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Preschool Teachers' Technology Use: Attitudes and Perceptions of Self-Efficacy

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ABSTRACT

This study seeks to determine the perceptions of technology self-efficacy and attitudes toward using technological equipment among preschool teachers. In this investigation, a sequential explanatory mixed method was employed. The primary participant group was selected using convenience sampling, whereas the subsample group was selected using maximum variation sampling. Participants included 118 teachers from nationwide preschool education organizations affiliated with the Ministry of National Education (MoNE). The Use of Technology in Early Childhood Education Questionnaire (Blackwell et al., 2013), the Self-efficacy Scale of Technology Usage in Education [SECTUE] (Doğru, 2017), and the Attitude Scale for the Use of Technological Equipment in Preschool Education [ASUTEP] (Kol, 2012) were utilized as quantitative data collection instruments. The researchers created a semi-structured interview form to collect qualitative data. Most teachers have a favorable view of the use of technology in preschool education and a high level of self-confidence in using technology. The study's quantitative findings indicate that variables such as gender, professional experience, type of organization, school district, education level, and the school's technology policy do not affect preschool teachers' attitudes toward technology and their perceptions of self-efficacy. In contrast, age and education level significantly affect attitudes and self-efficacy, respectively. Additionally, there is no correlation between attitude and self-efficacy. Preschool teachers often highlighted the need for a smart board as a technological inadequacy. The elimination of this weakness is thought to enhance teacher motivation. Furthermore, educators expressed the need to integrate innovative technologies in preschool environments. Teachers' willingness to use technology in their classrooms, positive attitudes, and self-efficacy perceptions are indicators that teacher support can be provided in the process of technology integration in preschool education.

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INTRODUCTION

Preschool education, also known as early childhood education, is one of life's pillars and spans from birth to age six (Karoğlu & Ünüvar, 2017). During this time, the child's cognitive, social, emotional, physical, and linguistic development is substantially complete, and their personality and moral development take shape (Aral et al., 2006; Barnett, 1995; MoNE, 2013). Preschool education is a developmentally appropriate process that provides a stimulating environment, imparts cultural values, and considers individual differences (Taşkın et all., 2014). The richer the stimuli in the preschool environment and the more diversified the experiences offered to the child, the faster the child develops, the more learning experiences they have, and the more lifelong learning gains they can achieve (Barnett, 2011). In today's era of information and communication, children are exposed to technological devices at a young age, and technology is frequently used in environments with various stimuli (Christakis & Garrison, 2009). In today's world, where technology has become an integral part of children's daily routines, it is frequently stated that technology should be used consciously (Kol, 2012). It is crucial to determine whether the time children spend with technology and the content and quality of their communication are appropriate (Christakis & Garrison, 2009).

Children may have challenges in adequately utilizing the technological equipment offered to them in a meaningful way, demanding the guidance and support of an adult. It can contribute to their learning if adults adequately meet these needs (Plowman at all., 2010). Teachers play a crucial function in this respect. Considering the amount of time children spend in school, teachers must have an adequate understanding of technology, select the appropriate technological devices for classroom use, and be able to guide children's interest in technology appropriately (Metin, 2008). Teachers with experience with technology create a more effective learning environment in the classroom and can utilize technological devices more effectively (Anastasiades & Vitalaki, 2011). According to Blackwell et al. (2000), teachers who have cultivated these skills are likelier to incorporate student-centered education into their curriculum.

According to Simsar and Kadim (2017) and Gök et all. (2011), teachers hold divergent views regarding the use of technology in the educational setting. Teachers can integrate technology into educational environments at varying intervals, frequencies, and course levels. McMurtry and Burkett (2010) examined teachers' diverse approaches to technology use, their attitudes toward technology use, their integration of technology into educational initiatives, and their use of technology in the classroom. If effective use of technology in classrooms is desired, teachers must better their technology skills, stay abreast of current developments in their fields, and incorporate contemporary approaches into their lessons (Sak et all., 2016). Notably, teachers who integrate technology into classroom practices (Simon et all., 2013) utilize technological devices as educational support materials and instruments for independent learning (Inan & Lowther, 2010). To integrate technology into the classroom and use it healthily, teachers must support the process and provide children with opportunities to learn with technology (Blum & Parette, 2015). According to Doğru et all. (2017), teachers' negative attitudes and low self-efficacy beliefs negatively impact their use of technology. Determining preschool teachers' attitudes and self-efficacy perceptions regarding their use of technology in educational environments is crucial for effective technology integration.

This study seeks to determine the attitudes and self-efficacy beliefs of preschool teachers regarding the use of technology in the classroom. In addition to analyzing teachers' attitudes toward technology and self-efficacy beliefs regarding demographic variables, this study examines their perspectives on technology and self-efficacy. Using a mixed method in which quantitative and qualitative data are analyzed, the study also seeks to contribute current findings with diverse data to the existing body of research. To these objectives, the following are the research questions:

- What do teachers think of the use of technology in preschool classes?

- What are preschool teachers' attitudes toward using technological instruments in the classroom and their levels of technology self-efficacy?
- Is there a relationship between preschool teachers' attitudes toward using technological equipment in the classroom and their technology self-efficacy beliefs?
- How do preschool teachers' demographics, such as level of education, professional experience, technology policy in educational organizations, and in-service training, affect their attitudes towards using technological tools in the classroom and their self-efficacy beliefs towards technology?
- What concepts emerged from teachers' semi-structured interviews regarding the use of technology in preschool education?

