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Investigation of Preschool Teachers' Use of Technology in Teaching in Terms of Technology Self-Efficacy Levels

Okul Öncesi Öğretmenlerinin Öğretimde Teknoloji Kullanım Amaçlarının Teknoloji Öz-Yeterlik Düzeyleri Açısından İncelenmesi

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Abstract

Purpose: The aim of this research was to examine the purpose of preschool teachers' use of technology in teaching in terms of technology self-efficacy levels. For this aim, the technology self-efficacy of preschool teachers was evaluated according to age, professional seniority, and learning level independent variables.
Design/Methodology/Approach: The study is a mixed-method research in which quantitative and qualitative research patterns are used together. Since the quantitative data in the data collection process were predominant, the explanatory mixed-method was used. The working group of the study consisted of preschool teachers working in Istanbul. 80 preschool teachers were included in the quantitative dimension of the research. Participants included in the qualitative dimension of the research were identified through outlier sampling. According to this, teachers in the general sample group created for the research were directed to the Use of Technology in Education Self-Efficacy Scale [TESS] developed by Doğru (2014). Then, four participants with the highest and lowest scores from this scale were determined for the qualitative dimension. Semi-structured interview questions developed by the researchers were directed to the determined sub-sample group. The statistical significance of the difference between TESS scores of preschool teachers and independent variables was evaluated with the SPSS program. On the quantitative data, respectively, Kolmogorov Smirnov normality test, descriptive statistics, and one-way analysis of variance were carried out. Inductive content analysis was made in the analysis of qualitative data.
Findings: As a result of quantitative data analysis, it has been determined that all preschool teachers have firm self-efficacy beliefs in technology use in teaching. In addition, it was found that the technology self-efficacy of preschool teachers did not differ significantly according to age, professional seniority, and education level. On the other hand, findings obtained from qualitative data analysis showed that teachers with high technology self-efficacy present their purpose of using technology in a more purposeful and reasoned way.
Highlights: Teachers with high technology self-efficacy have referred to the themes of *providing motivation, continuity, participation, strengthening participation, and justification*. These results are discussed based on the available literature, and various recommendations are presented in the context of preschool education.

Öz

Çalışmanın amacı: Bu araştırmanın amacı, okul öncesi öğretmenlerinin öğretimde teknoloji kullanım amaçlarının teknoloji öz-yeterlik düzeyleri açısından incelenmesidir. Bu amaç doğrultusunda okul öncesi öğretmenlerinin teknoloji öz-yeterlilikleri yaş, mesleki kıdem ve eğitim düzeyi bağımsız değişkenlerine göre değerlendirilmiştir.
Materyal ve Yöntem: Araştırma nicel ve nitel araştırma desenlerinin bir arada kullanıldığı karma yöntem bir araştırmadır. Verilerin toplanması sürecindeki nicel veriler ağırlıkta olduğu için açıklayıcı karma yöntem kullanılmıştır. Araştırmanın çalışma grubu İstanbul'da görev yapmakta olan okul öncesi öğretmenlerinden oluşmaktadır. Araştırmanın nicel boyutuna 80 okul öncesi öğretmeni dâhil edilmiştir. Araştırmanın nitel boyutuna dâhil edilen katılımcılar aykırı durum örneklemesi aracılığıyla belirlenmiştir. Buna göre araştırma için oluşturulan genel örneklem grubundaki öğretmenlere, Doğru (2014) tarafından geliştirilen Eğitimde Teknoloji Kullanımı Öz Yeterlilik Ölçeği [TESS] yöneltilmiştir. Ardından bu ölçekten en yüksek ve en düşük puan alan dörder katılımcı nitel boyut için belirlenmiştir. Belirlenen alt örneklem grubuna araştırmacı tarafından geliştirilen yarı yapılandırılmış görüşme soruları yöneltilmiştir. Okul öncesi Öğretmenlerinin TESS puanlarının bağımsız değişkenler ile arasındaki farkın istatistiksel anlamlılığı SPSS programıyla değerlendirilmiştir. Nicel veriler üzerinde sırasıyla; Kolmogorov Smirnov normallik testi, betimsel istatistik ve tek yönlü varyans analizi gerçekleştirilmiştir. Nitel verilerin analizinde ise tümevarımsal içerik analizi yapılmıştır.
Bulgular: Nicel veri analizleri sonucunda okul öncesi öğretmenlerinin tamamının öğretimde teknoloji kullanımı öz-yeterlik inançlarının yüksek olduğu tespit edilmiştir. Ayrıca, okul öncesi öğretmenlerinin teknoloji öz-yeterliklerinin yaş, meslekî kıdem ve öğrenim düzeyine göre anlamlı olarak farklılaşmadığı tespit edilmiştir. Diğer yandan nitel veri analizleri sonucu ulaşılan bulgular, teknoloji öz-yeterliği yüksek olan öğretmenlerin teknoloji kullanım amaçlarını daha amaçlı ve gerekçeli bir şekilde sunduklarını göstermiştir.
Önemli Vurgular: Yüksek teknoloji öz-yeterliğine sahip olan öğretmenler motivasyonu sağlama, devamlılık, katılım, katılımı güçlendirme ve kullanma gerekçesi temalarına atıf yapmışlardır. Bu sonuçlar, mevcut literatür temelinde tartışılmış ve okul öncesi eğitimine bağlamında çeşitli öneriler sunulmuştur.

