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Original article

Examining the Relationship Between Preschool Teachers' Artificial Intelligence Literacy and Their Creativity in Teaching

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Abstract

The purpose of this study is to examine the relationship between preschool teachers' artificial intelligence literacy and their creativity in teaching. A correlational survey model, a quantitative research method, was employed in the study. The sample was using convenience sampling and consisted of 388 preschool teachers working in public and private preschools in Istanbul. The Personal Information Form, Creativity in Teaching Scale, and Artificial Intelligence Literacy Scale were used as data collection tools. The findings revealed a moderate positive relationship between teachers' artificial intelligence literacy and creativity in teaching; accordingly, it can be interpreted that as the level of artificial intelligence literacy increases, the level of creativity in teaching also increases. In the artificial intelligence literacy scale, significant differences were found in favor of males in the awareness and evaluation subdimensions, and females in the ethics subdimension. In the school type variable, significant differences were found in favor of private schools in the usage and ethics subdimensions. In this context, it is recommended that in-service training programs be organized to enhance ethical awareness in the use of artificial intelligence among teachers, support creative applications in teaching, and increase the readiness levels of prospective teachers entering the profession regarding artificial intelligence literacy.

Keywords: Preschool Teacher, Artificial Intelligence, Artificial Intelligence Literacy, Creativity, Creativity in Teaching

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INTRODUCTION

With the technological advancements of the 21st century, the applications, technological products, and digital technologies that are part of our lives are rapidly evolving and becoming integrated into every aspect of life; as a result of the integration of information with artificial intelligence into various applications and learning tools, it is evident that these advancements are also being incorporated into education and teaching processes (Derinalp, 2024; Sezer, 2026). Artificial intelligence, which plays a significant role in this transformation, is used in learning and teaching processes, personalized instruction (providing student-specific learning content), monitoring student performance and development (virtual classrooms, educational chatbots), facilitating the teaching process (finding appropriate content and supporting teachers in lesson planning and assessment processes), and the creation of creative content (Gürbüz, 2023; Luckin et al., 2016). In particular, the integration of artificial intelligence technologies into educational settings—given their multifaceted capabilities—has reshaped the knowledge and skills teachers must possess; the use of digital tools in the teaching-learning process, the design of quality educational environments, and the establishment of ethical boundaries for technology have made AI literacy an essential requirement for ensuring their conscious and responsible use (Ng et al., 2021). AI literacy can be defined as a set of skills that enables individuals to critically evaluate AI technologies, understand the conceptual aspects of the subject, establish healthy interactions and collaborate, and utilize these technologies as tools across various digital platforms (Çelebi, Demir, & Karakuş, 2023; Long & Magerko, 2020). Wang, Rau & Yuan (2023) argue that AI literacy has four components: awareness, usage, evaluation, and ethics, while Su, Kit Ng & Chu (2023), on the other hand, propose three components: learning skills (creativity, problem-solving, communication, and innovation skills), literacy skills (media and information technology), and life skills.

In a world where technology and every other field are constantly changing and evolving, each passing century brings about changes that give rise to new sources and needs. Accordingly, individuals must acquire different skills, and education systems must equip individuals with these new skills; consequently, 21st-century skills are recognized as fundamental requirements in a global and digital context (Dede, 2009; Kozikoğlu & Altunova, 2018; Santosa, 2022). According to the U.S. National Academies of Sciences, Engineering, and Medicine's (1997) Preparing for the 21st Century: The Education Imperative Report is emphasized that children must be developed in the fields of science, technology, engineering, and mathematics (STEM); and that creativity, innovation, and digital literacy must be instilled to prepare children for the rapidly changing global economy, alongside social skills such as intercultural communication, collaboration, critical thinking, and problem-solving. In this context, in her study examining 21st-century educational challenges and strategies within the framework of children and digital literacy, Pangesti Apriliyana (2025) found that children lack critical thinking skills in the online environment and face serious risks such as unethical behavior and exposure to harmful content. To address these issues, she emphasized the need to foster strong collaboration among

schools, families, and the community to equip children with digital literacy skills. Consequently, when aiming to cultivate 21st-century skills in educational settings through teachers, the study examines how teachers utilize AI technologies for pedagogical purposes, the extent to which they integrate them into teaching processes, and their ability to create an active learning environment (Dağaşan, 2025). Teachers must support children by being flexible, adaptable, responsive, environmentally conscious, open to diversity, and receptive to new ideas, in line with the children's developmental needs. Therefore, teachers are expected to be sufficiently knowledgeable about children's developmental characteristics, cognitive abilities, and existing creativity, and to serve as role models. Especially in this era of technological advancement and its integration into classrooms, it is crucial for early childhood educators to use various techniques to develop children's creative abilities and support them with new creative teaching methods (Küpeli, 2024). In this regard, a review of the literature reveals an increasing number of studies on the integration of artificial intelligence technologies into education, involving families and teachers (Boztepe, 2025; Altun, 2024; Köken and Balaban Dağal, 2024; Mart and Kaya; 2024; Temur, 2024; Akyel and Tur, 2024; Karakuş, Geçgel, and Çetin, 2024; Çelebi, Demir, and Karakuş, 2023; Su, Kit Ng, and Chu, 2023; Akdeniz & Özdinç, 2021). By designing the pedagogical processes, they have acquired in a unique and flexible manner; planning open-ended activities, offering diverse learning processes, and providing children with a creative learning environment through a student-centered approach, preschool teachers foster creativity in teaching (Bai et al. 2019; Dababneh, Ihmeideh, and Al Omari, 2010; Karaca and Aral, 2017; Yuvacı and Dağlıoğlu, 2018; Zahra, Yusooff, and Hasim, 2013). When evaluating the relationship between teachers' artificial intelligence literacy and their creativity in teaching, this can be interpreted as the teacher's capacity to use technology and artificial intelligence for pedagogical purposes. Teachers who can use artificial intelligence tools consciously and critically are able to make teaching processes more flexible, enriched, and student-centered; by designing different types of content and learning experiences, they can effectively utilize creative teaching practices. This situation can be explained by the TPACK Model (Technological Pedagogical Content Knowledge), which is conceptualized as a framework in which teachers integrate technological knowledge, pedagogical knowledge, and content knowledge (Handayani, Hussin, & Norman, 2023; Shakhman et al., 2020; Valtonen et al., 2017). The TPACK model aims to enhance the quality of the teaching process through the interaction of these three knowledge domains, based on a dynamic and holistic relationship between content, pedagogy, and technology (Koehler, Mishra, & Yahya, 2007; Koehler & Mishra, 2005). In the model, pedagogical content knowledge (PCK) emerges as the common ground between pedagogy and content knowledge; technological content knowledge (TCK) arises from the interaction between technology and content knowledge; and technological pedagogical knowledge (TPK) emerges from the integration of technology and pedagogical knowledge (Mishra and Koehler, 2006; 2007; 2009). In this context, for preschool teachers, Technological Pedagogical Content Knowledge refers to the ability to use technology consciously and in a balanced manner for pedagogical purposes while presenting content appropriate to children's developmental characteristics using effective teaching

methods. Particularly in the early childhood period, the ability of teachers to select digital tools that support play-based learning processes, to concretize content to facilitate children's active participation, and to enrich learning environments—when evaluated as a reflection of their digital literacy and creativity in teaching—gives this study its originality. Additionally, the scarcity of research in this field constitutes another aspect that makes this study unique. In this context, the research aims to answer the following questions:

- What are preschool teachers' levels of artificial intelligence literacy?
- What are preschool teachers' levels of creativity in teaching?
- Do preschool teachers' levels of artificial intelligence literacy and creativity in teaching show a significant difference according to demographic variables (age, gender, years of professional service, level of education, etc.)?
- Is there a meaningful relationship between preschool teachers' artificial intelligence literacy and their creativity in teaching?

MATERIALS and METHODS

Research Model

The research was conducted as a quantitative study using a correlational survey model to examine the relationship between preschool teachers' levels of artificial intelligence literacy and their creativity in teaching. The correlational survey model is a survey model that determines the shape and level of the relationship between at least two or more variables (Karasar, 2023).

