study, 62.1% of participants reported having "some knowledge" of AI, 28.1% said they had "sufficient knowledge," and only 9.9% indicated they had "no knowledge at all." Regarding computer proficiency, most teachers described themselves as "average computer users" (86.2%), while only 7.9% considered themselves "expert users." These data indicate that preschool teachers generally have limited awareness of artificial intelligence, highlighting a cautious but open stance toward AI and demonstrating the urgent need for systematic professional development programs for preschool teachers.

Effective PD programs should aim to increase both teachers' perceived ease of use and perceived usefulness of AI tools, as these factors are critical in shaping positive attitudes and intentions to use technology (Peciuliauskiene et al., 2022). This study aims to examine the relationship between attitudes towards artificial intelligence and professional self-efficacy and to explore how demographic variables and AI knowledge levels may moderate or mediate this relationship, thereby providing practical implications for preschool PD programs (Wardat et al., 2024; Selwyn, 2019). Additionally, this research seeks to identify the educational interventions needed to foster positive attitude changes among teachers with varying levels of AI knowledge, thus addressing the existing literature gap and contributing to early childhood education by exploring the underexplored connection between teacher self-efficacy and AI attitudes (Chen et al., 2025; Holmes et al., 2019).

The Aim of the Study

This study redefines its aims as follows: (a) to describe preschool teachers' attitudes towards artificial intelligence and their professional self-efficacy levels; (b) to examine whether these constructs vary according to AI knowledge, computer usage, and demographic variables; (c) to predict the relationship between attitudes and professional self-efficacy at both general and subdimensional levels; and (d) to generate practice-oriented implications for the design of professional development programs for preschool teachers. The findings will inform PD designs that include age-appropriate AI applications and ethical security modules specifically tailored for early childhood environments.

Research Questions

1. What are preschool teachers' general attitudes towards artificial intelligence (overall, positive, and negative subdimensions)?
2. What are teachers' professional self-efficacy levels across the subdimensions of Classroom Management, Planning and Implementation, Monitoring and Evaluation, and Technology Literacy?
3. Do attitudes and professional self-efficacy vary according to teachers' level of AI knowledge and computer usage proficiency?
4. Do attitudes and self-efficacy differ based on demographic variables such as gender, education level, age, and professional seniority?
5. What is the relationship between attitudes and professional self-efficacy (at both the general and subdimensional levels)?
6. What practical implications for PD programs can be derived from these findings?

Method

Research Design

This study was conducted using the relational survey model, which is a quantitative research method. The relational survey model is a descriptive research design that aims to depict the existing level of relationships between multiple variables without intervening on those variables (Karasar, 2012). In this model, the researcher collected data from the same sample at a single measurement point to determine the relationships between variables and examine the level of covariation among them (Büyüköztürk et al., 2020). The relational survey model is preferred to reveal the tendency among variables that are not causal, but may co-vary (Fraenkel et al., 2019).

The Study Group of the Research

The study group consisted of preschool teachers who voluntarily participated in the study. The sociodemographic characteristics of the participants are presented in Table 1.

Table 1

Findings Regarding the Socio-Demographic Characteristics of the Participants

Variable	Number (n)	Percentage (%)
Gender		
Female	246	97,2
Male	7	2,8
Level of Education		
Bachelor's Degree	220	87,0
Master's Degree	33	13,0
Age		
18–25 years old	17	6,7
26–34 years old	86	34,0
35–45 years old	117	46,2
46 years old and above	33	13,0
Professional Seniority		
1–5 years	72	28,5
6–10 years	41	16,2
11–15 years	48	19,0
16–20 years	56	22,1
21–25 years	36	14,2
Level of Computer Use		
Below average	15	5,9
Average	218	86,2
Expert user	20	7,9
Level of Knowledge of Artificial Intelligence		
No knowledge	25	9,9
Some knowledge	157	62,1
Sufficient knowledge	71	28,1

When the data in Table 1 were examined, 97.2% of the participants were female and 2.8% were male. Regarding educational background, the majority (87.0%) held a bachelor's degree, while 13.0% had completed a master's degree. This indicates that most teachers hold undergraduate qualifications, with a smaller but notable proportion completing postgraduate education.

When the age distribution was examined, it was observed that the majority of teachers were in the 35–45 age range (46.2%), followed by the 26–34 age group (34.0%). In contrast, teachers aged 18–25 represented a low rate of 6.7%. This distribution indicates that the sample mainly consists of individuals who are professionally experienced and belong to the middle-aged group. In terms of professional seniority, a significant proportion of teachers had 1–5 years (28.5%) and 16–20 years (22.1%) of experience. This finding is meaningful as it shows that the sample includes teachers who have just started their careers, as well as those with many years of experience.

Data regarding computer proficiency indicate that the majority of teachers described themselves as "average computer users" (86.2%). The proportion of "expert users" remains limited at 7.9%, while the rate of those reporting usage "below average" is 5.9%. This shows that basic knowledge and skills related to technological tools have become widespread, but advanced-level usage remains limited. In terms of knowledge about artificial intelligence, 62.1% of participants responded "I have some knowledge," while 28.1% said "I have sufficient knowledge." The percentage of those who said, I have no knowledge at all," remained at 9.9%. These data indicate that preschool teachers generally have a limited awareness of artificial intelligence. Therefore, the need for professional development of AI applications is still relevant.

Data Collection Tools

In this study, two separate scales and a personal information form developed by the researcher were used to examine the relationship between preschool teachers' attitudes towards artificial intelligence and their professional self-efficacy.

To determine participants' attitudes towards artificial intelligence, the General Attitude Scale Towards Artificial Intelligence developed by Schepman and Rodway (2020) and adapted into Turkish by Kaya et al. (2024) was used. The scale consists of 20 items and 2 sub-dimensions (Positive Attitude, Negative Attitude). The internal consistency reliability coefficient of the scale was calculated as .82 for positive attitude and .84 for negative attitude. The overall internal consistency coefficient of the scale was not specified.

To determine teachers' levels of professional self-efficacy, the Preschool Teacher Professional Self-Efficacy Scale developed by Toran et al. (2024) was used. The scale consists of 24 items and four sub-dimensions (Classroom Management, Planning and Implementation, Monitoring and Evaluation, Technology Literacy). Each item on the scale is rated from 1 to 9, with the lowest possible score being 1 and the highest being

9. The internal consistency reliability coefficient for the professional self-efficacy scale was calculated as .86 for Classroom Management; .89 for Planning and Implementation; .84 for Monitoring and Evaluation; .83 for Technology Literacy; and .95 for the overall scale.

The findings regarding the internal consistency coefficients obtained in this study are presented in Table 2.