BACKGROUND

Utilizing Technology in Preschool Education

Preschool education encompasses the most vital years of a child's existence and is characterized by providing rich stimuli and support for all areas of development (Alabay, 2020). During this period, a flexible, play-based educational approach suited to each child's unique developmental characteristics should be implemented (MoNE, 2013). In addition, Oğuzkan and Oral (1983) noted that during this period, children experience the most rapid growth in all developmental areas and complete most of their personality development. In preschool education, it is crucial to plan this period's education so that parents and teachers can support children's healthy development, observe their skills and interests, and guide them (Fidan & Erden, 1998).

Preschool education must emphasize the cognitive, social, psychomotor, and physical development domains (Kurnaz & Özyürek, 2019). However, the extent to which technology supports these developmental areas is contested in the literature (Van Scoter Ellis & Railsback, 2001). Multiple studies have demonstrated, for instance, that technology can positively affect children due to its numerous interaction possibilities (Behnamnia et all., 2023; Umarova, 2023; Yang et all., 2022). However, if not used properly, it can negatively affect brain development (American Academy of Pediatrics Council on Communications and Media [AAP], 2016). According to Clements and Nastasi (1993), children between the ages of 2 and 7 can use computer applications suited to their developmental characteristics, but adult support is still necessary. During the preschool years, using technology with adult support can increase children's interaction and contribute to cooperation (Ching et al., 2009; Doggett, 2014; Gedik et all., 2017; Lim, 2012). The potential of conscious technology use under the guidance or supervision of parents or teachers to contribute to the development of preschool-aged children is not to be ignored (Buckleitner, 2009).

Before teachers can implement technological change in educational settings, they must accept change (Fullan, 2007). For effective use of technology in education, teachers should prioritize children's development and implement technologies suited to children's developmental characteristics in the classroom (Rosen & Jaruszewicz, 2009). The increase in technological devices used in preschool educational environments necessitates that teachers acquire specific skills to utilize these devices effectively (Dong, 2018). For instance, while teachers' self-efficacy in the use of technology influences their use of technology in the classroom (McMurtry & Burkett, 2010), the training they receive also influences their self-efficacy perceptions regarding technology (Aral et al., 2006; Blackwell et al., 2013). In addition, the teacher's attitude toward technology in the educational environment affects the integration of education and technology (Jack & Higgins, 2019). Teachers with a positive attitude toward technology can utilize it in all aspects of their lives (Sincar & Aslan, 2011).

Technology Self-Efficacy

Bandura (1997) defined self-efficacy as a person's perception of their capacity to organize the activities required to perform at a certain level and effectively complete them. Individuals with high self-efficacy perception about a subject perceive this situation as a task to be overcome when they encounter any difficulty in that subject (Göçer & Türkoğlu, 2018). Self-efficacy perception significantly influences all individual behaviors, including task completion and achieving goals (Maddux, 2016). For this reason, tools for measuring general self-efficacy perception (Aypay, 2010; Schwarzer & Jerusalem, 1995) and particular purpose measurement tools such as educational software development (Aşkar & Dönmez, 2004), science education (Bıkmaz, 2002), and mathematics and computer self-efficacy perception (Işıksal & Aşkar, 2003) have been developed. Among these are the technological self-efficacy beliefs designed for teachers. The scale (Doğru, 2017) provides the opportunity to measure a teacher's self-confidence in this domain, which is one of the critical elements of effective technology integration. Because technology is an integral part of life, the use of technology in education and the integration of education and technology have become mandatory. Teachers must have high technology self-efficacy beliefs to utilize technology effectively in the classroom (Lee & Tsai, 2014). Teachers' high self-efficacy beliefs increase their potential to integrate technology into educational environments (McCown & Roop, 1999). According to Sanders and Morrison (2001), teachers with low self-efficacy beliefs regarding technology are more hesitant to use technology in the classroom and incorporate technology into their programs to the extent of their confidence. Few studies have been conducted to ascertain teachers' self-efficacy perceptions of technology in preschool education and to examine its effects despite its significance. For instance, Yılmaz et all., (2016) conducted a study involving 174 preschool teachers in Balıkesir. According to the findings of the study, the gender, professional experience, and educational background of the participants did not influence their perceptions of self-efficacy. The study also discovered a weakly positive and statistically significant correlation between participants' self-efficacy beliefs and their attitudes toward using technological instruments in preschool education. In their study with 141 participants, including preschool teachers and pre-service teachers, Deniz and Avcı (2023) concluded that self-efficacy perception towards information communication technologies significantly predicted self-efficacy perception toward technological pedagogical content knowledge.

Attitude towards Technology Use

Attitude is an individual's tendency to respond relatively positively or negatively to any concrete or abstract object that has meaning for him/her and that he/she is aware of (Ustaahmetoğlu, 2013). Teachers' attitudes towards technology can be considered their tendency to use it in their classrooms. Considering the positive relationship between attitude and behavior (Bandura, 1986), it is crucial to determine teachers' perceptions and analyze the variables affecting this perception for effective technology integration. Teachers' positive attitudes towards technology affect the effective use of technology and play a role in children's positive attitudes towards technology (Çelik & Bindak, 2005). In addition, one of the factors of teachers' positive attitudes toward their profession is their ability to use technology in their classrooms (Usta & Korkmaz, 2010). There are various studies on the subject in the literature. In a study of 303 preschool teachers working in İstanbul province, Gülen and Kaya (2023) found that teachers' attitudes toward using technology tools and equipment varied by gender, age, school type, and education level but not by variables such as the type of university from which they graduated or professional experience. Çörekci (2020) investigated the perspectives of 180 preschool teachers and prospective teachers regarding the use of technology in music education. The research concluded that gender, age, experience, region, type of institution, instrument performance, and perception of competence in using technology in music education did not affect attitudes toward its use.