Participants

The participants of this study were composed of preschool teachers employed in public and private kindergartens in Istanbul during the 2025-2026 academic year. 400 teachers, selected through convenience sampling, voluntarily participated in the study. Convenience sampling is one of the most practical and cost-effective sampling methods commonly used in research (Yağar & Dökme, 2018). The demographic characteristics of the participants are presented in Table 1.

Table 1. Demographic Characteristics of the Participants

Demographic Characteristics		**F**	**%**
Gender	Female	348	87.0
	Male	52	13.0
Age	20-25 age	101	25.3
	26-30 age	72	18.0
	31-35 age	77	19.3
	36-40 age	57	14.2
	41+	93	23.3
	Total	388	
Level of Education	Associate Degree	72	18.0
	Bachelor's Degree	256	64.0
	Graduate Degree	72	18.0
Year of Experience	0-2 year	104	26.0
	3-5 year	142	35.5
	6-10 year	94	23.5
	11 year +	60	15.0
School Type	Public Kindergarten	284	71.0
	Private Kindergarten	116	29.0
Artificial Intelligence Level of Knowledge	Little Knowledge	156	40.2
	Average Knowledge	232	59.8
The Use of Artificial Intelligence in Education	Yes	277	71.4
	No	111	28.6
	Total	388	100.0

Table 1 presents the analysis results for the study group's demographic characteristics. Looking at the gender distribution, 88.1% of the participants are female (342) and 11.9% are male (46). In terms of age category, 23.7% were aged 20-25 (92), 18.6% were aged 26-30 (72), 19.8% were aged 31-35 (77), 14.4% were aged 36-40 (56), and 23.5% were aged 41 and above (91). The educational level of the participants was calculated as follows: 17.8% with an associate degree (69), 64.4% with a bachelor's degree (250), and 17.8% with a postgraduate degree (69). In terms of years of experience, 24.5% had 0-2 years (95), 35.8% had 3-5 years (139), 24.2% had 6-10 years (94), and 15.5% had 11+ years (60). Looking at the distribution by school type, 70.1% were public kindergartens (272) and 29.9% were private kindergartens (116). And looking at the study group’s artificial intelligence level of knowledge category, %40.2 were little knowledge (277), and %59.8 average knowledge (232); study group’s use of the artificial intelligence in education category, %71.4 had “yes” (277), and %28.6 had “no” (111).

Data Collection Tools

Three data collection tools were used in the study: the “Personal Information Form” created by the researchers containing demographic information about the teachers; the “Creativity in Teaching Scale” adapted into Turkish by Yalçın and Yıldız Çiçekler (2012) and the “Artificial Intelligence Literacy Scale” adapted into Turkish by Polatlıgil and Güler (2023).

Personal Information Form

The personal information form developed by researchers includes questions on age, gender, level of education, years of experience, school type, artificial intelligence level of knowledge and the use of artificial intelligence in education.

Teaching for Creativity Scale

Developed by Rubenstein, Mccoach, and Siegle (2013), this scale is designed to assess teachers' levels of creativity. Adapted into Turkish by Yalçın and Yıldız Çiçekler (2021), it was developed to examine teachers' perspectives on creativity, a fundamental element in the development of creativity. The seven-point Likert scale (7-Strongly agree, 6-Agree, 5-Somewhat agree, 4-Undecided, 3-Somewhat disagree, 2-Disagree, 1-Strongly disagree) consists of 36 items. The scale has four subscales: teacher self-efficacy, environmental encouragement, social values, and child potential. The internal consistency coefficient of the scale is .89, while the subscales have coefficients of .90 for teacher self-efficacy, .82 for environmental encouragement, .84 for social values, and .75 for child potential. The maximum score on the scale is 252, and the minimum is 36. An increase in the scale score indicates that preschool teachers' perceptions of creativity have improved. In this study, the Cronbach's Alpha coefficient for the creativity in teaching scale was .859.

Artificial Intelligence Literacy Scale (AILS)

Developed by Wang, Rau, and Yuan (2023), this scale was designed to measure artificial intelligence literacy in the context of human-artificial intelligence interaction. The Turkish adaptation of the scale was carried out by Polatlıgil and Güler (2023). The five-point Likert-type scale (1-Strongly Disagree, 2-Disagree, 3-Undecided, 4-Agree, 5-Strongly Agree) consists of 12 items. The scale has four subscales: awareness, use, evaluation, and ethics. The internal consistency coefficient of the scale is .939, with the subscales awareness .946, use .989, evaluation .988, and ethics .862. The maximum score on the scale is 60, and the minimum is 0. In this study, the Cronbach's Alpha coefficient for the creativity in teaching scale was .835.

Data Analysis

After obtaining ethical committee approval, data collection was initiated with the voluntary participation of teachers. The “Personal Information Form,” “Teaching for Creativity Scale,” and “Artificial Intelligence Literacy Scale” were prepared as online forms using the Google Forms platform. Links to these forms were shared with various groups of preschool teachers during face-to-face meetings, via email, and on social media channels. Data was obtained after obtaining consent for voluntary participation. Statistical software was used to analyze the study's findings. When normality tests were performed in scales, the data were found be normally distributed, as indicated by the Kolmogorov-Smirnov, Shapiro-Wilk, Q-Q Plot, and box plots. The data were analyzed using parametric

tests (Independent Samples T-Test, One-Way Analysis of Variance (ANOVA), Post-Hoc Scheffe Test etc.). All analyses were evaluated at a 95% confidence interval and a significance level of $p<0.05$.

RESULTS

Table 2. Descriptive Statistics of the Artificial Intelligence Literacy Scale and the Teaching for Creativity Scale in Education and Sub-dimensions.

	N	Min.	Max.	X̄	SS
Artificial Intelligence Literacy Scale	388	2.50	5.00	3.92	.50
Awareness	388	2.00	5.00	3.94	.65
Usage	388	2.00	5.00	3.66	.70
Evaluation	388	1.00	5.00	3.95	.63
Ethics	388	2.67	5.00	4.12	.60
Teaching for Creativity Scale	388	156.00	245.00	207.80	16.18
Teacher Self-Efficacy	388	61.00	91.00	78.40	6.27
Social Support	388	43.00	70.00	63.59	4.80
Environmental Encouragement	388	6.00	42.00	30.62	8.26
Child Potential	388	19.00	42.00	35.19	4.87

According to Table 2, when looking at the descriptive statistics of the scores obtained by the working group on the Teaching for Creativity Scale and the Artificial Intelligence Literacy Scale and sub-dimensions, the participants' total scores on the Artificial Intelligence Literacy Scale ranged from 2.50 to 5.00 points, with an average of 3.92 and a standard deviation of .50. The participants' awareness sub-dimension's scores on the artificial intelligence literacy scale ranged from 2.00 to 5.00 points, with an average of 3.94 and a standard deviation of .65; in usage sub-dimension's score ranged from 2.00 to 5.00 points, with an average of 3.66 and a standard deviation of .70; evaluation sub-dimension's score ranged from 1.00 to 5.00 points, with an average of 3.95 and a standard deviation of .63; ethics sub-dimension's score ranged from 2.67 to 5.00 points, with an average of 4.12 and a standard deviation of .60. The participants' total scores on the Teaching for Creativity Scale ranged from 156 to 245 points, with an average of 207.80 and a standard deviation of 16.18. The participants' teacher self-efficacy sub-dimension's scores on the creativity scale in teaching ranged from 61.00 to 91.00 points, with an average of 78.40 and a standard deviation of 6.27; in social support sub-dimension's score ranged from 43.00 to 70.00 points, with an average of 63.59 and a standard deviation of 4.80; environmental encouragement sub-dimension's score ranged from 6.00 to 42.00 points, with an average of 30.62 and a standard deviation of 8.26; child potential sub-dimension's score ranged from 19.00 to 42.00 points, with an average of 35.19 and a standard deviation of 4.87.

Table 3. Independent Samples T-Test Results of the Artificial Intelligence Literacy Scale by Gender.

	Groups	**N**	***M***	***SD***	**t**	**df**	**p**
Awareness	Female	342	3.90	0.65	-3.83	386	< .001**
	Male	46	4.28	0.55			
Usage	Female	342	3.63	0.70	-2.60	386	.010*
	Male	46	3.91	0.64			
Evaluation	Female	342	3.92	0.62	-2.38	386	.018*
	Male	46	4.15	0.66			
Artificial Intelligence Literacy Total	Female	342	3.90	0.50	-2.47	386	.014*
	Male	46	4.09	0.50			
	Total	388					

Only statistically significant pairwise comparisons are presented. p<.05*, p<.001**.