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INTRODUCTION

The changes and developments that societies have made in science and technology are also changing the existing structure in which they live. In addition to this change, it also creates several differences in education. These differences in education constitute the society of the future (Alkan, 2005). The speed of change created by technology in social life differs from one society to another. This speed can affect societies positively or negatively. For children, who are considered minor individuals in society, this effect is of great importance (Aral & Doğan-Keskin, 2018). Children in early childhood correspond to the concrete operational stage from Piaget's stages of cognitive development. Therefore, the more stimulus children are exposed to in this process, the better their mental, social, language, and psychomotor skills will be enriched. To achieve this, materials for all areas of development need to be used effectively. Materials selected for early childhood should attract the child's attention, and the opportunity to concretise it should be allowed. This concretisation will increase the permanence of what the child has learned (Korkmaz & Ünsal, 2016). It is no longer possible for knowledge to be transmitted and learned by traditional teaching techniques. In this period, the central role belongs to the teacher, who guides the child. All the studies that the teacher has carried out on his/her behalf and the teacher's self-efficacy are also crucial for the child. Bandura was the first to introduce the concept of self-efficacy within the framework of Social Cognitive Theory. According to this theory, contrary to what is described in many theories, the behavior of people is not only affected by environmental factors or characteristics of a person, but also by the environment, expectations, interests, goals, perceptions of that person, and also expectations, interests, goals, and perceptions affect the environment at the same level. In other words, the individual and the environment are in a state of interaction (Bandura, 1977).

One of the most valid reasons for the everyday use of technology in our lives is that its level of accessibility has increased, and now many homes have these tools and equipment. In addition to this, information only reached us in printed sources in the past; however, having some basic skills is sufficient to access information and technology today. Since technology has a constantly developing and evolving nature, it appeals to every age group (Yılmaz ve Özkan, 2013). The light, color, and mobility that the technological tools contain attract children. Therefore children spend a long time with technology. These children are referred to as "digital natives" by Prensky (2005), who face technology before being born and from the first time they are born. While the time these children spend with technological tools is essential, the quality, content, and appropriateness of this time are of the same importance (Christakis & Garrison, 2009). Considering that children use technology for such a long time in everyday life, this use should effectively contribute to the development of children (Ömrüuzun, 2019). It is possible to say that education is the factor that facilitates efficient and effective use of technology, contributing to development and compliance with technology (Wang, Ertmer & Newby, 2004). One of the outcomes of technological change is that education methods and content also have to change. With the change in the teaching system, the role of teachers has changed to a model and guide. For this reason, a person should believe in self-efficacy that increases his or her ability to cope with and resist the difficulties he or she faces while performing a task. If the teacher has a firm belief in self-efficacy, he or she is more inclined to use various teaching methods (Henson, 2001). For teachers are considered one of the most critical parts of the education system. The teacher's self-efficacy also plays a vital role in the effectiveness of the student and the school (Ekici, 2008). This research is essential for determining the preschool teachers' purpose of using technology in education and their level of technology self-efficacy. Hence, teachers should introduce technology to children, but they should do this consciously. The facility and benefits that technology brings should be carefully selected, and their negativity should also be told to children. Technological awareness is important for teachers, children, and families severely.