Table 2

Findings Related to the Internal Consistency Coefficient Values of the Data Collection Tools

Data Collection Tools	Number of Items	Internal Consistency (Cronbach's Alpha)
	n	α
Positive Attitude	12	0.96
Negative Attitude	8	0.91
General Attitude Scale Towards Artificial Intelligence	20	0.83
Classroom Management	7	0.98
Planning and Implementation	9	0.98
Monitoring and Evaluation	5	0.97
Technology Literacy	3	0.94
Professional Self-Efficacy Scale	24	0.99

The internal consistency coefficients (Cronbach's α) presented in Table 2 indicate that all the scales and subscales demonstrate a high level of reliability.

The Positive Attitude Subscale (12 items) was found to have $\alpha = .96$, and the Negative Attitude Subscale (8 items) had $\alpha = .91$. Both values indicated a "perfect" level of consistency for the scales ($\alpha \geq .90$).

For the overall scale (20 items), the obtained $\alpha = .83$ still demonstrates "good" ($\alpha \geq .80$) internal consistency; this also confirms that the sub-dimensions form a meaningful and reliable whole.

Likewise, the sub-dimensions of the Professional Self-Efficacy Scale yielded highly consistent results.

Classroom Management (7 items) $\alpha = .98$ Planning and Implementation (9 items) $\alpha = .98$
Monitoring and Evaluation (5 items) $\alpha = .97$ Technology Literacy (3 items) $\alpha = .94$

These values indicated that the items in each subscale strongly reflected the same structure. The level of $\alpha = .99$ calculated for the entire 24-item structure of the scale also demonstrates that the overall scale has an extremely high internal consistency and that the coherence among the items is very strong.

In general, both the scale measuring attitudes towards artificial intelligence and the professional self-efficacy scale and its sub-dimensions present internal consistency values well above the α ≥ .70 threshold suggested by Nunnally and Bernstein (1994), demonstrating that the data collection tools used in the study provide both valid and reliable measurements.

Data Analysis

The data obtained within the scope of this study were transferred to SPSS. To determine whether parametric or non-parametric tests were applied in the data analysis, a normality distribution analysis was conducted. In the normal distribution, the skewness and kurtosis values of the variables were examined. The findings related to the normal distribution of the data are presented in Table 3.

Table 3

Findings Related to the Normality Distribution of the Data

Variable	Skewness	Kurtosis
Gender	5.794	31.82
Education Level	2.208	2.879
Age	-0.135	-0.389
Professional Seniority	0.107	-1.352
Computer Usage Level	-0.227	4.313
Artificial Intelligence Knowledge Level	-0.065	-0.322

When the data presented in Table 3 were examined, it was observed that the variables of participants' gender, education level, and computer usage level significantly deviated from the normal distribution, whereas the variables of age, professional seniority, and artificial intelligence knowledge level displayed a normal distribution. In the literature, a skewness value between -1 and +1, a kurtosis value between -2 and +2, or a kurtosis value between -1 and +1, together with a skewness value between -2 and +2, indicates that the data are normally distributed (George & Mallery, 2024; Leech, Barret & Morgan, 2005). In this context, the Mann-Whitney U test was used for the analysis of the participants' gender and education level variables, while the Kruskal–Wallis H test was used for the analysis of computer usage level. One-way analysis of variance was used to analyze the variables of age, professional seniority, and artificial intelligence knowledge level. Homogeneity of variances in multiple group comparisons was checked using Levene's test. The Scheffe test was used for multiple comparisons to determine differences between the groups. In addition, various descriptive statistics were used.

Findings

Findings Regarding Preschool Teachers' Overall Attitudes Toward Artificial Intelligence

The findings regarding preschool teachers' overall attitudes toward artificial intelligence are presented in Table 4.

Table 4
Findings of the Arithmetic Mean Scores Regarding Preschool Teachers' Overall Attitudes Toward Artificial Intelligence

Data Collection Tool	Level	n	$\bar{x}$	Ss
Positive Attitude	High (I agree)	253	3.56	0.92
Negative Attitude	Medium (I am undecided)	253	3.13	0.92
General Attitude Towards Artificial Intelligence	Medium (I am undecided)	253	3.38	0.55

The findings presented in Table 4 indicate a distinct positive tendency in preschool teachers' attitudes toward artificial intelligence. The arithmetic mean score obtained for the positive attitude sub-dimension (=3.56) falls within the high (agree) level, revealing that participants generally approach artificial intelligence with a positive outlook. In contrast, the mean score for the negative attitude sub-dimension (=2.88) lies within the "Neutral" range; this suggests that rather than developing a wholly negative attitude towards the potential drawbacks or risks of artificial intelligence, teachers tend to adopt a cautious and balanced approach.

The value calculated for the overall score of the scale (= 3.38) also points to the "Neutral" level; this indicates that teachers' overall attitudes toward artificial intelligence are neither extremely positive nor negative, but reflect a more moderate level of uncertainty/ambivalence. The fact that the overall attitude shows a lower standard deviation (0.55) compared to the sub-dimensions suggests that the shared sense of uncertainty among the teachers is relatively more homogeneous and that there are fewer extreme opinions (either overly positive or overly negative) within the group.

The formula was used as the basis for calculating arithmetic mean scores. The interval corresponding to the arithmetic mean score was determined as 0.80. The intervals related to the calculated scores were as follows:

The following basic intervals were considered when calculating arithmetic mean scores:

1.00 1.80 Strongly Disagree (Very Low) 1.81 2.59 Disagree (Low)
2.60 3.39 Somewhat Agree (Moderate) 3.40 4.19 Agree (High)
4.20 5.00 Strongly Agree (Very High)

Findings Regarding the Professional Self-Efficacy of Preschool Teachers

The findings regarding teachers' professional self-efficacy are presented in Table 5.

Table 5

Arithmetic Mean Score Findings Regarding the Professional Self-Efficacy of Preschool Teachers

Data Collection Tool	Level	n	$\bar{x}$	Ss
Classroom Management	Very High Proficiency	253	7.94	1.68
Planning and Implementation	Very High Proficiency	253	7.89	1.67
Monitoring and Evaluation	Very High Proficiency	253	7.83	1.67
Professional Self-Efficacy	Very High Proficiency	253	7.85	1.66

The findings in the table indicate that preschool teachers' perceptions of professional self-efficacy were quite high in all sub-dimensions.

Classroom Management average

=7.94 Planning and Implementation average

=7.89 Monitoring and Evaluation average

=7.83 Overall Professional Self-Efficacy average

=7.85

These values fall within the range of 7.22–8.11 on a 1–9 scale, which corresponds to the level of "Very High Proficiency." Therefore, teachers perceive themselves as strong and competent in managing the classroom environment, as well as in the processes of educational planning, implementation, monitoring, and evaluation.