According to Table 3, an independent samples t-test was conducted to examine whether the Artificial Intelligence Literacy Scale scores and its sub-dimensions differed significantly according to the gender of the participants. The results indicated statistically significant differences between genders in the overall Artificial Intelligence Literacy scores, t(386)= -2.47,p=.014. Furthermore, significant differences were also found in the sub-dimension of Awareness (t(386)= -3.83, p<.001), Usage (t(386)= -2.60, p=.010), and Evaluation (t(386)= -2.38, p=.018). Across the overall scale and these specific sub-dimension, male participants reported significantly higher mean scores compared to their female counterparts. Conversely, no statistically significant difference was observed between female (M=4.14, SD=0.59) and male (M=4.01, SD=0.63) participants in the Ethics sub-dimension, t(386)=1.38, p=.167.

Table 4. Independent Samples T-Test Results of the Teaching for Creativity Scale by Gender.

	Groups	**N**	***M***	***SD***	**t**	**df**	**p**
Social Support	Female	342	31.00	8.17	2.48	386	.014*
	Male	46	27.80	8.42			
	Total	388					

Only statistically significant pairwise comparisons are presented.p<.05*, p<.001**.

According to Table 4, an independent-samples t-test was conducted to determine whether there were significant differences in the research variables by gender. The results indicated no significant differences between female and male participants in terms of Teaching for Creativity Scale, Teacher Self-Efficacy, Social Support, and Child Potential (p>.05). However, a significant difference was found regarding Environmental Encouragement scores, t(386)=2.48, p=.014. Female participants reported significantly higher levels of environmental encouragement (M=31.00, SD=8.17) compared to male participants (M=27.80, SD=8.42).

Table 5. Results of the One-Way Analysis of Variance (ANOVA) Conducted to Determine Whether Scores on the Artificial Intelligence Literacy Scale Vary According to the Age Variable.

	Groups	**N**	***M***	***SD***	**Source of Var.**	**SS**	**df**	**MS**	**F**	**p**
Awareness	20-25	92	4.24	0.42	Between G.	14.81	4	3.70	9.47	< .001**
	26-30	72	4.06	0.53	Within G.	149.72	383	0.39		
	31-35	77	3.75	0.62	Total	164.53	387			
	36-40	56	3.85	0.50						
	41+	91	3.78	0.66						
Usage	20-25	92	4.05	0.51	Between G.	27.95	4	6.99	16.44	< .001**
	26-30	72	3.82	0.62	Within G.	162.82	383	0.43		
	31-35	77	3.42	0.75	Total	190.77	387			
	36-40	56	3.62	0.74						
	41+	91	3.38	0.66						
Evaluation	20-25	92	4.22	0.62	Between G.	11.28	4	2.82	7.69	< .001**
	26-30	72	3.97	0.55	Within G.	140.51	383	0.37		
	31-35	77	3.77	0.61	Total	151.79	387			
	36-40	56	3.96	0.64						
	41+	91	3.79	0.60						
Artificial	20-25	92	4.17	0.46	Between G.	9.81	4	2.45	10.72	< .001**
Intelligence	26-30	72	3.97	0.49	Within G.	87.66	383	0.23		
Literacy Total	31-35	77	3.76	0.47	Total	97.47	387			
	36-40	56	3.89	0.46						
	41+	91	3.77	0.50						
	Total	388								

Only statistically significant pairwise comparisons are presented. p<.05*, p<.001**.

According to Table 5, an one-way analysis of variance (ANOVA) was conducted to investigate whether the scores for Artificial Intelligence Literacy and its sub-dimensions significantly differed according to the participants' age groups. The results of the analysis revealed statistically significant differences among the age groups in the overall Artificial Intelligence Literacy scale ($F(4,383)=10.72$, $p<.001$). Furthermore, significant main effects were also observed in three of its sub-dimensions: Awareness ($F(4,383)=9.47$, $p<.001$), Usage ($F(4,383)=16.44$, $p<.001$), and Evaluation ($F(4,383)=7.69$, $p<.001$). Looking at the descriptive statistics, younger participants (particularly the 20-25 age group) generally reported the highest mean scores across these significant dimensions. Conversely, no statistically significant difference was found among the age groups regarding the scores in the Ethics sub-dimension, $F(4,383)=0.85$, $p=.497$.

Table 6. Results of the Post-Hoc Scheffe Test Following a One-Way Analysis of Variance (ANOVA) Conducted to Determine Which Subgroups Differ in Artificial Intelligence Literacy Scale Scores Based on the Age Variable.

	Group (I)	**Group (J)**	***MD* (I-J)**	***SE***	**p**
Awareness	20-25	31-35	0.49	0.10	< .001**
	20-25	36-40	0.39	0.11	.009*
	20-25	41+	0.46	0.09	< .001**
Usage	20-25	31-35	0.64	0.10	< .001**
	20-25	36-40	0.43	0.11	.005*
	20-25	41+	0.67	0.10	< .001**
	26-30	31-35	0.41	0.11	.006*
	26-30	41+	0.45	0.10	.001*
Evaluation	20-25	31-35	0.45	0.09	< .001**
	20-25	41+	0.42	0.09	< .001**
Artificial Intelligence Literacy Total	20-25	31-35	0.41	0.07	< .001**
	20-25	36-40	0.28	0.08	.016*
	20-25	41+	0.40	0.07	< .001**

Only statistically significant pairwise comparisons are presented. p<.05*, p<.001**.

According to Table 6, a scheffe post-hoc test was conducted to determine exactly which age groups significantly differed from one another. The pairwise comparisons for the Awareness sub-dimension indicated that the 20-25 age group (M=4.24) scored significantly higher than the 31-35 age group (MD=0.49, p<.001), the 36-40 age group (MD=0.39, p=.009), and the 41 and over age group (MD=0.46, p<.001). Regarding the Usage sub-dimension, a similar trend was observed. The 20-25 age group reported significantly higher scores than the 31-35 age group (MD=0.64, p<.001), the 36-40 age group (MD=0.43, p=.005), and the 41+ age group (MD=0.67, p<.001). Additionally, the 26-30 age group exhibited significantly higher usage scores than both the 31-35 age group (MD=0.41, p=.006) and the 41+ age group (MD=0.45, p=.001). For the Evaluation sub-dimension, the analysis demonstrated that participants in the youngest cohort, the 20-25 age group, had significantly higher mean scores than those in the 31-35 age group (MD=0.45, p<.001) and the 41+ age group (MD=0.42, p<.001). Finally, when examining the Artificial Intelligence Literacy Total scores, the post-hoc results confirmed that the 20-25 age group scored significantly higher than the 31-35 age group (MD=0.41, p<.001), the 36-40 age group (MD=0.28, p=.016), and the 41 and over age group (MD=0.40, p<.001). Consistent with the initial ANOVA findings, no post hoc comparisons were conducted for the Ethics sub-dimension because the overall model was not statistically significant.

Table 7. Results of the One-Way Analysis of Variance (ANOVA) Conducted to Determine Whether Scores on the Teaching for Creativity Scale Vary According to the Age Variable.

	Groups	**N**	***M***	***SD***	**Source of Var.**	**SS**	**df**	**MS**	**F**	**p**
Teacher Self-Efficacy	20-25	92	79.57	6.46	Between G.	704.52	4	176.13	4.65	.001*
	26-30	72	77.54	6.97	Within G.	14504.95	383	37.87		
	31-35	77	76.36	5.15	Total	15209.47	387			
	36-40	56	78.02	6.74						
	41+	91	79.88	5.52						
Environmental Encouragement	20-25	92	33.38	7.35	Between G.	1783.37	4	445.84	6.94	< .001**
	26-30	72	28.33	6.60	Within G.	24592.17	383	64.21		
	31-35	77	27.91	9.55	Total	26375.55	387			
	36-40	56	30.73	9.21						
	41+	91	31.86	7.45						
Child Potential	20-25	92	35.28	5.17	Between G.	237.83	4	59.46	2.55	.039*
	26-30	72	35.90	4.57	Within G.	8943.44	383	23.35		
	31-35	77	33.74	5.56	Total	9181.27	387			
	36-40	56	36.02	4.18						
	41+	91	35.24	4.36						
Teaching for Creativity Scale Total	20-25	92	211.40	13.46	Between G.	5115.74	4	1278.93	5.09	.001*
	26-30	72	205.83	15.88	Within G.	96183.18	383	251.13		
	31-35	77	201.61	16.12	Total	101298.91	387			
	36-40	56	208.50	19.06						
	41+	91	210.51	15.65						
	Total	388								

Only statistically significant pairwise comparisons are presented. p<.05*, p<.001**.