Within the scope of the literature review, studies on the aims of technology use of preschool teachers and their self-efficacy beliefs in technology are examined. The literature review showed that several studies had been conducted at the national and international levels (Eneyati, Modanloo & Kazemi, 2012; Giles, 2016; Korkmaz & Ünsal, 2016). These studies mostly used teacher candidates or teachers with different branches as a sample group (e.g., İlkay, 2017; Birişçi & Kul, 2018; Ünal, 2013). However, the literature review has shown that there is only a small number of studies on the self-efficacy beliefs of preschool teachers who are already working. Additionally, no study that uses the mixed method can be found. In addition, there is no study in which the practices of preschool teachers in the classroom are verbally included in the study. For all these reasons, it is possible to say that this research is significant in terms of the sample group, method, and content. When the literature on the subject of technology is reviewed, it has been found out that studies are examining the perceptions of teacher candidates regarding technology or their perceptions of professional self-efficacy (Özdemir & Taç, 2017; Korkmaz & Ünsal, 2016). While preschool teachers and technology subjects are rarely found together, there is no study involving the teacher's practice with the child. There is almost no research in which the belief in technology self-efficacy and the teacher coexists (Abbitt, 2011; Sezgin, Erdoğan & Erdoğan, 2017). As a research method, quantitative studies are included in general (Köroğlu, 2014; Saracaloğlu, Yenice & Özden, 2013; Uysal, 2013, Kartal, 2019). No study can be found in which the preschool teacher, technology self-efficacy, analysis of practices, and the mixed method combined. In the reviewed studies, either teachers' perceptions of self-efficacy or perspectives on technology constitute the content of the research alone (Küçük, Altun & Paliç, 2013; Kurt, 2012; Altuğ, 2017). The main aim of the current research was to ensure that preschool teachers are aware of the purposes of using technology and to analyze its transfer to children in terms of belief in technology self-efficacy. For this purpose, answers to the following research questions are sought.

- What is the level of preschool teachers' self-efficacy beliefs in the use of technology?
- Do the self-efficacy beliefs of preschool teachers' use of technology significantly differ according to age, years in the job, and level of education?

- How do preschool teachers' belief levels of technology self-efficacy affect their purpose and status of using technology in education?

Based on these, technology is at the center of our lives and has a vital role in every stage of our lives. This new system influencing all individuals also applies to preschool children born into technology and referred to as "digital natives." Therefore, teachers should introduce technology to children, but they should do this consciously. The facility and benefits that technology brings should be carefully selected, and their negativity should also be told to children. Therefore, technological awareness is essential for teachers, children, and families severely.

The Role of Teacher in Preschool Education

Today children, who have to be provided with education by teachers, are digital natives and born into the technological structure. Some of these children receive education from digital natives and some from digital immigrant teachers. Nevertheless, teachers are expected to help children gain critical thinking, creativity, support the formation of decision-making mechanisms, direct them to do teamwork, and provide the necessary environment for them to make enough use of technology (Özdan, 2018). For teachers to ensure this, they must prepare learning environments by taking into account the individual differences, interests, wishes, and needs of children and supporting them with different methods and techniques, as well as adopting different assessment methods (Rhodes, 2017). A teacher is the only person who determines the future of a society, a country, since every person in society becomes helpful in their homeland by taking shape in the hands of a teacher. In the 21st century, science and technology are changing and developing very quickly. Thanks to this change, the old ones are being renewed (Yılmaz & Uslu, 2018). One of the most significant changes is the value given to preschool. The importance given to preschool is increasing and getting stronger every day (Özgül, 2011). The teacher must have tremendous pedagogical potential in ensuring the active participation of children and be open to social sharing during the learning and teaching processes. This is one of the most critical innovations in developing society (Grosseck, 2008). Today, to achieve the educational goals expected by the family, society, and age, it is necessary to establish a bond of love and respect based on trust between the teacher and the child. In addition, the teacher should know the child sufficiently, recognize his interests, needs and have full knowledge of the characteristics of the child's family (Yılmaz, Tomris & Kurt, 2016; Arabacı & Aksoy, 2005). The professional experience, expertise in the field, view of the profession, and levels of education of preschool teachers, who are expected to have all these skills and abilities simultaneously, are evaluated as teacher qualifications. One of the most important factors determining quality in education is the quality of the teacher (Kılıç & Acat, 2007).

Teachers should use informatics and technology at all stages of their lives and education (Sincar & Aslan, 2011). The preschool teacher can attract children's attention and increase the permanence of learning by using simulation or instructive video in an educational environment. Activities seen by children and practiced by doing and living become more permanent. In addition, the technology provides convenience to the teacher in the classroom, offers the opportunity to obtain unlimited documents, and strengthens communication with both other teachers and parents (McLoughlin, Brady, Lee & Russell 2007). When all this information is considered, every preschool, primary, middle, and high school child in the education system is called digital natives. At this point, all branch teachers are obliged to be advanced, knowledgeable, and skilled in technology. However, after preschool children encounter advanced technology in life, their first contact with the outside is in the preschool institution and with their first teacher. Preschool teacher is the first person to get them involved in technology outside of their family. The teacher should both make technology beneficial to the child by attracting his or her attention in the way the child is used to and raise the child's awareness of the harms of technology. Considering the first encounters are more complex in every aspect, the importance of technology self-efficacy of the preschool teacher becomes apparent.