METHOD

Research Design

The sequential explanatory mixed method was used to analyze quantitative and qualitative data one after the other in this study. Mixed methods are preferred because they enhance the diversity of research analysis by combining quantitative and qualitative data (Fraenkel et all., 2012). In this study, following the suggestion of Fraenkel et al. (2012), the researchers initially collected and analyzed quantitative data, accompanied by the gathering and analysis of qualitative data. Subsequently, the results section combined both the quantitative and qualitative findings.

Participants

During the academic year 2021-2022, 118 teachers from preschool education institutions participated in the study (Table 1). The teachers affiliated with the MoNE from the provinces of Ankara, Ağrı, Antalya, Bartın, Giresun, İstanbul, İzmir, Kars, Malatya, Yozgat, and Van who agreed to complete the online form were announced through official channels and social media. To ascertain this primary participant group, one of the non-random sampling methods, convenience sampling, was employed (Büyükoztürk et all., 2020).

Table 1. *Demographics of participants*

Variable	Category	f	%
Gender	Female	113	95.8
	Male	5	4.2
Age	20-29	52	44.1
	30-39	40	33.9
	40-49	20	16.9
	50-59	6	5.1
Education level	High School	3	2.5
	College	25	21.2
	Undergraduate	77	65.3
	Graduate	13	11
Experience	0-5	33	28
	6-10	26	22
	11-15	43	36.4
	16-20	9	7.6
	20+	7	5.9
Organization	Public school	76	64.4
	Private school	42	35.6
School district	Urban	107	90.7
	Rural	11	9.3

Maximum variation sampling was used to create a subsample group from the entire participant population (Büyükoztürk et al., 2020; Fraenkel et al., 2012). Upper and lower categories were identified using the arithmetic mean and standard deviation (Fraenkel et al., 2012). In this study, those above the mean and standard deviation values for both measures comprised the upper group, while those below the mean and standard deviation values comprised the lower group. A subsample group was established by identifying the participants with the highest and lowest scores. The SECTUE subgroup comprised 10 participants (Table 2), while the ASUTEP subgroup contained 8 participants (Table 3). The ages of the participants in the SECTUE subsample ranged from 20 to 29, 30 to 39, and 40 to 49, and there were nine women and one male in the group. Their professional experience ranged from 0 to 5 years, 6 to 10 years, 11 to 15 years, and 16 to 20 years, and they held college, undergraduate, and graduate degrees. The teachers of the upper group were coded as T-high, while those of the lower group were coded as T-low.

Table 2. *Demographics of SECTUE subgroup*

Teachers	Age	Gender	Education Level	Experience	SECTUE Scores
T-high1	30-39	F	undergraduate	6-10	240
T-high2	30-39	F	undergraduate	11-15	240
T-high3	30-39	F	undergraduate	11-15	240
T-high4	30-39	F	graduate	0-5	239
T-high5	20-29	F	undergraduate	16-20	238
T-low1	40-49	M	undergraduate	11-15	105
T-low2	20-29	F	undergraduate	0-5	109
T-low3	30-39	F	college	11-15	117
T-low4	40-49	F	undergraduate	11-15	125
T-low5	40-49	F	graduate	16-20	133

The subsample group from which the ASUTEP data were collected consists of eight teachers whose ages range between 20-29, 30-39, and 40-49 and consists of seven women and one male. The participants, whose professional experience ranged from 0 to 3, 6 to 10, and 11 to 15 years, held seven undergraduate degrees and one graduate degree.

Table 3. *Demographics of ASUTEP subgroup*

Teachers	Age	Gender	Education Level	Experience	ASUTEP Scores
T-high1	20-29	F	undergraduate	0-5	85
T-high2	20-29	F	undergraduate	6-10	83
T-high3	30-39	F	undergraduate	11-15	83
T-high4	20-29	M	undergraduate	0-5	83
T-low1	40-49	F	undergraduate	11-15	40
T-low2	20-29	F	undergraduate	0-5	60
T-low3	20-29	F	graduate	0-5	65
T-low4	30-39	F	undergraduate	6-10	66

Data Collection Instruments

Technology in Early Childhood Questionnaire

The Technology in Early Childhood Questionnaire (TECQ) created by Blackwell et all. (2013) was translated into Turkish by Omrüuzun (2019) with two early childhood education experts and a language expert. The questionnaire includes questions regarding the frequency with which teachers utilize technology, their technological instruments, their views on the use of technology in the classroom, and their technology training.

Self-Efficacy Scale of Technology Usage in Education

The Self-Efficacy Scale of Technology Usage in Education (SECTUE), developed by Doğru (2017), includes 48 items, and is measured on a five-point likert scale. The fit index values were computed as follows: X2=1114.22, NFI=0.97, RFI=0.97, CFI=0.98, GFI=0.75, AGFI=0.71, IFI=0.98, and RMSEA=0.073. The factor loadings of the items exhibited a range of 0.35 to 0.91. Based on the findings from both exploratory and confirmatory factor analyses, it can be stated that the scale items demonstrated a satisfactory level of fit. The Cronbach Alpha coefficient for internal consistency was computed to be 0.935 over the entirety of the scale.

Attitude Scale for the Use of Technological Equipment in Preschool Education

The Attitude Scale Towards the Use of Technological Equipment in Preschool Education (ASUTEP), as Kol (2012) devised, comprises 20 items and follows a five-point Likert scale. The researchers assessed the fit of the scale for conducting factor analysis by utilizing the Kaiser-Meyer Olkin (KMO) coefficient, which yielded a value of 0.89. The Barlett Sphericity test was employed, resulting in a value of 0.00. The scale used in this study was determined to be suitable for factor analysis based on the item factor loadings, which ranged from 0.481 to 0.787. Additionally, the scale's reliability was assessed using Cronbach's Alpha coefficient, which yielded a value of 0.92.