According to Table 7, an one-way analysis of variance (ANOVA) was conducted to examine whether the research variables significantly differed based on the age groups of the participants. The results of the analysis revealed statistically significant differences among the age groups in terms of Teaching for Creativity Scale (F(4,383)=5.09, p=.001), Teacher Self-Efficacy (F(4,383)=4.65, p=.001), Environmental Encouragement (F(4,383)=6.94, p<.001), and Child Potential (F(4,383)=2.55, p=.039). Examining the descriptive statistics, participants in the 20-25 age group reported the highest mean scores for the Teaching for Creativity Scale (M=211.40, SD=13.46) and Environmental Encouragement (M=33.38, SD=7.35). Conversely, no statistically significant difference was found among the age groups regarding the Social Support scores, F(4,383)=0.36, p=.840.

Table 8. Results of the Post-Hoc Scheffe Test Following a One-Way Analysis of Variance (ANOVA) Conducted to Determine Which Subgroups Differ in Teaching for Creativity Scale Scores Based on the Age Variable.

	Group (I)	**Group (J)**	***MD* (I-J)**	***SE***	**p**
Teacher Self-Efficacy	20-25	31-35	3.20	0.95	.024*
	41+	31-35	3.52	0.95	.009*
Environmental Encouragement	20-25	26-30	5.05	1.26	.003*
	20-25	31-35	5.47	1.24	.001**
	41+	31-35	3.95	1.24	.040*
Teaching for Creativity Scale Total	20-25	31-35	9.79	2.45	.003*
	41+	31-35	8.90	2.45	.012*

Only statistically significant pairwise comparisons are presented. p<.05*, p<.001**.

According to Table 8, a scheffe post-hoc test was conducted to determine exactly which age groups significantly differed from one another. The results indicated that for Teacher Self-Efficacy, the mean scores of participants in the 20-25 age group (MD=3.20, p=.024) and the 41 and over age group (MD=3.52, p=.009) were significantly higher than those of participants in the 31-35 age group. Regarding Environmental Encouragement, the analysis revealed that the 20-25 age group reported significantly higher scores compared to both the 26-30 age group (MD=5.05, p=.003) and the 31-35 age group (MD=5.47, p=.001). Additionally, the 41+ age group scored significantly higher on this variable than the 31-35 age group (MD=3.95, p=.040). For the Teaching for Creativity Scale Total scores, the post-hoc comparisons demonstrated that both the 20-25 age group (MD=9.79, p=.003) and the 41+ age group (MD=8.90, p=.012) exhibited significantly higher mean scores than their counterparts in the 31-35 age group.

Finally, an interesting statistical phenomenon was observed regarding the Child Potential variable. Although the one-way ANOVA indicated a statistically significant overall main effect, the rigorous, highly conservative nature of the Scheffé post hoc procedure—which strictly controls for Type I error, especially with unequal sample sizes—did not yield any statistically significant pairwise differences between age categories (p>.05 for all comparisons). This discrepancy, commonly recognized in statistics when utilizing conservative post-hoc methods, confirms that while an overarching variance exists, it is not robust enough to be attributed to any two specific age groups under strict comparative criteria.

Table 9. Results of the One-Way Analysis of Variance (ANOVA) Conducted to Determine Whether Scores on the Artificial Intelligence Literacy Scale Vary According to the Educational Level Variable.

	Groups	N	*M*	*SD*	Source of Var.	SS	df	MS	F	p
Usage	Associate Degree	69	3.65	0.60	Between G.	8.23	2	4.12	8.68	< .001**
	Bachelor's Degree	250	3.58	0.71	Within G.	182.54	385	0.47		
	Postgraduate	69	3.97	0.70	Total	190.77	387			
Evaluation	Associate Degree	69	3.87	0.72	Between G.	5.76	2	2.88	7.59	.001*
	Bachelor's Degree	250	3.90	0.63	Within G.	146.03	385	0.38		
	Postgraduate	69	4.21	0.44	Total	151.79	387			
Artificial	Associate Degree	69	3.88	0.47	Between G.	3.65	2	1.82	7.48	.001*
Intelligence	Bachelor's Degree	250	3.87	0.51	Within G.	93.83	385	0.24		
Literacy	Postgraduate	69	4.13	0.47	Total	97.47	387			
Total	Total	388								

Only statistically significant pairwise comparisons are presented. p<.05*, p<.001**.

According to Table 9, a one-way analysis of variance (ANOVA) was conducted to determine whether the scores for Artificial Intelligence Literacy and its sub-dimensions differed significantly based on the educational levels of the participants. The results demonstrated a statistically significant difference among the educational groups concerning the overall Artificial Intelligence Literacy scores, F(2,385)=7.48, p=.001. Additionally, significant main effects were found in the Usage (F(2,385)=8.68, p<.001) and Evaluation (F(2,385)=7.59, p=.001) sub-dimensions. Examining the descriptive statistics, participants with a postgraduate degree reported the highest mean scores across these significant variables compared to those with associate or bachelor's degrees. Conversely, no statistically significant differences were observed among the educational levels regarding the Awareness (F(2,385)=1.82, p=.163) and Ethics (F(2,385)=2.02, p=.135) sub-dimensions.

Table 10. Results of the Post-Hoc Scheffe Test Following a One-Way Analysis of Variance (ANOVA) Conducted to Determine Which Subgroups Differ in Artificial Intelligence Literacy Scale Scores Based on the Educational Level Variable.

	Group (I)	Group (J)	*MD* (I-J)	*SE*	p
Usage	Postgraduate	Associate Degree	0.32	0.12	.023*
	Postgraduate	Bachelor's Degree	0.39	0.09	< .001**
Evaluation	Postgraduate	Associate Degree	0.34	0.10	.006*
	Postgraduate	Bachelor's Degree	0.31	0.08	.001**
Artificial Intelligence Literacy Total	Postgraduate	Associate Degree	0.25	0.08	.012*
	Postgraduate	Bachelor's Degree	0.25	0.07	.001**

Only statistically significant pairwise comparisons are presented. p<.05*, p<.001**.

According to Table 10, a Scheffe post hoc test was conducted to determine exactly which education level groups significantly differed from one another. The pairwise comparisons for the Usage sub-dimension revealed that participants with a postgraduate degree scored significantly higher than those with an associate degree (MD=0.32, p=.023) and a bachelor's degree (MD=0.39, p<.001). Similarly, regarding the Evaluation sub-dimension, postgraduate degree holders exhibited significantly higher mean scores compared to both associate degree holders (MD=0.34, p=.006) and bachelor's degree holders (MD=0.31, p=.001). Finally, when examining the Artificial Intelligence Literacy Total scores,

the post-hoc results confirmed that the postgraduate cohort significantly outperformed both the associate degree group (MD=0.25, p=.012) and the bachelor's degree group (MD=0.25, p=.001).

Table 11. Results of the One-Way Analysis of Variance (ANOVA) Conducted to Determine Whether Scores on the Teaching for Creativity Scale Vary According to the Educational Level Variable.

	Groups	**N**	***M***	***SD***	**Source of Var.**	**SS**	**df**	**MS**	**F**	**p**
Environmental	Associate Degree	69	78.40	6.27	Between G.	208.090	2	104.05	4.603	.011*
Encouragement	Bachelor's Degree	250	64.24	4.60	Within G.	8702.10	385	22.60		
	Postgraduate	69	63.83	4.31	Total	8910.19	387			
	Total	388								

Only statistically significant pairwise comparisons are presented. p<.05*, p<.001**.