Moreover, the relatively low standard deviation values (.66 – .68) among the sub-dimensions indicate that participants' self-efficacy perceptions were similar and consistent in these areas. While the highest average was observed in "Classroom Management" (7.94), "Monitoring and Evaluation were slightly lower (7.83), suggesting that teachers were somewhat more cautious regarding their process-oriented assessment skills.

In calculating arithmetic mean scores, the formula was used as a basis. The arithmetic mean score was 0.89. The intervals related to the calculated scores are as follows:

The following fundamental intervals were considered when calculating the arithmetic mean scores:

1.00 1.89 Insufficient

1.89 2.78 Very low proficiency

2.78 3.67 Low proficiency

3.67 4.56 Lower-intermediate proficiency

4.56 5.44 Intermediate proficiency

5.44 6.33 Upper-intermediate proficiency

6.33 7.22 High proficiency

7.22 8.11 Very high proficiency

8.11 9.00 Extremely proficient

Findings Regarding the Differentiation of Preschool Teachers' General Attitudes towards Artificial Intelligence According to the Gender Variable

Findings regarding the differentiation of preschool teachers' general attitudes towards artificial intelligence according to gender are presented in Table 6.

Table 6
Mann Whitney U Test Findings on the Differentiation of Preschool Teachers' General Attitudes Towards Artificial Intelligence According to the Gender Variable

Data Collection Tools	Gender	n	Rank Avg.	Rank Total	U	p
Positive Attitude	Female	246	127.41	31343.5	759.5	0.6
	Male	7	112.5	787.5		
Negative Attitude	Female	246	126.78	31187	806	0.77
	Male	7	134.86	944		
General Attitude Towards Artificial Intelligence	Female	246	127.08	31261	842	0.73
	Male	7	124.29	870		

When the data in Table 6 were examined, it was found that preschool teachers' attitudes towards artificial intelligence did not show a significant difference in terms of gender in the dimensions of positive attitude ($U = 759.500$; $p = .60 >. 05$), negative attitude ($U = 806.000$; $p = .77 > .05$), or in the total score of the scale overall ($U = 842.000$; $p = .73 > .05$).

Findings Related to the Differentiation of Preschool Teachers' Professional Self-Efficacy by Gender Variable

Findings regarding the differentiation of preschool teachers' professional self-efficacy according to gender are presented in Table 7.

Table 7
Mann Whitney U Test Findings on the Differentiation of Preschool Teachers' Professional Self-Efficacy by Gender Variable

Data Collection Tools	Gender	n	Rank Avg.	Rank Total	U	p
Classroom Management	Female	246	127.26	31305.50	797.5	0.73
	Male	7	117.93	825.50		
Planning and Implementation	Female	246	127.17	31285.	818	0.82
	Male	7	120.86	846.		

Data Collection Tools	Gender	n	Rank Avg.	Rank Total	U	p
Monitoring and Evaluation	Female	246	127.33	31322.50	780.5	0.67
	Male	7	115.50	808.50		
Technology Literacy	Female	246	126.67	31160.50	779.5	0.67
	Make	7	138.64	970.50		
Professional Self-Efficacy	Female	246	127.15	31280.	823	0.84
	Male	7	121.57	851.		

When the data in Table 7 were examined, it was found that preschool teachers' professional self-efficacy did not show a significant difference in terms of classroom management (U = 797.500; p = .73 > .05), planning and implementation (U = 818.000; p = .82 > . 05), monitoring and evaluation (U = 780.500; p = .67 > .05), technology literacy (U = 779.500; p = .67 > .05), or in the overall total score of the scale (U = 823.000; p = .84 > .05), according to the gender variable.

Findings on the Variation of Preschool Teachers' General Attitudes Towards Artificial Intelligence According to the Education Level Variable

The findings regarding the variation in preschool teachers' general attitudes towards artificial intelligence according to the education level variable are presented in Table 8.

Table 8

Mann Whitney U Test Findings Regarding the Variation of Preschool Teachers' General Attitudes Towards Artificial Intelligence According to the Education Level Variable

Data Collection Tools	Level of Education	n	Rank Avg.	Rank Total	U	p
Positive Attitude	Bachelor's Degree	220	126.89	27916.50	3606.5	0.95
	Master's Degree	33	127.71	4214.50		
Negative Attitude	Bachelor's Degree	220	124.96	27492.	3182	0.25
	Master's Degree	33	140.58	4639.		
General Attitude Towards Artificial Intelligence	Bachelor's Degree	220	125.28	27561.	3251	0.33
	Master's Degree	33	138.48	4570.		

When the data in Table 8 were examined, it was determined that preschool teachers' attitudes toward artificial intelligence did not create a significant difference in terms of positive attitude (U = 3606.500; p = .95 > .05), negative attitude (U = 3182.000; p = .25 > .05), or the overall total score of the scale according to the education level variable (U = 3251.000; p = .33 > .05).

Findings Regarding the Differentiation of Preschool Teachers' Professional Self-Efficacy According to the Variable Education Level

Findings regarding the differentiation of preschool teachers' professional self-efficacy according to the education level variable are presented in Table 9.

Table 9

Mann Whitney U Test Findings on the Differentiation of Preschool Teachers' Professional Self-Efficacy According to the Education Level Variable

Data Collection Tools	Level of Education	n	Rank Avg.	Rank Total	U	p
Classroom Management	Bachelor's Degree	220	125.28	27561.	3251	0.32
	Master's Degree	33	138.48	4570.		
Planning and Implementation	Bachelor's Degree	220	125.69	27652.	3342	0.46
	Master's Degree	33	135.73	4479.		
Monitoring and Evaluation	Bachelor's Degree	220	125.10	27521.50	3211.5	0.28
	Master's Degree	33	139.68	4609.50		
Technology Literacy	Bachelor's Degree	220	124.78	27450.50	3140.5	0.21
	Master's Degree	33	141.83	4680.50		
Professional Self-Efficacy	Bachelor's Degree	220	124.76	27447.	3137	0.21
	Master's Degree	33	141.94	4684.		

When the data in Table 9 were examined, it was found that the professional self-efficacy of preschool teachers did not show a statistically significant difference according to the educational level variable in the dimensions of classroom management (U = 3251.000; p = .32 > .05), planning and implementation (U = 3342.000; p = .46 > .05), monitoring and evaluation (U = 3211.500; p = .28 > .05), technology literacy (U = 3140.500; p = .21 > .05), or in the overall total score of the scale (U = 3137.000; p = .21 > .05).