Semi-structured Interview Form

The semi-structured interview form developed by the researchers and used to obtain qualitative data consists of four questions. The development of semi-structured interview forms adhered to the recommendations outlined by Galletta (2013). The opinions of two faculty members who are experts in early childhood education and technology and one language expert were solicited, and arrangements were made to construct the final form. The questions in the form, which has an application time of 20-30 minutes, are as follows: "How do you use technological equipment in your classroom?"; "What do you think about using technology in the classroom? How do you think your attitude towards technology affects your use?"; "For what purposes do you use technology in the classroom?"; "To what extent do you consider yourself competent in incorporating technology into your classroom?".

Data Collection Process

The study's data collection procedure consisted of two phases. Using TECQ, ASUTEP, and SECTUE, quantitative data were collected online from 118 preschool teachers in the first stage. In the second stage, the ASUTEP and SECTUE scores were ordered from highest to lowest. Ten participants with five high and five low scores on the SECTUE scale, eight with four high and four low scores on the ASUTEP scale, and 18 participants in total formed a subsample. The researcher conducted semi-structured face-to-face interviews with this group to collect and analyze qualitative data.

Data Analysis

The quantitative data analysis in this study was conducted using SPSS (Statistical Package for the Social Sciences). The statistical significance level for quantitative data analysis was set at 0.05. The scales used in the data group were subjected to reliability and normality analysis, and the appropriate statistical tests were identified (Table 4).

Table 4. *Analysis of reliability and Kolmogorov-Smirnov (K-S) normality*

Scale	Cronbach's Alpha (α)	K-S (p)
ASUTEP	0.90	.010
SECTUE	0.96	.000

It is recognized that the scale data are highly reliable ($\alpha>0.80$), and the K-S test results indicate that the scale data show a normal distribution ($p<0.05$). As a result, nonparametric methods were employed in the analyses of the scales. The Mann-Whitney U analysis compared scale scores based on two categories of variables. The Kruskal Wallis H test was used to compare scale scores from multiple categories. If the Kruskal Wallis H test indicated a significant difference between the groups, the Mann-Whitney U test was used to determine the difference between which groups. Spearman Correlation analysis was used to examine the relationship between the scale scores. Qualitative data was examined using content analysis. In content analysis, frequently occurring and interrelated concepts in the data are grouped and interpreted based on shared characteristics. (Fraenkel et al., 2012).

Ethic

The ethics committee of the Gazi University Ethics Commission approved the study with the research code number 2022-653. Participants who accepted the "Participant Volunteering Form" were informed that their participation in the study was voluntary and that their information would be used anonymously by the researcher alone.

FINDINGS

Preschool Teachers' Perspectives on the Use of Technology in Education

Utilized Technologies in the Classroom and Frequency of Use

Internet (52.5%), smartphone (46.6%), and camera (40.7%) were the technologies used daily and most frequently, while the technologies not used were the smart board (61.9%), camera (33.1%), smartphone (27.1%), computer (12.7%), and internet (11.9%) (Table 5). Although it is recognized that technology is utilized as much as possible, computers (18.6%), smartphones (13.6%), and internet (10.2%) are not utilized despite having ample access.

Table 5. *Utilized technologies in the classroom and frequency of use*

		No access	have access but do not use it	Every two to three months	Once a month	2-3 times a month	Once a week	3-4 times a week	Every day
Computer	f	15	22	7	1	5	10	11	47
	%	12.7	18.6	5.9	0.8	4.2	8.5	9.3	39.8
Internet	f	14	12	5	1	3	9	12	62
	%	11.9	10.2	4.2	0.8	2.5	7.6	10.2	52.5
Camera	f	39	4	5	0	3	6	13	48
	%	33.1	3.4	4.2	0.0	2.5	5.1	11.0	40.7
Smart Board	f	73	7	4	1	5	5	5	18
	%	61.9	5.9	3.4	0.8	4.2	4.2	4.2	15.3
Smartphone	f	32	16	1	2	2	3	7	55
	%	27.1	13.6	0.8	1.7	1.7	2.5	5.9	46.6

Teachers' Confidence in the Technologies They Utilize

Teachers are generally accepted to be confident in their ability to utilize technology in the classroom (Table 6). Internet (83.9%), computer (83.1%), camera (79.7%), smartphone (77.9%), and smart board (75.4%) are the technologies that teachers are confident in using, whereas smartphone (13.5%), computer (12.7%), internet (12.7%), camera (9.3%), and smart board (9.3%) are the technologies that teachers are not confident in using.

Table 6. *Teachers' confidence in the technologies they utilize*

		I do not confident at all	I do not confident	Undecided	I am confident	I am very confident
Computer	f	7	8	5	61	37
	%	5.9	6.8	4.2	51.7	31.4
Internet	f	6	9	4	59	40
	%	5.1	7.6	3.4	50.0	33.9
Camera	f	6	5	13	57	37
	%	5.1	4.2	11.0	48.3	31.4
Smart board	f	6	5	18	53	36
	%	5.1	4.2	15.3	44.9	30.5
Smartphone	f	5	11	10	49	43
	%	4.2	9.3	8.5	41.5	36.4

Technologies Employed in Classroom Activities

Most teachers use technology in their classrooms for all activities except the smart board (65.3% do not use it) (Table 7). The activities that utilized technology the most were field trips (13.4%), movement (11%), and music (10.1%), whereas the activities that utilized technology the least were

literacy preparation (0%), Turkish (0.8%), games (1.6%), and science education (3%).