According to Table 11, an One-way analysis of variance (ANOVA) was conducted to determine whether the scores for Teaching for Creativity Scale and its sub-dimensions differed significantly across participants' educational levels. The results indicated that there was no statistically significant difference among the educational groups in terms of teacher self-efficacy, F(2,385)=0.090, p=.914, social support, F(2,385)=0.088, p=.916, child potential, F(2,385)=1.503, p=.224, and overall creativity in teaching scores, F(2,385)=0.143, p=.867. However, a statistically significant difference was found in the environmental encouragement sub-dimension, F(2,385)=4.603, p=.011. Examination of the descriptive statistics revealed that participants with an associate degree (M=78.40, S=6.27) reported higher levels of environmental encouragement compared to those with a bachelor's degree (M=64.24, SD=4.60) and postgraduate degree (M=63.83, SD=4.31). Although the one-way analysis of variance (ANOVA) revealed a statistically significant difference in Environmental Encouragement scores across educational levels, post hoc comparisons conducted using the Scheffé test indicated that none of the pairwise group differences were statistically significant (p>.05). This finding suggests that, despite the overall group effect observed in the ANOVA, the differences between specific educational level groups were not sufficiently strong to reach statistical significance under the conservative Scheffé procedure.

Table 12. Results of the One-Way Analysis of Variance (ANOVA) Conducted to Determine Whether Scores on the Artificial Intelligence Literacy Scale Vary According to the Years of Experience Variable.

	Groups	**N**	***M***	***SD***	**Source of Var.**	**SS**	**df**	**MS**	**F**	**p**
Awareness	0-2 years	95	4.15	.67	Between G.	5.44	3	1.813	4.377	.005*
	3-5 years	139	3.85	.67	Within G.	159.09	384	.414		
	6-10 years	94	3.88	.60	Total	164.53	387			
	11+ years	60	3.92	.60						
Usage	0-2 years	95	3.90	.60	Between G.	7.07	3	2.358	4.929	.002*
	3-5 years	139	3.59	.79	Within G.	183.70	384	.478		
	6-10 years	94	3.56	.62	Total	190.77	387			
	11+ years	60	3.61	.70						
Evaluation	0-2 years	95	4.18	.61	Between G.	7.33	3	2.444	6.497	< .001**
	3-5 years	139	3.84	.66	Within G.	144.46	384	.376		
	6-10 years	94	3.85	.59	Total	151.79	387			
	11+ years	60	3.97	.53						
Artificial Intelligence Literacy Total	0-2 years	95	4.09	.47	Between G.	3.61	3	1.203	4.923	.002*
	3-5 years	139	3.85	.54	Within G.	93.86	384	.244		
	6-10 years	94	3.84	.44	Total	97.47	387			
	11+ years	60	3.93	.49						
	Total	388		.50						

Only statistically significant pairwise comparisons are presented. p<.05*, p<.001**.

According to Table 12, a One-way analysis of variance (ANOVA) was conducted to determine whether the scores for Artificial Intelligence Literacy and its sub-dimensions differed significantly across participants' years of experience. The results demonstrated a statistically significant difference among the experience groups concerning the overall Artificial Intelligence Literacy scores, F(3,384)=4.92, p=.002. Furthermore, significant main effects were found in the following sub-dimensions: Awareness (F(3,384)=4.38, p=.005), Usage (F(3,384)=4.93, p=.002), and Evaluation (F(3,384=6.50, p<.001). Examining the descriptive statistics, participants with 0-2 years of experience reported the highest mean scores in Awareness (M=4.15), Usage (M=3.90), and Evaluation (M=4.18) compared to other groups. Conversely, no statistically significant differences were observed among the experience levels regarding the Ethics sub-dimension, F(3,384)=0.66, p=.580.

Table 13. Results of the Post-Hoc Scheffe Test Following a One-Way Analysis of Variance (ANOVA) Conducted to Determine Which Subgroups Differ in Artificial Intelligence Literacy Scale Scores Based on the Years of Experience Variable.

	Group (I)	**Group (J)**	***MD* (I-J)**	***SE***	**p**
Awareness	0-2 Years	3-5 Years	.294	.086	.009*
	0-2 Years	6-10 Years	.264	.094	.048*
Usage	0-2 Years	3-5 Years	.306	.092	.012*
	0-2 Years	6-10 Years	.334	.101	.012*
Evaluation	0-2 Years	3-5 Years	.331	.082	< .001**
	0-2 Years	6-10 Years	.324	.089	.005*
Artificial Intelligence Literacy Total	0-2 Years	3-5 Years	.227	.066	.008*
	0-2 Years	6-10 Years	.237	.072	.013*

Only statistically significant pairwise comparisons are presented. p<.05*, p<.001**.

According to Table 13, a Scheffe post hoc test was conducted to determine which years of experience groups differed significantly from one another. The analysis revealed that participants with 0-2 years of experience had significantly higher scores than those with 3-5 or 6-10 years of experience across all significant variables. Specifically, for the Awareness dimension, the 0-2 years' group scored significantly higher than the 3-5 years' group (p=.009) and the 6-10 years' group (p=.048). Similar patterns were observed in Usage, where the 0-2 years' group outperformed the 3-5 years (p=.012) and 6-10 years (p=.012) groups. In the Evaluation sub-dimension, the 0-2 years' group again showed significantly higher mean scores than the 3-5 years (p=.001) and 6-10 years (p=.005) groups. Finally, regarding the total artificial intelligence literacy scores, the 0-2 years' experience group demonstrated significantly higher literacy levels than both the 3-5 years (p=.008) and 6-10 years (p=.013) groups. No other significant pairwise differences were found between the remaining experience categories (p>.05).

Table 14. Results of the One-Way Analysis of Variance (ANOVA) Conducted to Determine Whether Scores on the Teaching for Creativity Scale Vary According to the Years of Experience Variable.

	Groups	**N**	***M***	***SD***	**Source of Var.**	**SS**	**df**	**MS**	**F**	**p**
Social Support	0-2 years	95	30.83	8.25	Between G.	631.68	3	210.56	3.141	.025*
	3-5 years	139	31.42	8.10	Within G.	25743.87	384	67.04		
	6-10 years	94	28.44	7.99	Total	26375.55	387			
	11+ years	60	31.85	8.58						
	Total	388								

Only statistically significant pairwise comparisons are presented. p<.05*, p<.001**.

According to Table 14, a one-way analysis of variance (ANOVA) was conducted to examine whether scores on the Teaching for Creativity Scale and its sub-dimensions varied significantly by participants' years of experience. The results indicated that there were no statistically significant differences among the experience groups in the overall Teaching for Creativity Scale total scores, F(3,384)=2.09, p=.101. Similarly, no significant differences were found in the sub-dimensions of Teacher Self-Efficacy (F(3,384)=2.21, p=.086), Environmental Encouragement (F(3,384)=0.45, p=.721), and Child Potential (F(3,384)=1.25, p=.291). However, a statistically significant main effect was observed for the Social Support sub-dimension, F(3,384)=3.14, p=.025. Despite the significant ANOVA result, a follow-up Scheffe post-hoc test was performed to identify specific group differences, but the test did not reveal any statistically significant pairwise comparisons between the experience groups (p>.05). This suggests that while the overall model for Social Support indicated a difference, the effect was not strong enough to be localized between specific experience levels using the conservative Scheffe criterion.

Table 15. Results of the One-Way Analysis of Variance (ANOVA) Conducted to Determine Whether Scores on the Artificial Intelligence Literacy Scale Vary According to the School Type Variable.

	Groups	**N**	***M***	***SD***	**Source of Var.**	**SS**	**df**	**MS**	**F**	**p**
Usage	Public Preschool	272	3.59	.71	Between G.	4.36	1	4.36	9.03	.003*
	Private Preschool	116	3.82	.67	Within G.	186.41	386	.48		
	Total	388			Total	190.77	387			

Only statistically significant pairwise comparisons are presented. p<.05*.

According to Table 15, one-way analysis of variance (ANOVA) was conducted to examine whether the scores on the Artificial Intelligence Literacy Scale and its sub-dimensions varied significantly based on the participants' school type. The results indicated that there was no statistically significant difference between public and private preschool teachers regarding their overall Artificial Intelligence Literacy total scores, F(1,386)=3.74, p=.054. Similarly, no significant differences were found in the sub-dimensions of Awareness (F(1,386)=0.61, p=.437), Evaluation (F(1,386)=0.25, p=.615), and Ethics (F(1,386)=2.59, p=.109). However, a statistically significant difference was observed in the Usage sub-dimension based on school type, F(1,386)=9.03, p=.003. An examination of the group means indicates that teachers working in Private Preschools reported significantly higher usage scores (M=3.82, SD=.67) compared to those working in Public Preschools (M=3.59, SD=.71).