Findings Regarding the Differentiation of Preschool Teachers' General Attitudes Towards Artificial Intelligence According to Age Level Variable

Findings regarding the differentiation of preschool teachers' general attitudes towards artificial intelligence according to the age-level variable are presented in Table 10.

Table 10

Mann Whitney U Test Findings Regarding the Differentiation of Preschool Teachers' General Attitudes Towards Artificial Intelligence According to Age Level Variable

Data Collection Tool	Age	n	$\bar{x}$	Ss	VK	KT	Sd	KO	F	p
Positive Attitude	18–25	17	40.41	7.83	Within Group	261.648	3	87.216		
	26–34	86	41.73	11.64	Between Groups	30294.463	249	121.665		
	35–45	117	43.56	11.66	Total	30556.111	252		0.72	0.54
	46 and over	33	43.9	7.92						
Negative Attitude	18–25	17	25.41	5.64	Within Group	83.382	3	27.794		
	26–34	86	25.73	7.70	Between Groups	13595.615	249	54.601		
	35–45	117	24.56	7.70	Total	13678.996	252		0.51	0.68
	46 and over	33	24.39	6.7						
General Attitude Towards Artificial Intelligence	18–25	17	65.82	8.21	Within Group	87.257	3	29.86		
	26–34	86	67.47	11.24	Between Groups	30943.185	249	124.270	0.23	0.87
	35–45	117	68.13	11.81	Total	31030.443	252			
	46 and over	33	67.48	9.60						

When the data in Table 10 were examined, it was found that preschool teachers' attitudes towards artificial intelligence did not show a significant difference according to age in terms of positive attitude (F(3-249) = .72; p = .72 > .05), negative attitude (F(3-249) = .51; p = .68 > .05) dimensions, or in terms of the total score for the overall scale (F(3-249) = .23; p = .87 > .05).

Findings Regarding the Differentiation of Preschool Teachers' Professional Self-Efficacy Based on the Age Level Variable

The findings regarding the differentiation of preschool teachers' professional self-efficacy based on the age-level variable are presented in Table 11.

Table 11

Mann Whitney U Test Findings Regarding the Differentiation of Preschool Teachers' Professional Self-Efficacy Based on Age Level Variable

Data Collection Tool	Age	n	$\bar{x}$	Ss	VK	KT	Sd	KO	F	p
Classroom Management	18–25	17	54.24	13.45	Within Group	61.27	3	20.342	0.15	0.93
	26–34	86	55.74	11.67	Between Groups	34956.870	249	140.389		
	35–45	117	55.85	11.74	Total	35017.897	252			
	46 and over	33	54.82	11.85						
Planning and Implementation	18–25	17	69.41	17.46	Within Group	130.414	3	43.471	0.19	0.9
	26–34	86	71.28	14.90	Between Groups	56543.523	249	227.82		
	35–45	117	71.44	14.81	Total	56673.937	252			
	46 and over	33	69.67	15.17						
Monitoring and Evaluation	18–25	17	38.53	9.56	Within Group	18.228	3	6.76	0.09	0.97
	26–34	86	39.33	8.35	Between Groups	17512.760	249	70.332		
	35–45	117	39.26	8.36	Total	17530.988	252			
	46 and over	33	38.67	7.92						
Technology Literacy	18–25	17	21.18	6.53	Within Group	145.756	3	48.585	1.67	.17
	26–34	86	23.3	5.48	Between Groups	7232.600	249	29.47		
	35–45	117	23.12	5.7	Total	7378.356	252			
	46 and over	33	21.18	5.62						
Professional Self-Efficacy	18–25	17	183.35	46.21	Within Group	1249.80	3	416.360	.26	.85
	26–34	86	189.38	39.50	Between Groups	396715.553	249	1593.235		
	35–45	117	189.67	39.49	Total	397964.632	252			
	46 and over	33	184.33	39.14						

When the data in Table 11 were examined, it was found that the professional self-efficacy levels of preschool teachers did not show a significant difference according to the age variable in the dimensions of classroom management ($F(3\text{-}249) = .15$; $p = .93 > .05$), planning and implementation ($F(3\text{-}249) = .19$; $p = .90 > .05$), monitoring and evaluation ($F(3\text{-}249) = .09$; $p = .97 > .05$), technology literacy ($F(3\text{-}249) = 1.67$; $p = .17 > .05$), or in terms of the total score of the overall scale ($F(3\text{-}249) = .26$; $p = .85 > .05$).

Findings on the Differentiation of Preschool Teachers' General Attitudes towards Artificial Intelligence According to the Variable of Professional Seniority

Findings regarding the differentiation of preschool teachers' general attitudes towards artificial intelligence according to professional seniority are presented in Table 12.

Table 12

Mann Whitney U Test Findings on the Differentiation of Preschool Teachers' General Attitudes Towards Artificial Intelligence According to the Variable of Professional Seniority

Data Collection Tool	Prof. Seniority (Year)	n		Ss	VK	KT	Sd	KO	F	p
	1–5	72	42.21	10.36	Within Group	287.233	4	71.808		
Positive Attitude	6–10	41	40.66	12.30	Between Groups	30268.877	248	122.52	0.59	0.67
	11–15	48	43.27	12.6	Total	30556.111	252			
	16–20	56	43.84	11.84						
	21–25	36	43.25	7.67						
	1–5	72	25.86	6.71	Within Group	121.440	4	30.360		
Negative Attitude	6–10	41	24.71	8.36	Between Groups	13557.556	248	54.668	0.55	0.7
	11–15	48	23.85	7.39	Total	13678.996	252			
	16–20	56	24.95	7.75						
	21–25	36	25.19	6.95						
	1–5	72	68.7	10.55	Within Group	334.710	4	83.678		
General Attitude Towards Artificial Intelligence	6–10	41	65.37	11.55	Between Groups	30695.732	248	123.773	0.68	0.61
	11–15	48	67.13	11.21	Total	31030.443	252			
	16–20	56	68.79	11.71						
	21–25	36	68.44	10.71						

When the data in Table 12 were examined, it was found that preschool teachers' attitudes toward artificial intelligence did not show a significant difference in terms of positive attitude ($F(4\text{-}248) = .72$; $p = .72 > .05$), negative attitude ($F(4\text{-}248) = .51$; $p = .68 > .05$), and total score across the overall scale according to the variable of professional seniority ($F(4\text{-}248) = .23$; $p = .87 > .05$).

Findings on the Differentiation of Preschool Teachers' Professional Self-Efficacy According to the Professional Seniority Variable

Findings on the differentiation of preschool teachers' professional self-efficacy according to the professional seniority variable are presented in Table 13.