Table 7. *Technologies employed in classroom activities*

		Not using	Field trips	Drama	Science	Movement	Math	Music	Literacy prep.	Game	Art	Turkish	All activities
Computer	f	37	1	2	0	4	0	2	0	0	1	1	70
	%	31,4	0.8	1.7	0	3.4	0	1.7	0	0	0.8	0.8	59.3
Internet	f	19	1	2	0	6	0	7	0	0	2	0	81
	%	16,1	0.8	1.7	0	5.1	0	5.9	0	0	1.7	0	68.6
Camera	f	37	10	2	1	1	0	0	0	1	1	0	65
	%	31,4	8.5	1.7	0.8	0.8	0	0	0	0.8	0.8	0	55.1
Smart board	f	77	1	0	2	0	2	1	0	0	0	0	35
	%	65,3	0.8	0	1.7	0	1.7	0.8	0	0	0	0	29.7
Smartphone	f	51	3	0	1	2	0	2	0	1	1	0	57
	%	43,2	2.5	0	0.8	1.7	0	1.7	0	0.8	0.8	0	48.3

Opinions Regarding Technology Use in Education

Most teachers (44,1 %) stated that the optimal time to introduce technology to preschoolers is between 49 and 72 months (Table 8). According to 38.1% of teachers, the optimal age range is between 0 and 48 months, while 17.8% cite early childhood. In addition, 89.8% of the teachers stated that educators use technology and interactive media appropriately, while 4.2% disagreed and 5.9% were unsure.

Table 8. *Opinions regarding technology use in education*

Opinions	Category	f	%
The optimal age to introduce kids to technology	0-48 month	45	38.1
	49-72 month	52	44.1
	early childhood	21	17.8
Early childhood educators' use of technology and interactive media that is appropriate	I agree	106	89.8
	I disagree	5	4.2
	Undecided	7	5.9

The Receiving Technological Training by Educators

While 38.12% of teachers reported receiving training on the use of technology in education during their undergraduate studies, 61.9% emphasized that they did not. Table 9 shows that 10.2% of respondents did not receive technology-related professional development training, 55.1% received individual training, 16.9% received online training, and 17.8% received assistance from a colleague. 66.9% of teachers reported that their institutions did not provide in-service training on the use of technology in education, 14.4% reported that in-service training was provided several times a year, 7.6% once a year, 6.8% once every two to three years, and 4.2% once a month. In addition, 45.8% of teachers emphasized that their school has a technology use policy, while 54.2% emphasized that their school does not have a technology use policy.

Table 9. *Training offered by teachers regarding the use of technology*

Variable	Category	f	%
Status of undergraduate education	Yes	45	38.1
	No	73	61.9
Participation in professional development training related to technology	No	12	10.2
	Individual	65	55.1
	Online	20	16.9
	Assistance from a trainer	21	17.8
Frequency of in-service training in the organization	None	79	66.9
	Every two to three years	8	6.8
	Once a year	9	7.6
	A few times a year	17	14.4
	Once a month	5	4.2
The school's technology policy	Yes	54	45.8

	No	64	54.2

Preschool Teachers' Attitudes Regarding the Use of Technological Equipment in Education

It is seen that preschool teachers' attitudes towards the use of technological equipment are above the average score that can be determined from the scale (Table 10). In this case, the participants favor using technological instruments in the classroom.

Table 10. *Descriptive statistics of teachers' ASUTEP scores*

Scale	N	Min	Max	X	S
ASUTEP	118	40	85	74.34	5.45

Preschool Teachers' Self-Efficacy Perceptions Towards the Use of Technology in Education

Preschool teachers' self-efficacy regarding technology use in education is believed to exceed the scale's mean score (Table 11). The finding shows that the participants' perceptions of technological self-efficacy are positive.

Table 11. *Descriptive statistics of teachers' SECTUE scores*

Scale	N	Min	Max	X	S
SECTUE	118	105	240	191.98	29.56

The Correlation Between Preschool Teachers' Technology Self-Efficacy Beliefs and Attitudes Towards the Use of Technological Equipment

Table 12 demonstrates no correlation between teachers' attitudes toward the use of technological instruments and their self-efficacy regarding the use of technology in education ($p>0.05$).

Table 12. *Correlation between preschool teachers' ASUTEP and SECTUE scores*

Scale	r	p
ASUTEP SECTUE	.092	.324

The Effects of the Demographics of Preschool Teachers on Attitudes Towards the Use of Technology in Education and Self-Efficacy Beliefs

According to Gender

There is no statistically significant difference between teachers' attitudes toward the use of technology in education and their self-efficacy levels according to their gender ($p>0.05$).

Table 13. *Statistics regarding preschool teachers' ASUTEP and SECTUE scores by gender*

Scale	Gender	N	X	S	U	p
ASUTEP	Female	113	151.97	24.84	275.5	.925
	Male	5	143.00	53.32		
SECTUE	Female	113	192.59	28.61	244.5	.612
	Male	5	178.20	48.98		

According to Age

The attitudes of preschool teachers toward the use of technology in education differ significantly with age ($p<0.05$) (Table 14). The attitudes of teachers aged 50 to 59 are significantly lower than those of all other age groups. However, it is also recognized that age does not significantly affect teachers' perceptions of their technological self-efficacy ($p>0.05$).