Table 16. Results of the One-Way Analysis of Variance (ANOVA) Conducted to Determine Whether Scores on the Teaching for Creativity Scale Vary According to the School Type Variable.

	Groups	**N**	***M***	***SD***	**Source of Var.**	**SS**	**df**	**MS**	**F**	**p**
Environmental Encouragement	Public Preschool	272	30.00	8.64	Between G.	348.10	1	348.10	5.162	.024*
	Private Preschool	116	32.07	7.09	Within G.	26027.45	386	67.43		
	Total	388			Total	26375.55	387			

Only statistically significant pairwise comparisons are presented. p<.05*.

According to Table 16, a One-way analysis of variance (ANOVA) was conducted to examine whether the scores on the Teaching for Creativity Scale and its sub-dimensions varied significantly based on the participants' school type. The results indicated that there was no statistically significant difference between public and private preschool teachers regarding their overall creativity in teaching total scores, F(1,386)=0.429, p=.513. Similarly, no significant differences were found in the sub-dimensions of teacher self-efficacy, F(1,386)=0.150, p=.698, social support, F(1,386)=0.576, p=.448, and child potential, F(1,386)=0.164, p=.685. However, a statistically significant difference was observed in the environmental encouragement sub-dimension based on school type, F(1,386)=5.162, p=.024. An examination of the group means indicates that teachers working in private preschools (M=32.07, SD=7.09) reported higher environmental encouragement scores compared to those working in public preschools (M=30.00, SD=8.64).

Table 17. Results of the One-Way Analysis of Variance (ANOVA) Conducted to Determine Whether Scores on the Artificial Intelligence Literacy Scale Vary According to the Artificial Intelligence Level of Knowledge Variable.

	Groups	**N**	***M***	***SD***	**Source of Var.**	**SS**	**df**	**MS**	**F**	**p**
Awareness	Little Knowledge	156	3.63	.64	Between G.	24.87	1	24.86	68.70	< .001**
	Average Knowledge	232	4.15	.57	Within G.	139.67	386	.36		
			3.26	.62	Total	164.53	387			
Usage	Little Knowledge	156	3.94	.61	Between G.	43.00	1	43.00	112.31	< .001**
	Average Knowledge	232	3.69	.63	Within G.	147.77	386	.38		
			4.12	.57	Total	190.771	387			
Evaluation	Little Knowledge	156	3.96	.56	Between G.	16.61	1	16.61	47.42	< .001**
	Average Knowledge	232	4.23	.60	Within G.	135.18	386	.35		
			4.12	.660	Total	151.79	387			
Ethics	Little Knowledge	156	3.63	.64	Between G.	6.47	1	6.47	19.12	< .001**
	Average Knowledge	232	4.15	.57	Within G.	130.62	386	.34		
			3.26	.62	Total	137.08	387			
Artificial Intelligence Literacy Total	Little Knowledge	156	3.64	.45	Between G.	20.62	1	20.62	103.54	< .001**
	Average Knowledge	232	4.11	.44	Within G.	76.86	386	.20		
	Total	388	3.64	.45	Total	97.47	387			

p<.05*, p<.001**.

According to Table 17, a One-way analysis of variance (ANOVA) was conducted to examine whether the scores on the Artificial Intelligence Literacy Scale and its sub-dimensions varied significantly based on the participants' artificial intelligence level of knowledge. The results indicated that there were statistically significant differences between the groups across all dimensions. Specifically, significant differences were found in awareness, $F(1,386)=68.70$, $p< .001$, usage, $F(1,386)=112.31$, $p<.001$, evaluation, $F(1,386)=47.42$, $p<.001$, and ethics, $F(1,386)=19.12$, $p<.001$. In addition, a significant difference was observed in the overall artificial intelligence literacy scores, $F(1,386)=103.54$, $p<.001$. Examination of the group means revealed that participants with an average level of artificial intelligence knowledge reported higher scores in awareness ($M=4.15$, $SD=.57$), evaluation ($M=4.23$, $SD=.60$), ethics ($M=4.15$, $SD=.57$), and overall artificial intelligence literacy ($M=4.11$, $SD=.44$) compared to those with little knowledge. However, for the usage dimension, participants with little knowledge ($M=3.94$, $SD=.61$) reported higher scores than those with average knowledge ($M=3.69$, $SD=.63$).

Table 18. Results of the One-Way Analysis of Variance (ANOVA) Conducted to Determine Whether Scores on the Teaching for Creativity Scale Vary According to the Artificial Intelligence Level of Knowledge Variable.

	Groups	N	*M*	*SD*	Source of Var.	SS	df	MS	F	p
Teacher Self-Efficacy	Little Knowledge	156	76.78	6.27	Between G.	686.89	1	686.89	18.26	< .001**
	Average Knowledge	232	79.50	6.04	Within G.	14522.59	386	37.62		
			62.80	4.78	Total	15209.47	387			
Environmental Encouragement	Little Knowledge	156	64.11	4.75	Between G.	160.27	1	160.27	7.07	.008*
	Average Knowledge	232	30.38	8.18	Within G.	8749.93	386	22.67		
			30.78	8.32	Total	8910.19	387			
Creativity in Teaching Total	Little Knowledge	156	79.50	6.04	Between G.	2421.25	1	2421.25	9.45	.002*
	Average Knowledge	232	62.80	4.78	Within G.	98877.66	386	256.16		
	Total	388	64.11	4.75	Total	101298.92	387			

Only statistically significant pairwise comparisons are presented. p<.05*, p<.001**.

According to Table 18, a One-way analysis of variance (ANOVA) was conducted to examine whether scores on the Teaching for Creativity Scale and its sub-dimensions differed significantly across participants' levels of artificial intelligence knowledge. The results indicated that there were statistically significant differences between the groups in teacher self-efficacy, F(1,386)=18.26, p<.001, environmental encouragement, F(1,386)=7.07, p=.008, and creativity in teaching total scores, F(1,386)=9.45, p=.002. In contrast, no statistically significant differences were found in social support, F(1,386)=0.21, p=.648, or child potential, F(1,386)=1.82, p=.178. Examination of the group means revealed that participants with an average level of artificial intelligence knowledge reported higher teacher self-efficacy scores (M=79.50, SD=6.04) than those with little knowledge (M=76.78, SD=6.27). However, for environmental encouragement and overall creativity in teaching, participants with little knowledge (M=64.11, SD=4.75; M=79.50, SD=6.04, respectively) reported higher scores than those with average knowledge (M=30.38, SD=8.18; M=62.80, SD=4.78, respectively).

Table 19. Results of the One-Way Analysis of Variance (ANOVA) Conducted to Determine Whether Scores on the Artificial Intelligence Literacy Scale Vary According to the Use of Artificial Intelligence in Education Variable.

	Groups	N	*M*	*SD*	Source of Var.	SS	df	MS	F	p
Awareness	Yes	277	4.12	.61	Between G.	30.76	1	30.76	88.76	<.001**
	No	111	3.50	.53	Within G.	133.77	386	.35		
						164.53	387			
Usage	Yes	277	3.87	.61	Between G.	41.27	1	41.27	106.57	<.001**
	No	111	3.15	.65	Within G.	149.50	386	.39		
	Total	388				190.77	387			
Evaluation	Yes	277	4.08	.57	Between G.	18.31	1	18.30	52.94	<.001**
	No	111	3.60	.64	Within G.	133.48	386	.35		
						151.79	387			
Ethics	Yes	277	4.18	.57	Between G.	3.28	1	3.28	9.45	.002*
	No	111	3.98	.63	Within G.	133.81	386	.35		
						137.08	387			
Artificial Intelligence Literacy Total	Yes	277	4.06	.46	Between G.	20.38	1	20.38	102.07	<.001**
	No	111	3.56	.41	Within G.	77.09	386	.20		
	Total	388	3.92	.50	Total	97.47	387			

p<.05*, p<.001**.