Table 13
Mann Whitney U Test Findings on the Differentiation of Preschool Teachers' Professional Self-Efficacy According to the Professional Seniority Variable

Data Collection Tool	Prof. Seniority (Year)	n	$\bar{x}$	Ss	VK	KT	Sd	KO	F	p
Classroom Management	1–5	72	54.82	12.60	Within Group	237.516	4	59.379	0.42	0.79
	6–10	41	54.41	13.89	Between Groups	34780.381	248	140.243		
	11–15	48	57.6	10.92	Total	35017.897	252			
	16–20	56	56.32	10.26						
	21–25	36	55.25	11.22						
Planning and Implementation	1–5	72	69.94	15.99	Within Group	371.474	4	92.868	0.41	0.8
	6–10	41	69.95	17.76	Between Groups	56302.463	248	227.26		
	11–15	48	72.77	13.83	Total	56673.937	252			
	16–20	56	72.16	12.81						
	21–25	36	70.25	14.65						
Monitoring and Evaluation	1–5	72	38.69	8.88	Within Group	71.73	4	17.768	0.25	0.91
	6–10	41	38.41	10.2	Between Groups	17459.916	248	70.403		
	11–15	48	39.83	7.96	Total	17530.988	252			
	16–20	56	39.57	7.31						
	21–25	36	39.36	7.41						

Data Collection Tool	Prof. Seniority (Year)	n	$\bar{x}$	Ss	VK	KT	Sd	KO	F	p
Technology Literacy	1–5	72	22.25	5.79	Within Group	65.694	4	16.424	0.56	0.69
	6–10	41	22.20	6.52	Between Groups	7312.661	248	29.487		
	11–15	48	23.38	4.72	Total	7378.356	252			
	16–20	56	23.25	4.96						
	21–25	36	22.47	4.86						
Professional Self-Efficacy	1–5	72	185.71	42.51	Within Group	2549.26	4	637.256	0.4	0.81
	6–10	41	184.98	47.12	Between Groups	395415.607	248	1594.418		
	11–15	48	193.4	36.77	Total	397964.632	252			
	16–20	56	191.30	34.58						
	21–25	36	187.33	37.40						

When the data in Table 13 were examined, it was found that the professional self-efficacy levels of preschool teachers did not show a significant difference with respect to professional seniority in the dimensions of classroom management ($F(4\text{-}248) = .42$; $p = .79 > .05$), planning and implementation ($F(4\text{-}248) = .41$; $p = .80 > .05$), monitoring and evaluation ($F(4\text{-}248) = .25$; $p = .91 > .05$), technology literacy ($F(4\text{-}248) = .56$; $p = .69 > .05$), or overall scale scores ($F(4\text{-}248) = .40$; $p = .81 > .05$).

Findings Regarding the Variation of Preschool Teachers' Overall Attitudes Toward Artificial Intelligence According to Their Level of Computer Use

The findings regarding the variation in preschool teachers' overall attitudes toward artificial intelligence according to their level of computer use are presented in Table 14.

It was found that preschool teachers' attitudes toward artificial intelligence did not show a statistically significant difference in the dimensions of positive attitude (= 2.98; $p = .23 > .05$), negative attitude (= 2.29; $p = .32 > .05$), or in the overall scale (= 4.54; $p = .10 > .05$) according to the computer usage level.

Table 14

Kruskal Wallis-H Test Findings on the Variation of Preschool Teachers' Overall Attitudes Toward Artificial Intelligence According to Their Level of Computer Use

Data Collection Tool	Computer Use	n	Rank	Sd	X^2	p
Positive Attitude	Below Average	15	104.37	2	2.98	0.23
	Average	218	126.7			
	Expert	20	147.28			
Negative Attitude	Below Average	15	132.07	2	2.29	0.32
	Average	218	128.81			
	Expert	20	103.43			
General Attitude Towards Artificial Intelligence	Below Average	15	109.7	2	4.54	0.1
	Average	218	125.35			
	Expert	20	158			

Findings on the Differentiation Status of Preschool Teachers' Professional Self-Efficacy According to the Variable of Computer Usage Level

Findings on the differentiation status of preschool teachers' professional self-efficacy according to computer usage level are presented in Table 15.

Table 15

Kruskal Wallis-H Test Findings on the Differentiation Status of Preschool Teachers' Professional Self-Efficacy According to the Variable of Computer Usage Level

Data Collection Tool	Computer Use	n	Rank	Sd	X^2	p
Classroom Management	Below Average	15	91.73	2	4.43	0.11
	Average	218	128.16			
	Expert	20	140.82			
Planning and Implementation	Below Average	15	99.63	2	4.31	0.12
	Average	218	126.71			
	Expert	20	150.68			
Monitoring and Evaluation	Below Average	15	95.47	2	4.42	0.11
	Average	218	127.33			
	Expert	20	147.10			
Technology Literacy	Below Average	15	94.7	2	7.19	.03*
	Average	218	126.29			
	Expert	20	159.48			

Data Collection Tool	Computer Use	n	Rank	Sd	X^2	p
Professional Self-Efficacy	Below Average	15	96.53	2	5.22	0.07
	Average	218	126.69			
	Expert	20	153.25			

*p ≤ .05

It was found that preschool teachers' attitudes towards artificial intelligence did not show a statistically significant difference in the dimensions of classroom management (= 4.43; p = .11 > .05), planning and implementation (= 4.31; p = .12 > .05), monitoring and evaluation (= 4.42; p = .11 > .05), and in the overall scale according to the variable of computer usage level (= 4.54; p = .10 > .05), whereas a significant difference was found in the dimension of technological literacy (= 7.19; p = .03 ≤ .05). The findings of the Mann-Whitney U test conducted to determine between which groups the differences occurred are presented in Table 16.

Table 16
Mann Whitney U Test Results on the Differences in Preschool Teachers' Technology Literacy Levels According to Computer Usage Level

Data Collection Tools	Computer Use	n	Rank Avg.	Rank Total	U	p
Technology Literacy	Below Average	15	89.1	1336.5	1216.5	0.09
	Average	218	118.92	25924.5		
	Below Average	15	12.97	194.5	74.5	.01*
	Expert	20	21.78	435.5		
	Average	218	116.87	25477	1606	.05*
	Expert	20	148.2	2964		

*p ≤ .05

There was no significant difference in technology literacy levels between preschool teachers with below-average computer use and those with average computer use in terms of professional self-efficacy in technology literacy (U = 1216.500; p = .09 > .05). However, teachers who use computers at an "expert" level (mean rank = 148.20),

- demonstrated significantly higher technology literacy compared to the "below average" user group (mean rank = 12.97) (U = 74.50; p = .01 ≤ .05).
- scored higher than the "average" user group, and this difference was found to be marginally significant (U = 1606; p = .05 ≤ .05+).