Table 14. *Statistics regarding preschool teachers' ASUTEP and SECTUE scores by age*

Scale	Age	N	X	S	x^2	p	Difference
ASUTEP	20-29	52	155.92	24.44	8.2	.043	1>4, 2>4, 3>4
	30-39	40	151.53	23.18			
	40-49	20	149.75	31.99			
	50-59	6	120.67	25.48			
SECTUE	20-29	52	194.29	30.16	4.5	.209	-
	30-39	40	193.98	25.94			
	40-49	20	190.25	32.64			
	50-59	6	164.50	29.47			

According to Educational Levels

Table 15 demonstrates that teachers' attitudes and self-efficacy regarding technology use in education differed significantly by educational level ($p<0.05$). The self-efficacy and attitude levels of graduate degree participants are statistically significantly higher than those of college and undergraduate participants.

Table 15. *Statistics regarding preschool teachers' ASUTEP and SECTUE scores by education level*

Scale	Education Level	N	X	S	x^2	p	Difference
ASUTEP	High School	3	156.67	6.81	12.6	.006	2<4, 3<4
	College	25	145.48	32.19			
	Undergraduate	77	149.61	24.30			
	Graduate	13	173.92	16.46			
SECTUE	High School	3	202.00	5.00	14.5	.002	2<4, 3<4
	College	25	182.48	33.97			
	Undergraduate	77	190.03	27.29			
	Graduate	13	219.54	20.76			

According to Professional Experience

As shown in Table 16, there is no statistically significant difference between teachers' attitudes toward the use of technology in education and their self-efficacy beliefs based on their professional experience ($p>0.05$).

Table 16. *Statistics regarding preschool teachers' ASUTEP and SECTUE scores by professional experience*

Scale	Experience	N	X	S	x^2	p
ASUTEP	0-5	33	158.88	26.79	3.0	.393
	6-10	26	151.50	17.40		
	11-15	43	149.23	29.19		
	16-20	9	148.00	25.13		
	20+	7	136.71	31.28		
SECTUE	0-5	33	198.61	31.59	1.7	.637
	6-10	26	191.31	24.04		
	11-15	43	189.42	31.01		
	16-20	9	189.56	29.36		
	20+	7	182.14	31.89		

According to the Type of Organization

According to Table 17, there is no statistically significant difference between teachers' attitudes toward the use of technology in education and their self-efficacy levels based on the type of organization for which they work ($p>0.05$).

Table 17. *Statistics regarding preschool teachers' ASUTEP and SECTUE scores by the type of organization*

Scale	Type of Organization	N	X	S	U	p
ASUTEP	Public	76	153.66	26.45	1384.5	.234
	Private	42	147.86	25.90		
SECTUE	Public	76	195.59	29.13	1268.5	.066

Private	42	185.45	29.55	

According to the School District

Table 18 indicates no statistically significant difference between teachers' attitudes toward the use of technology in education and their self-efficacy beliefs based on the region of the school where they work (p>0.05).

Table 18. *Statistics regarding preschool teachers' ASUTEP and SECTUE scores by the school district*

Scale	School District	N	X	S	U	p
ASUTEP	Urban	107	150.79	26.73	488.5	.354
	Rural	11	159.36	21.01		
SECTUE	Urban	107	190.79	29.76	457.5	.225
	Rural	11	203.64	25.95		

According to the Receiving Training on Using Technology in Undergraduate Education

Table 19 demonstrates no statistically significant difference between attitudes toward the use of technology in education and beliefs of self-efficacy based on teachers' training in the use of technology during their undergraduate education (p>0.05).

Table 19. *Statistics regarding preschool teachers' ASUTEP and SECTUE scores by receiving training*

Scale	Training	N	X	S	U	p
ASUTEP	Yes	45	151.42	30.36	1576.5	.714
	No	73	151.70	23.67		
SECTUE	Yes	45	194.80	32.26	1415.5	.208
	No	73	190.25	27.86		

According to the School's Technology Policy

Table 20 reveals no statistically significant difference between teachers' attitudes toward the use of technology in education and their self-efficacy beliefs based on whether their school has a technology policy (p>0.05).

Table 20. *Statistics regarding preschool teachers' ASUTEP and SECTUE scores by the school's technology policy*

Scale	Technology Policy	N	X	S	U	p
ASUTEP	Yes	54	151.39	28.16	1677.5	.785
	No	64	151.77	24.83		
SECTUE	Yes	54	190.76	31.35	1699.0	.875
	No	64	193.02	28.17		

Emerging Concepts from Semi-structured Interviews

The study aimed to supplement the teacher's responses to the questionnaires and scales with qualitative data and expand the analysis. In order to determine teachers' perspectives on the use of technology in the classroom, four-question semi-structured interviews were conducted. Teachers with high scores on the attitude scale were coded as TA-high, and those with low scores were coded as TA-low; those with high scores on the self-efficacy scale were coded as TSE-high, and those with low scores were coded as TSE-low. Table 21 outlines the concepts that emerged from the semi-structured interviews.

Table 21. *Emerging concepts from semi-structured interviews*

Context	High Group Concepts	Low Group Concepts
Using technology in the classroom	Active learning Concrete Experience Visualization Instant Feedback	Embodiment Diversity in activities
Teacher attitudes towards technology use	Self-confidence Knowledge of technology use Experience	Embodiment Diversity in activities
Purpose of using technology	Concrete learning Activity types Activating curiosity	Visual awareness Diversity of methods and techniques
Confidence in the use of technology (self-efficacy)	Active engagement Technological opportunities Material support Experience	Material deficiency

The query "How do you use technological tools in your classroom?" was asked of teachers. Teachers in the high group emphasized active learning, concrete experience, visualization, and instant feedback, whereas teachers in the low group emphasized concretization and diversity in activities. The following are some statements made by teachers:

> TSE-high1: We must arrange our activities accordingly in order to guarantee that students learn for life through the activities we conduct in the classroom. We specifically offer activities in which youngsters will be more involved. Technological tools can help us visually express the subject we are working on that day. As a result, we make it concrete. This also increases children's participation.