According to Table 19, a One-way analysis of variance (ANOVA) was conducted to examine whether the scores on the Artificial Intelligence Literacy Scale and its sub-dimensions varied significantly based on the participants' use of artificial intelligence in education. The results indicated that there were statistically significant differences between the groups across all dimensions. Specifically, significant differences were found in awareness, $F(1,386)=88.76$, $p< .001$, usage, $F(1,386)=106.57$, $p<.001$, evaluation, $F(1,386)=52.94$, $p<.001$, and ethics, $F(1,386)=9.45$, $p=.002$. In addition, a significant difference was observed in the overall artificial intelligence literacy scores, $F(1,386)=102.07$, $p<.001$. Examination of the group means revealed that participants who use artificial intelligence in education reported higher scores in awareness (M=4.12, SD=.61), usage (M=3.87, SD=.61), evaluation (M=4.08, SD=.57), ethics (M=4.18, SD=.57), and overall artificial intelligence literacy (M=4.06, SD=.46) compared to those who do not use artificial intelligence in education (Awareness M=3.50, SD=.53; Usage M=3.15, SD=.65; Evaluation M=3.60, SD=.64; Ethics M=3.98, SD=.63; Overall M=3.56, SD=.41).

Table 20. Results of the One-Way Analysis of Variance (ANOVA) Conducted to Determine Whether Scores on the Teaching for Creativity Scale Vary According to the Use of Artificial Intelligence in Education Variable.

	Groups	**N**	***M***	***SD***	**Source of Var.**	**SS**	**df**	**MS**	**F**	**p**
Teacher Self-Efficacy	Yes	277	79.16	6.54	Between G.	550.77	1	550.77	14.50	<.001**
	No	111	76.52	5.10	Within G.	14658.70	386	37.97		
					Total	15209.47	387			
Child Potential	Yes	277	35.53	5.09	Between G.	113.61	1	113.61	4.84	.028*
	No	111	34.33	4.17	Within G.	9067.66	386	23.49		
						9181.27	387			
Creativity in	Yes	277	209.44	16.29	Between G.	2605.58	1	2605.58	10.19	.002*
Teaching Total	No	111	203.70	15.22	Within G.	98693.33	386	255.68		
	Total	388	207.80	16.18	Total	101298.92	387			

Only statistically significant pairwise comparisons are presented. p<.05*, p<.001**.

According to Table 20, a One-way analysis of variance (ANOVA) was conducted to examine whether the scores on the Teaching for Creativity Scale and its sub-dimensions varied significantly based on the participants' use of artificial intelligence in education. The results indicated that there were statistically significant differences between the groups in certain dimensions. Specifically, significant differences were found in teacher self-efficacy, $F(1,386)=14.50$, $p<.001$, and child potential, $F(1,386)=4.84$, $p=.028$. However, no significant differences were observed in environmental encouragement, $F(1,386)=.08$, $p=.780$, or social support, $F(1,386)=3.58$, $p=.059$. In addition, a significant difference was observed in the overall creativity in teaching scores, $F(1,386)=10.19$, $p=.002$. Examination of the group means revealed that participants who use artificial intelligence in education reported higher scores in teacher self-efficacy (M=79.16, SD=6.54), child potential (M=35.53, SD=5.09), and overall creativity in teaching (M=209.44, SD=16.29) compared to those who do not use

artificial intelligence in education (Teacher Self-Efficacy M=76.52, SD=5.10; Child Potential M=34.33, SD=4.17; Creativity in Teaching Total M=203.70, SD=15.22).

Table 21. Results of the Pearson Correlation Matrix Between Artificial Intelligence Literacy Scale and Sub-Dimensions and Teaching for Creativity Scale and Sub-Dimensions.

Variable	1	2	3	4	5	6	7	8	9	10
1. Awareness	1									
2. Usage	.648**	1								
3. Evaluation	.493**	.650**	1							
4. Ethics	.334**	.314**	.370**	1						
5. AI Literacy Total Scale	.804**	.856**	.809**	.630**	1					
6. Teacher Self-Efficacy	.381**	.348**	.400**	.352**	.475**	1				
7. Social Support	.249**	.136**	.202**	.280**	.275**	.515**	1			
8. Child Potential	.263**	.137**	.098	.153**	.209**	.251**	.437**	1		
9. Environmental Encouragement	.236**	.339**	.185**	.268**	.332**	.213**	.025	.209**	1	
10. Creativity in Teaching Total Scale	.421**	.390**	.339**	.402**	.498**	.724**	.640**	.634**	.663**	1

Note. N = 388. ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

According to Table 21, Pearson correlation analysis was conducted to examine the relationships between the Artificial Intelligence Literacy Scale and its sub-dimensions and the Creativity in Teaching Scale and its sub-dimensions. The results indicated statistically significant positive correlations among almost all variables. Specifically, the overall Artificial Intelligence Literacy Total Scale showed a moderate positive correlation with the Creativity in Teaching Total Scale (r=.498, p<.01). When examining the sub-dimensions, the strongest correlation between the two scales was found between AI Literacy Total and Teacher Self-Efficacy (r=.475, p<.01). Within the Creativity in Teaching dimensions, Teacher Self-Efficacy was significantly correlated with awareness (r=.381, p<.01), usage (r=.348, p<.01), evaluation (r=.400, p<.01), and ethics (r=.352, p<.01). Additionally, Environmental Encouragement showed a significant correlation with usage (r=.339, p<.01) and ethics (r=.268, p<.01). While most variables were positively related, no significant correlation was found between Social Support and Environmental Encouragement (r=.025, p>.05), nor between Evaluation and Child Potential (r=.098, p>.05). Overall, the findings suggest that higher levels of artificial intelligence literacy are associated with increased creativity in teaching.

DISCUSSION

This study aims to examine the relationship between preschool teachers' artificial intelligence literacy and their creativity in teaching. In the initial findings, the scores obtained by preschool teachers on the creativity in teaching scale and the artificial intelligence literacy scale were examined, and the results were analysed descriptively. The fact that participants scored close to the maximum on the artificial intelligence literacy scale indicates that teachers have adapted to technological transformation

processes. Given that ethical awareness is the sub-dimension of AI literacy that received the highest score, it can be inferred that teachers prioritize the principle of safety when incorporating AI into the classroom. The fact that the score for the "application" subscale was found to be lower than those for the other subscales indicates a gap in the transfer of theoretical knowledge to the practical level. In the context of creativity in education, alongside teachers' strong confidence in their own competencies, the critical role of social support in creative processes comes to the fore. Accordingly, it can be concluded that professional solidarity and the social environment serve as sources of motivation. In line with the findings of the research, the fact that classroom teachers in Kaman's (2025) study scored highly on the statement "I am always careful to ensure that artificial intelligence technology is not used for malicious purposes" indicates that they are sensitive to potential misuse from an ethical and security perspective and tend to use artificial intelligence applications in a responsible, informed, and controlled manner. In their study examining the levels of artificial intelligence literacy among teachers in different disciplines, Demirtaş and İşçi (2026) found that preschool teachers possess a high level of literacy. In Hocaoğlu's (2025) study examining the artificial intelligence awareness of special education teachers, the finding that teachers possess high levels of both theoretical and practical knowledge indicates that they have a certain level of knowledge regarding artificial intelligence and are able to apply this knowledge in practice. Based on this, it can be concluded that teachers are open to technological advancements and transformations and incorporate them into their teaching practices.

In the findings obtained from the artificial intelligence literacy scale for preschool teachers, based on the gender variable, significant differences were found in favor of males across all subscales; however, on the creativity in teaching scale, a significant difference was found in favor of females in the social support subscale. Although some studies in the literature reveal no difference between genders in teachers' AI literacy (Muzaffer and Ünal, 2025; Ateş, 2025); consistent with these research findings, a study conducted by Cheng et al. (2025) with elementary school students also found that male students had higher levels of artificial intelligence literacy than female students. Based on this finding, it can be inferred that even at a young age, boys show greater interest in technology and demonstrate higher proficiency in digital processes. In a study by Nyaaba et al. (2024) examining the use of generative AI tools in pre-service teachers' research, the authors found that male participants used these tools more frequently than female participants. In addition, consistent with the findings of this study, examining teachers' tendencies toward creative thinking found that female teachers scored higher and it appears that female teachers are more open to collaboration and social support than male teachers (Türkdoğan, 2019; Kammermeier et al., 2025). Similarly, in the study by Jehan, Shahzada, and Mustafa (2022), it was found that female teachers scored higher than male teachers on the subscales of originality, fluency, flexibility, context, and motivation.