These results indicate that as computer usage experience increases, teachers' perceptions of their technology literacy also rise; however, the difference between teachers with "below average" and "average" levels is not distinct.

Findings Regarding the Differentiation Status of Preschool Teachers' General Attitudes Towards Artificial Intelligence Based on the Variable of Artificial Intelligence Knowledge Level

The findings regarding the differentiation status of preschool teachers' general attitudes towards artificial intelligence based on age are presented in Table 17.

Table 17

Mann Whitney U Test Findings Regarding the Differentiation Status of Preschool Teachers' General Attitudes Towards Artificial Intelligence Based on the Age Level Variable

Data Collection Tool	Artificial Intelligence Knowledge Level	n		Ss	VK	KT	Sd	KO	F	p
Positive Attitude	I have no knowledge	17	37.64	11.92	Within Group	719.31	2	359.516		
	I have some knowledge	86	43.3	10.27	Between Groups	29837.80	250	119.348	3.01	.05*
	I have sufficient knowledge	117	43.63	11.94	Total	30556.111	252			
						Source of Difference (LSD) I have some knowledge> I have no knowledge I have sufficient knowledge> I have no knowledge				
Negative Attitude	I have no knowledge	17	25.96	5.79	Within Group	152.737	2	76.368		
	I have some knowledge	86	24.39	7.30	Between Groups	13526.259	250	54.105	1.41	0.25
	I have sufficient knowledge	117	26.	7.94	Total	13678.996	252			

Data Collection Tool	Artificial Intelligence Knowledge Level	n		Ss	VK	KT	Sd	KO	F	p
General Attitude Towards Artificial Intelligence	I have no knowledge	17	63.60	8.93	Within Group	697.709	2	348.855		
	I have some knowledge	86	67.42	10.51	Between Groups	30332.734	250	121.331	2.88	0.06
	I have sufficient knowledge	117	69.63	12.64	Total	31030.443	252			

*p ≤ .05

When the data in Table 17 were examined, it was found that there was a significant difference in the positive attitude dimension of preschool teachers' attitudes towards artificial intelligence according to the variable of artificial intelligence knowledge level ($F(2\text{-}250) = 3.01$; $p = .05 \leq .05$); however, there was no significant difference in the negative attitude dimension ($F(2\text{-}250) = 1.41$; $p = .25 > .05$) or in the total score of the entire scale ($F(2\text{-}250) = 2.88$; $p = .06 > .05$). To identify the differences observed in the positive attitude dimension, an analysis using the LSD test, a multiple comparison test, was conducted. This is because Fisher LSD (Least Significant Difference (LSD) test, when applied after a significant overall F-value is obtained from ANOVA, provides higher test power in pairwise comparisons, offering a greater ability to detect genuine group differences. While more conservative post-hoc methods, such as Scheffé and Tukey, strictly control the familywise error rate, they may increase the risk of Type II errors (missing a difference). In contrast, when significance is achieved in ANOVA, LSD offers a more sensitive approach for detecting differences between groups (Field, 2013; Tabachnick & Fidell, 2014). Upon examining the differences between groups as determined by the LSD test, it was found that teachers who have some or sufficient knowledge of artificial intelligence have significantly more positive attitudes towards artificial intelligence compared to those with no knowledge at all. This finding indicates that teachers' level of knowledge about artificial intelligence is a determinant factor in attitudinal terms. Similarly, the literature notes that knowledge accumulation regarding technology strengthens individuals' positive approaches towards it (Davis, 1989; Venkatesh et al., 2003). Therefore, it can be said that professional development programs aimed at increasing preschool teachers' awareness and knowledge level about artificial intelligence are critically important both for accelerating teachers' processes of adopting technology and for supporting the development of more positive attitudes in classroom practices.

Findings on the Differentiation Status of Preschool Teachers' Professional Self-Efficacy According to the Variable of Artificial Intelligence Knowledge Level

Findings regarding the differentiation status of preschool teachers' professional self-efficacy according to the variable of artificial intelligence knowledge level are presented in Table 18.

Table 18

Mann Whitney U Test Findings on the Differentiation Status of Preschool Teachers' Professional Self-Efficacy According to the Variable of Artificial Intelligence Knowledge Level

Data Collection Tool	Artificial Intelligence Knowledge Level	n	$\bar{x}$	Ss	VK	KT	Sd	KO	F	p
Classroom Management	I have no knowledge	17	52.28	14.2	Within Group	324.34	2	162.17		
	I have some knowledge	86	55.72	11.32	Between Groups	34693.864	250	138.775	1.17	0.31
	I have sufficient knowledge	117	56.41	11.93	Total	35017.897	252			
Planning and Implementation	I have no knowledge	17	66.84	18.5	Within Group	518.738	2	259.369		
	I have some knowledge	86	71.21	14.31	Between Groups	56155.198	250	224.621	1.16	0.32
	I have sufficient knowledge	117	72.6	15.31	Total	56673.937	252			
Monitoring and Evaluation	I have no knowledge	17	36.60	9.87	Within Group	210.777	2	105.388		
	I have some knowledge	86	39.19	8.4	Between Groups	17320.211	250	69.281	1.52	0.22
	I have sufficient knowledge	117	39.97	8.35	Total	17530.988	252			
Technology Literacy	I have no knowledge	17	20.60	5.81	Within Group	154.902	2	77.451		
	I have some knowledge	86	22.69	5.21	Between Groups	7223.453	250	28.894	2.68	0.07
	I have sufficient knowledge	117	23.49	5.58	Total	7378.356	252			
Professional Self-Efficacy	I have no knowledge	17	176.32	47.32	Within Group	4558.277	2	2279.139		
	I have some knowledge	86	188.81	38.	Between Groups	393406.355	250	1573.625	1.45	0.24
	I have sufficient knowledge	117	191.93	40.42	Total	397964.632	252			

When the data in Table 18 were analyzed, it was determined that preschool teachers' levels of professional self-efficacy did not show a significant difference according to their level of knowledge about artificial intelligence in the dimensions of classroom management ($F(2\text{-}250) = 1.17$; $p = .31 > .05$), planning and implementation ($F(2\text{-}250) = 1.16$; $p = .32 > .05$), monitoring and assessment ($F(2\text{-}250) = 1.52$; $p = .22 > .05$), technological literacy ($F(2\text{-}250) = 2.68$; $p = .07 > .05$), or in the overall total score of the scale ($F(2\text{-}250) = 1.45$; $p = .24 > .05$).

Findings on the Relationship Between Preschool Teachers' General Attitudes Toward Artificial Intelligence and Their Levels of Professional Self-Efficacy

Findings regarding the relationship between preschool teachers' general attitudes toward artificial intelligence and their levels of professional self-efficacy are presented in Table 19.