> TA-low4: We live in a technological age. At home, every child has easy access to modern devices. To make a difference at school, we now incorporate lessons into our activity plans that allow students to participate more actively and concretize abstract topics. We may also broaden our horizons by utilizing smartphones, smart boards, and the internet. With rapid feedback, we can determine whether they understand the content and increase involvement.

Participants were asked, "What are your thoughts on using technology in the classroom? How do you believe your perspective on technology impacts your use of technology? Teachers in the upper group expressed self-confidence, experience, and knowledge of technology use, whereas teachers in the lower group expressed insufficient knowledge and an incapacity to acquire materials. Some teacher statements include the following:

> TA-high2: We do not always use technology in the classroom. It cannot be adapted to every activity. We are increasingly willing to use our phones and computers in class. Because we have more experience with them. We are not excited when new technology equipment arrives or is seen if we need to learn how to use it. Using technology should be valuable for our efforts as well.

> TSE-low3: I am optimistic about technology. When used correctly, I feel it can be incredibly beneficial to kids. Technology can be used to draw children's attention during activities and playtime. However, we are limited in materials in our class. We can only use our phones. Our usage area is limited when materials are few.

In response to the question, "Why do you use technology in the classroom?" teachers in the upper group highlighted the concepts of concrete learning, arousing curiosity, and types of activities, whereas teachers in the lower group emphasized the concepts of visual awareness and diversity of methods and techniques. Some teacher statements include the following:

> TSE-high5: Because children have a short attention span and a limited ability to comprehend

abstract concepts, we believe it is necessary to concretize the concepts we aim to teach in the classroom. We can depict these notions using technology. This allows us to hold children's attention for extended periods.

TA-low1: When completing arithmetic tasks in the classroom, showing rather than explaining the ideas of light and heavy makes learning more persistent. We boost their visual perception by doing so. We apply several ways in the activities at the same time. We provide diversity by utilizing technological resources rather than merely paperwork.

Teachers were asked, "To what extent do you consider yourself competent at incorporating technology into the classroom?". The teachers in the upper group concurred on the concepts of active participation, technological possibilities, material support, and experience, whereas the teachers in the lower group mentioned a lack of materials. Some teacher statements include the following:

TA-high3: Technology is now present in every aspect of our daily existence. It is nearly hard to do anything apart from it. The employment of technology in our classrooms is unavoidable. We employ devices such as phones, tablets, and computers in reading and math exercises. Of course, first and foremost, you must understand how to use them. For example, we teach children number concepts by picturing them on the smart board. Participation is increasing. We are having more fun. We can play a variety of songs and games. We have a basic knowledge of how to use them. If we teachers are trained in this area, we can undertake more different activities if we have advanced technological experience.

TSE-low4: Normally, I am more at ease with the technological tools we utilize in class. I analyze them in the evening, gather the needed materials, and present them in the classroom the following day. I believe that the greater the diversity in line with the possibilities, the more excellent the retention in learning. Unfortunately, not all classrooms in our country have equal access to technology. The lack of materials also indicates educational disparities. Everyone uses the same program but does not employ the same methods or materials to present the exercises. I am confident that if smart boards were installed in every classroom and teachers were taught how to use them, teacher retention would increase even further.

RESULTS AND DISCUSSIONS

Most preschool teachers are assumed to be open to incorporating technology into their classrooms. Internet, smartphones, and cameras were the technologies they utilized the most, but they highlighted the smart board the most. There are some findings in the literature that there are problems in the distribution (İdin & Dönmez, 2016) and use (Somyürek et all., 2009) of smart boards. Teachers in the upper group stated that they use technology in the classroom due to its benefits in active learning, concretization, activating curiosity, visualization, and feedback processes, whereas teachers in the lower group stated that they use technology due to its contribution to the diversity and concretization processes. Almost all participants noted that learning with technology is more permanent, emphasizing the significance of incorporating technology into educational settings. It is generally accepted that most teachers feel comfortable integrating technology into their lessons. Internet, computers, cameras, and smartphones are the primary technologies they employ confidently. Furthermore, semi-structured interviews revealed that teachers were generally confident in using technology in the classroom; however, there was a need to introduce more cutting-edge technologies and provide in-service training. It is also recognized that most educators utilize technology in almost all activities. Field trips, movement, and music were the activities where technology was utilized the most, while Turkish, games, and science were the activities where technology was utilized the least. Notable is the absence of technology in literacy preparation activities. Moreover, while most teachers believe that the optimum age to introduce children to technology in preschool is between 49 and 72 months, most believe that technology and interactive media are utilized correctly in classrooms. Şalcı et all. (2018) concluded that

preschool teachers should introduce children to technology between the ages of six and seven. The American Academy of Pediatrics (2011) emphasized that exposing children under two to visual media could result in various problems. Although the reservations are more evident for children under the age of two, it is acknowledged that there are varying viewpoints for older children. Remarkably, most teachers stated they did not receive any training on using technology during their undergraduate education and that their organizations did not provide training in this area. In addition, more than half of the participants stated no technology policy in their schools. Blackwell et all. (2014) revealed that providing support to teachers and having a technology policy at school affected teachers' self-confidence, affecting their perceptions of technology. It is known that preschool teachers take technology literacy courses in their undergraduate programs and that MoNE offers both in-person and online in-service training. Nonetheless, it is apparent from the teacher interviews that these trainings are insufficient.