The study's findings indicate that age is a determining factor in both artificial intelligence literacy and creativity among preschool teachers. It was found that young teachers in the 20–25 age group scored

significantly higher on the overall AI literacy scale and sub-dimensions of awareness, usage, and evaluation compared to the 31–35, 36–40, and 41+ age groups. In studies investigating the relationship between age and creativity levels among preschool teachers, present divergent findings in the literature. While some research identifies significant differences in teacher self-efficacy and environmental encouragement by age, Arıcı (2023) observes a positive correlation: creativity self-efficacy increases with age. Conversely, Çoban (2016) reports that although creativity scores initially rise with age, they begin to decline after the 40–44 age range, a trend attributed to professional burnout. In contrast, Gül (2023) and Eskidemir Meral and Tezel Şahin (2019) concluded that age has no significant impact on the sub-dimensions of teaching creativity. Offering a contemporary perspective, Ateş (2025) suggests that higher creativity scores in younger teachers are linked to their superior proficiency in understanding and integrating artificial intelligence technologies into educational processes. This finding suggests that the younger generation, often referred to as "digital natives," adapts more quickly to technological advancements and incorporates AI tools more extensively into the teaching environment.

The research findings indicate that educational level is a determining factor in preschool teachers' artificial intelligence literacy, and that teachers with a graduate degree possess significantly higher literacy in this area. This finding suggests that graduate education contributes to the development of pedagogical models by integrating theory and practice within technological education contexts through the Design-Based Research Methodology, alongside advanced research techniques, critical thinking skills, and the ability to analyze complex systems that graduate education imparts to individuals. In contrast to this finding in the study, there are also studies showing that teachers' educational levels do not make a significant difference in AI literacy (Elçiçek, 2024; Kaman, 2025). This difference may stem from variations in the research conducted across different teaching disciplines or age groups. When examining the environmental incentive dimension of creativity in education, it is noteworthy that although a significant difference was detected in the ANOVA by educational level, the Scheffé test failed to identify a specific difference between groups. This suggests that academic education (graduate-level) provides a direct advantage in fields requiring technical and cognitive skills, such as artificial intelligence; however, the environmental dimension of creativity (school resources, administrative support, interactions with the immediate environment, etc.) is more sensitive to contextual factors within the social environment rather than educational level, though it doesn't result in significant differences.

The research findings reveal that the variable of years of professional experience is a critical factor shaping both AI literacy and creative processes in teaching. Teachers in the early years of their careers (0–2 years) have significantly higher total AI literacy scores, as well as scores in the awareness, usage, and evaluation sub-dimensions, compared to their colleagues with 3–5 and 6–10 years of experience. This finding suggests that the "digital native" generation, which has grown up alongside digital technologies, possesses a higher sense of self-efficacy in understanding AI tools, integrating them into classroom teaching processes, and implementing various digital teaching strategies; while also

supporting the view that, compared to teachers with long-standing experience in the profession, they are more open to innovation, collaborative, eager to use diverse materials, and more inclined to develop their skills in this area (Autry & Berge, 2011; Pazin, Maat & Mahmud, 2022; Prensky, 2001). Parallel to this finding, Akın et al. (2025) concluded that new-generation teachers have a more practical level of knowledge about artificial intelligence than older-generation teachers. In this case, it can be considered that newly employed teachers use artificial intelligence more frequently.

The research findings reveal that the type of school is a critical factor shaping both AI literacy and creative processes in teaching. Based on this finding, it can be concluded that the processes of digital transformation in education vary across institutions. It has been observed that the rapid pace at which private educational institutions adopt innovative technologies has led to a digital divide between public schools and private educational institutions; furthermore, as private educational institutions aim to reach a larger student body—driven by financial considerations—they are able to distinguish themselves by possessing the necessary digital infrastructure and integrating digital tools more extensively into their curricula. In parallel with this finding, Latham and Montacute's (2025) study concluded that private schools are generally ahead of public schools in terms of assigning staff to monitor AI use and providing related training, determining AI-related policies, and accessing resources. Kaya (2022) concluded that teachers working in private schools generally embrace digital teaching, are personally inclined toward it, and effectively use digital environments as a learning tool in the classroom. Based on these findings, the resources provided by schools are one of the most significant factors influencing the speed at which individuals adapt to new technologies. Consequently, it has been concluded that teachers working in private schools are more open to technological advancements and that both the use of artificial intelligence and environmental incentives in creative learning environments are important.

The research findings reveal that the AI knowledge and that use in teaching process is a critical factor shaping both AI literacy and creative processes in teaching. This finding is consistent with the technological pedagogical content knowledge (TPACK) framework in the literature; according to this framework, as teachers' knowledge and skills regarding technology increase, so do their competence and creative capacity in integrating these tools into educational processes (Mishra & Koehler, 2006). It is stated that technological proficiency enables teachers to move beyond traditional teaching methods and design innovative, student-centered activities (Balakrishnan, 2022; Chai et al., 2021). In addition to this finding, it has been observed that, due to rapid advancements in artificial intelligence technologies, teachers' concerns are growing regarding the use of AI technologies to create a learning environment that enhances students' learning performance; it has been concluded that the use of AI tools by teachers in their lessons plays a vital role in this regard (Wang, Liu & Tu, 2021). In conclusion, it can be said that developing teachers' digital and technological competencies is an essential requirement not only in terms of acquiring theoretical knowledge but also in terms of professional self-efficacy and creative teaching practices in the technological age of the future.

CONCLUSION

Early childhood education represents the first and most critical stage of socialization following the family environment, laying the foundational pillars for an individual's social, cognitive, and emotional development. Within this framework, the teacher—as the primary determinant of educational quality—plays a strategic role in adapting to the innovations brought by the digital era. This research has demonstrated a significant relationship between preschool teachers' artificial intelligence (AI) literacy levels and their creativity in teaching. The findings prove that digital technologies, particularly AI-driven tools, serve not merely as supplementary aids in preschool classrooms, but as "digital levers" that trigger and enrich the creative processes of educators. An increase in teachers' technological competencies enables them to blend traditional learning environments with digital pedagogy, thereby facilitating the design of more original, flexible, and child-centered educational experiences.

In conclusion, supporting the AI literacy skills of teachers for a high-quality digital integration in early childhood education is not only a necessity but a fundamental investment in the sustainability of creative learning environments. This study confirms that transforming technology from a perceived source of anxiety into an instrument that nurtures pedagogical creativity will be a decisive factor in the future success of early childhood education. According to the research findings, as the level of artificial intelligence literacy increases, the level of creativity in teaching also increases. In this context, in-service training can be organized for teachers to increase their artificial intelligence literacy and integrate it into education. Various workshops can be planned on the use of artificial intelligence tools and the integration of artificial intelligence into teaching. Experts can develop AI-supported applications to be used in education, tailored to children's age groups and development. Preschool education institutions can organize annual seminars on the use of AI and its pedagogical integration into their curricula. For teachers, artificial intelligence tools, the UNESCO AI Competency Framework (UNESCO, 2026), the European Framework for Teachers' Digital Competence (Redecker, 2017), and the TPACK framework (Mishra, Warr & Islam, 2023)—which is used to establish the necessary foundation for teachers to effectively use AI tools—to develop teachers' high-quality digital literacy skills.

Additional Declaration

Author Contributions

The research was conducted under the supervision of the fourth author, and all authors contributed equally to the development of the research idea, data analysis, writing, and editing stages.

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Responsible Artificial Intelligence Statement

In this study, artificial intelligence tool Grammarly was used in language editing and correct language errors. We declare that we, as the authors, take full responsibility for the problems that may arise from the content produced by artificial intelligence.

Conflicts of Interest

The authors declare that there are no conflicts of interest related to the publication of this study.

Ethics Approval

In all processes of this study, the principles of Pen Academic Publishing Research Ethics Policy were followed. This research was reviewed at the meeting of the Ethics Committee of İstanbul Sabahattin Zaim University on 30/07/2025, numbered 2025/08, and ethical committee approval was obtained.

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