Table 19
Pearson Correlation Test Findings on the Relationship Between Preschool Teachers' General Attitudes Toward Artificial Intelligence and Their Levels of Professional Self-Efficacy

	1	**2**	**3**	**4**	**5**	**6**	7	**8**
1. Positive Attitude	—							
2. Negative Attitude	-0.323**	—						
3. Attitude Towards Artificial Intelligence	0.778**	0.343**	—					
4. Classroom Management	0.409**	-0.311**	0.199**	—				
5. Planning and Implementation	0.401**	-0.299**	0.2**	0.984**	—			
6. Monitoring and Evaluation	0.413**	-0.295**	0.214**	0.97**	0.978**	—		
7. Technology Literacy	0.38**	-0.256**	0.207**	0.868**	0.88**	0.883**	—	
8. Professional Self-Efficacy	0.411**	-0.302**	0.207**	0.99**	0.994**	0.987**	0.911**	—

**p<.01

An examination of the data presented in Table 19 reveals the following findings.

Relationship between Positive Attitude and Negative Attitude: There is a negative, low-level ($r = -.323$), and significant inverse relationship between the sub-dimensions of positive and negative attitudes. This indicates that the positive and negative dimensions of attitude partially reflect each other, but never overlap (Cohen, 1988).

Positive attitude and general attitude toward Artificial Intelligence: A strong, positive, and significant relationship (r = .778) was found between positive attitude scores and general attitude toward artificial intelligence. This confirms the power of the positive sub dimension to reflect all items of the scale.

Relationships Between Positive Attitude and the Sub dimensions of Professional Self-Efficacy

Classroom Management: moderate level (r = .409),

Planning and Implementation: moderate level (r = .401),

Monitoring and Evaluation: Moderate level (r = .413), all showing positive and significant relationships.

Technology Literacy: A positive but weak relationship was found (r = .380), and it was significant. This suggests that a positive attitude toward artificial intelligence moderately correlates with pedagogical skills and shows a weaker correlation with technology literacy.

Relationships between General Attitude toward Artificial Intelligence and Sub dimensions of Professional Self-Efficacy: There positive, weak, and significant correlations between general attitude and all professional self-efficacy sub dimensions:

- Classroom Management (r = .199),
- Planning and Implementation (r = .200),
- Monitoring and Evaluation (r = .214),
- Technology Literacy (r = .207).

Relationships between Professional Self-Efficacy Sub dimensions: The sub dimensions had very strong, positive, and significant associations with each other and with the overall score of the scale (r = .868). These high correlations confirm that the sub-dimensions of professional self-efficacy gather around a common construct.

Overall, the relationship between attitude toward Artificial Intelligence and professional self-efficacy: Finally, there was a positive, weak (r = .207), and significant relationship between the general attitude toward artificial intelligence and the overall professional self-efficacy score. This shows that teachers' positive perceptions of artificial intelligence were partially reflected in their professional competence.

In the related literature, correlation value ranges are as follows: 0.00–0.19: very weak/insignificant; 0.20–0.39: weak; 0.40–0.59: moderate; 0.60–0.79: strong; 0.80–1.00: very strong (Cohen, 1988; Dancey & Reidy, 2004).

Discussion and Conclusion

The role of artificial intelligence in education has a significant impact on teachers' professional competencies and attitudes. The increasing use of artificial intelligence (AI) applications in education is shaping teachers' attitudes toward these technologies and their self-efficacy beliefs. AI has emerged as a crucial tool for improving the effectiveness of instructional processes in recent years. The potential of AI applications in education can transform teachers' instructional methods and enhance student engagement. For example, Holmes et al. (2019) emphasized the transformative potential of AI in instructional processes. In particular, an increase in teachers' knowledge of how to use AI enables them to utilize these technologies more effectively. The convenience offered by AI in teaching, learning, and assessment processes helps reduce teachers' workloads and provides them with more opportunities to offer guidance (Zhan et al. 2024). An important finding of this study is that some demographic variables frequently emphasized in the literature (gender, age, educational level, and professional seniority) do not create a significant difference in preschool teachers' attitudes and self-efficacy toward artificial intelligence. In studies by Kay (2006), Cai et al. (2017), Chen et al. (2025), and Holmes et al. (2019), it has been suggested that such variables may have an impact on self-efficacy regarding technology. However, the different conclusion reached in this study suggests that in the preschool context, perceptions of artificial intelligence may be more related to teachers' professional competencies and technological knowledge rather than individual characteristics. This situation offers an opportunity to challenge existing theoretical assumptions and makes a unique contribution to the literature.

Another noteworthy finding of the study is that, although teachers' overall attitudes toward artificial intelligence remain neutral, their professional self-efficacy levels are quite high. This suggests that teachers have strong confidence in their professional abilities but approach artificial intelligence with uncertainty and caution. In particular, the fact that AI applications are not yet well known or experienced in the context of early childhood education may be the main reason for this neutral attitude toward AI. The findings are significant in showing that the weak but meaningful positive relationship between self-efficacy and attitude indicates that as teachers' perceptions of professional competence strengthen, they may become more open to innovation. Therefore, in-service training programs should not only provide technical knowledge but also be designed to increase teachers' confidence in integrating AI technologies into their pedagogical practices.

Teachers' professional self-efficacy is a critical factor in the success of educational processes. The concept of self-efficacy, as defined by Bandura (1997), reflects individuals' beliefs about their ability to perform specific tasks. Teachers with high self-efficacy beliefs are less likely to give up in the face of challenges, which positively influences students' learning processes (Aşkar & Umay, 2001). Self-efficacy beliefs are necessary for teachers to use AI applications effectively. Selwyn (2019) emphasized the need to enhance teachers' proficiency in using AI technologies. In this context, the importance of professional development programs aimed at increasing teachers' AI knowledge and skills becomes apparent.

The role of artificial intelligence applications in education alleviates teachers' workload and provides them with more opportunities to offer guidance to students. Jiang (2022) examined the contributions of AI in tracking student progress and providing feedback to students. These applications make it easier for teachers to identify the topics with which students struggle in their learning processes and provide support for creating supplementary learning materials (Akgun & Greenhow, 2022; Chiu et al., 2022). Furthermore, AI applications allow teachers to integrate game-based learning methods to increase student engagement. Such practices boost students' motivation and encourage their active participation in learning processes (Zhan et al., 2024). The findings of this study indicate that preschool teachers' overall attitudes toward artificial intelligence are neutral, while their professional self-efficacy levels are quite high. Notably, the lack of a significant difference according to gender, age, education level, or professional seniority suggests that demographic variables may not be decisive factors influencing attitudes and self-efficacy. Instead, as emphasized in the literature examined in this study, knowledge and previous experience with artificial intelligence appear to play a more effective role. Indeed, the fact that teachers with greater AI knowledge displayed more positive attitudes supports the importance of education and experience in fostering acceptance and confidence in educational technologies. Additionally, the presence of a weak but significant positive correlation between professional self-efficacy and attitudes toward artificial intelligence shows that teachers' openness to innovation is related to their professional competence. These results reveal that in-service training programs for preschool teachers should not only introduce AI applications but also be designed to strengthen their confidence in effectively integrating these tools into their classrooms.