The participants are assumed to have a positive attitude toward technology use in the classroom. In semi-structured interviews, the teachers in the upper group stated that self-confidence, experience, and knowledge of technology use positively impacted their attitudes toward technology use, whereas the teachers in the lower group emphasized that difficulties in providing materials and lack of knowledge on these issues negatively impacted their attitudes. Based on the acceptance that effective use of technology is related to teachers' attitudes towards technology (Albion, 2001), it is assumed that teachers in preschool education with these positive attitudes will support technology integration in schools. It was also discovered that instructors were highly confident in their technology use. Nevertheless, in semi-structured interviews, all teachers in the lower and upper groups emphasized that a lack of materials, issues with material support, and inadequate technological facilities affected their perceptions of self-efficacy. In addition, the teachers in the upper group claimed that their self-efficacy increased as their experience with the use of technology grew and as the rate of support from technological tools increased to guarantee students' active participation in the lesson. Köroğlu and Demiriz (2015) stated that preschool teachers' perceptions of technology competence were relatively high. Studies also highlight that teachers' information and communication technology literacy is high (Cüre & Özdener, 2008; Keskin, 2008) and not just at the perception level. Based on the assertions that teachers' perceptions of their self-efficacy about technology are crucial for effective technology use (Torkzadeh & Van Dyke, 2001) and that it is effective for teachers to teach technology to their students correctly (Gnidovec et all., 2020; Henson, 2001), this finding is quite encouraging. There was no correlation between teachers' technology self-efficacy beliefs and their attitudes regarding using technological instruments in the classroom. The finding is somewhat unexpected. It was believed that teachers with high self-efficacy would demonstrate positive attitudes toward technology at a high level, whereas those with low self-efficacy would demonstrate attitudes at a low level. Köroğlu and Demiriz (2015) also concluded that there is no correlation between preschool teachers' attitudes toward technology and their perceptions of self-efficacy. Nonetheless, Yılmaz et all. (2016) observed a weakly positive correlation between preschool teachers' attitudes toward technology and their self-efficacy beliefs. However, it is recognized that the study examined general self-efficacy beliefs and that the sample group was limited to Balıkesir.

The gender factor did not affect the technology self-efficacy beliefs and attitudes of preschool teachers toward using technological instruments. All teachers' attitudes (Gülen & Kaya, 2023) and self-efficacy perceptions (Yılmaz et al., 2016) are positive, regardless of gender, which is a very encouraging finding. Köroğlu and Demiriz (2015) reached a similar conclusion in their investigation. It was recognized that the age of teachers affected their attitudes toward the use of technological equipment significantly. Regarding attitudes toward the use of technology, it is observed that younger teachers are more optimistic than senior teachers. Regarding self-efficacy, it was recognized that age did not play a role. Çetin and Güngor (2014) concluded that younger teachers had more positive technology self-efficacy. Professional experience did not affect preschool teachers' technology self-

efficacy beliefs and attitudes regarding using technological tools. Önkol et all. (2011) and Çörekçi (2020) found that professional experience did not influence preschool teachers' computer usage skills and abilities. However, according to Marcinkiewicz (1993), younger teachers with less professional expertise have more favorable attitudes toward technological innovations. Pajares (2002) emphasizes that although younger instructors have less technological experience, their knowledge is more up-to-date. It is recognized that the literature on age and professional experience contains a variety of results and perspectives. It was observed that the level of education affected technological self-efficacy beliefs and attitudes toward using technological equipment. On both evaluations, preschool teachers with a master's degree scored statistically higher than those with an undergraduate or college degree. With graduate education, preschool teachers cultivate a positive attitude toward technology and self-efficacy solid beliefs. In the literature, some studies contradict this finding. Güneş and Buluç (2017) did not find a correlation between education level and technology self-efficacy, while Köroğlu and Demiriz (2015) did not find a correlation between education level and technology self-efficacy and attitude toward the use of tools. It demonstrates, however, that taking a course on the use of technology in education during undergraduate education does not affect the attitudes and self-efficacy beliefs of preschool teachers regarding the use of technological tools. This situation indicates that the courses related to the use of technology in education offered in undergraduate education should be re-evaluated in terms of curriculum or practical application. In addition, it is believed that teachers' employment in private or public schools, rural or urban areas, or institutions with a technology policy do not affect their attitudes and self-efficacy perceptions regarding technology use.

This study has reached significant conclusions regarding teachers' perceptions, one of the most critical actors in preschool education, regarding the widespread use of technology in classrooms. Positive thoughts, attitudes, and self-efficacy perceptions regarding the use of technology in the classroom were prevalent among teachers. This circumstance suggests that teachers can play a supportive role in integrating technology to enhance the efficacy and efficiency of preschool education.

RECOMMENDATIONS

Preschool teachers frequently emphasized the lack of a smart board as a technological deficiency. It is believed that eliminating this deficiency will boost teacher motivation. In addition, teachers requested the incorporation of new technologies into preschool settings.

There was mention of the need for more training on the effective use of technology in both undergraduate education and in-service training. It may be beneficial to examine the currency of the curriculum and practices of technology-related courses in the curriculum for undergraduate education. Additionally, it would be beneficial to examine the MoNE's in-service training on the use of technology in the classroom, considering preschool teachers.

It was discovered that technology was either not used in certain activities, such as those involving literacy preparation, or was used only rarely in other activities, such as games and Turkish education. It may be beneficial to investigate whether teachers consciously chose not to use technology in these activities due to a lack of knowledge or for another reason.

The differing views of teachers regarding the age at which children should be introduced to technology are alarming. The findings of scientific studies may be beneficial in informing teachers about the topic.

It is believed that more than half of preschools do not have a technology policy; if they do, the teachers are unaware. With the assistance of school administrators and under the direction of MoNE and YEĞİTEK officials, it may be beneficial to raise awareness about the school's technology policy.

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