However, most educators lack the knowledge or skills to use AI. This is one of the greatest challenges in the field of education (Ajalo et al., 2025). For educators to effectively utilize AI, they must possess the necessary knowledge and skills, which are vital for the success of the transformation process in education. In this context, it is essential to develop professional development programs. With the help of artificial intelligence programs, educators can create innovative and inclusive learning environments using these technologies. Both theoretical and practical training should be provided to teachers to enable them to gain hands-on experience. To harness the potential of AI in education, fostering teachers' positive attitudes toward these technologies is important.

Implications for Professional Development Programs

Based on the findings of this study, professional development programs for preschool teachers should be designed with several key considerations. First, these programs should emphasize both theoretical knowledge and practical application opportunities, allowing teachers to gain firsthand experience with AI tools that are specifically tailored for early childhood education settings. Second, because teachers' attitudes toward AI significantly correlate with their professional self-efficacy, development programs should explicitly address confidence-building through scaffolded learning experiences that demonstrate successful AI integration in age-appropriate activities. Third, programs should include collaborative learning communities in which teachers can share experiences, discuss ethical considerations, and develop classroom implementation strategies. Finally, development initiatives should acknowledge and build upon teachers' existing professional strengths, as evidenced by their high self-efficacy scores, while addressing the specific areas where they express uncertainty about AI applications.

Education policies should develop strategies to increase teachers' knowledge and skills regarding AI. This will increase the effectiveness of AI applications in education and contribute to teachers' professional development. To harness the potential of AI in education, fostering teachers' positive attitudes toward these technologies is critical. Clark and Mayer (2024) addressed the ethical and social dimensions of AI in education and argued that teachers' sensitivity to these technologies needs to be increased. Additionally, teachers' attitudes toward AI are directly related to their professional self-efficacy.

Observations indicate that teachers knowledgeable about artificial intelligence tend to use these technologies more effectively in classrooms. This highlights the importance of the relationship between teachers' professional competencies and their attitudes toward AI use.

The impact of artificial intelligence applications on education is directly related to teachers' professional competencies. Teachers' attitudes toward AI had a decisive effect on their professional self-efficacy. In particular, teachers who are knowledgeable about AI tend to use these technologies more effectively in the classroom. This highlights the importance of the relationship between teachers' professional competencies and their attitudes toward AI. To harness the potential of AI in education, nurturing positive attitudes among teachers toward these technologies is critical.

In conclusion, artificial intelligence plays a significant role in shaping teachers' professional competencies and attitudes. The findings of this study indicate that although preschool teachers' levels of professional self-efficacy are quite high, their overall attitudes towards artificial intelligence remain neutral, with knowledge of artificial intelligence being the most decisive factor in developing a positive attitude. The results highlight the importance of developing in-service training programs aimed at increasing teachers' knowledge and confidence in teaching the subject. Effective education policies and hands-on professional development opportunities will not only strengthen teachers' professional competencies by ensuring the meaningful integration of artificial intelligence into teaching practices, as more than just a technological tool, but will also increase student achievement.

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Ikimokyklinio ugdymo mokytojų profesinio saviveiksmingumo ir nuostatų į dirbtinį intelektą ryšys

Yakup Yıldırım[1], Ece Arzum Güçlü[2]

[1] Akdenizo universitetas, Švietimo fakultetas, Ankstyvosios vaikystės ugdymo katedra, Pagrindinis miestelis, TR-07760 Pinarbaši, Konijaalti, Antalija, Turkija, yakupyildirim1986@gmail.com

[2] Akdenizo universitetas, Švietimo fakultetas, Ankstyvosios vaikystės ugdymo katedra, Pagrindinis miestelis, TR-07760 Pinarbaši, Konijaalti, Antalija, Turkija, ecearzu22@gmail.com

Santrauka

Dirbtinis intelektas (toliau – DI) tampa vis svarbesniu įrankiu švietimo srityje, todėl kyla klausimų, koks mokytojų požiūris į jį ir ar dažnai jie DI įtraukia į praktiką. Šiame tyrime buvo nagrinėta, kaip ikimokyklinio ugdymo mokytojų profesinis saviveiksmingumas siejasi su jų nuostatomis į DI. Tyrimui atlikti taikytas reliacinis metodas, duomenys surinkti iš 253 mokytojų, dirbančių ikimokyklinio ugdymo įstaigose. Duomenims analizuoti naudotos dvi skalės: bendroji nuostatų į DI ir ikimokyklinio ugdymo mokytojų profesinio saviveiksmingumo. Iš gautų rezultatų nustatyta, kad nors ikimokyklinio ugdymo mokytojų nuostatos į DI buvo teigiamesnės, apskritai jos liko neutralios. Pastebėta, kad mokytojų profesinio saviveiksmingumo lygis buvo labai aukštas visose subdimensijose. Tyrimo rezultatai parodė, kad nors ir nebuvo nustatyta statistiškai reikšmingų skirtumų pagal lytį, išsilavinimą, amžių ar profesinį stažą, vis dėlto mokytojai, turintys aukštesnį DI žinių lygį, išreiškė žymiai teigiamesnes nuostatas. Atlikta koreliacijos analizė atskleidė silpną, bet reikšmingą teigiamą ryšį tarp nuostatų į DI ir profesinio saviveiksmingumo. Šie rezultatai rodo, kad ikimokyklinio ugdymo mokytojai yra atviri DI, tačiau laikosi atsargios pozicijos, todėl būtina rengti profesinio tobulinimo programas, kurios stiprintų jų su DI susijusias žinias ir įgūdžius. Šis tyrimas prisideda prie ikimokykliniam ugdymui skirtos literatūros, nes nagrinėja šiuo metu dar nepakankamai ištirtą ryšį tarp mokytojų saviveiksmingumo bei nuostatų į DI ir pateikia rekomendacijas, kaip kurti profesinio tobulėjimo iniciatyvas šioje srityje.

Esminiai žodžiai: *mokymasis visą gyvenimą, dirbtinis intelektas, mokytojo profesinis saviveiksmingumas, ikimokyklinis ugdymas.*

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