Technology Self-Efficacy

The rapid expansion of technological developments has made the support of technology in learning and teaching activities in educational environments mandatory, and the integration of technology and learning environments has become inevitable. This process, which began with the gradual development of new technologies and the use of computers, takes shape with teachers' concerns, attitudes, and perceptions of self-efficacy for using technology (Kurt, Günüç & Ersoy, 2013). For this reason, teachers need to have enough knowledge and skills on technology to support children's interests, wishes, and needs, and their efficient and effective use of the technological products, which are the outcomes of the age.

The concept referred to as self-efficacy perception can be observed in the behavior of individuals. Therefore, it would be appropriate to mention the concept of self-efficacy as one of the most important factors determining how individuals behave in situations, events, or difficult moments (Yaman, Cansüngü-Koray & Altunçekiç, 2004). It is a fact that the self-efficacy perception of a person who performs an action or fulfills a duty with his internal motivation, without the need for external motivation, is high (Kapıcı, 2003). On the other hand, individuals with low self-efficacy beliefs believe that the action or situation is more complicated and complex than it seems. Since they look at this situation from an opposing perspective, they cannot solve their problems on their own and successfully perform the task they want to do (Korkmaz & Ünsal, 2016).

Studies showed that the reflection of developing technology on the educational understanding also leads teachers to use technology as a teaching aid. The ability to include technology in education is one of the characteristics that a 21st-century teacher should have. Identifying and developing teachers' perceptions of technology self-efficacy is of great importance in terms of their

ability to use technology in education activities (Ekici, Taşkın-Ekici & Kara, 2012). Technology, which allows the teachers to use 21st-century skills, practice, and acts in collaboration with students, also offers a creative learning environment (Lambert & Gong, 2010). However, research has shown that the technology is not being used adequately by teachers (Hew & Brush, 2007). However, teachers' lack of experience in technology prevents them from teaching by using technology (Sutton, 2010). Therefore, to benefit from technology in the implementation process of education activities, it will be ideal that the concept of self-efficacy is introduced (Giles & Kent, 2016). To improve the use of technology, the importance of the ability to include technology in education should be emphasized, and teachers should have a belief in self-efficacy (Liu et al., 2014). Based on this idea, the higher the teachers' self-sufficiency is, the higher goals they will set for themselves, and they will be more willing to achieve these goals.

With the inclusion of technology in the education environment, the adaptation of technology by teachers to the classroom has become an essential task for teachers (Southall, 2012). This shows the importance of the concept of self-efficacy of educational technology for teachers. When the teachers with low technology self-efficacy and high technology self-efficacy are compared, teachers with high self-efficacy beliefs are more efficient in the use of technology in education, and they include these activities in the classroom (Kutluca & Aydın, 2016). In addition to visualizing abstract concepts for preschool children, technology makes it easier for them to access information more safely (Li, 2007). When technology is used correctly in the classroom environment, children's motivation and confidence in the learning process also increase (Torff & Tirotta, 2010). It can also be said that children's participation in the process and academic skills increases (Mercier & Higgins, 2013). Therefore, teachers need to have enough knowledge and skills on technology to minimize the problems, support children's interests, wishes, and needs, and their efficient and effective use of the technological products which are the outcomes of the age we live in (Kurt, Günüç & Ersoy, 2013).

Technological tools, especially tablets, smartphones, have strong potential for preschool children. For this reason, these tools should be included in the learning process to increase children's academic skills (Sullivan, 2013). Because, according to the researchers, these technological materials are believed to help the transfer of information to children and their basic needs (Fernández-López et al., 2013). The correct use of technology in preschool education is about integrating technological material into the program and regulating it according to each child. Besides, it is believed that the correct use of the material will also be achieved with the competencies and knowledge of teachers (Haugland, 2000). Research showed that the inclusion of technology in the educational environment contributes to children's academic, cognitive, and social skills (Gedik, Çetin & Koca, 2017). The computer, which is one of the technological tools, gives children skills such as learning through exploring, problem-solving, decision making (Akkoyunlu, Akman & Tuğrul, 2002). Also, teachers are given new duties, and the requirements of the information society renew these standards. It can be said that it develops the child's learning, imagination, and innovative thinking and integrates learning activities with technology (Orhan et al., 2014). A situation that critically affects the success or failure of a child is the positive effect of the teacher's belief in his or her ability and efficacy (Slutsky, 2016). With the inclusion of technology in the education environment, the adaptation of technology by teachers to the classroom has become an important task for teachers (Southall, 2012). This shows the importance of the concept of self-efficacy of educational technology for teachers. When the teachers with low technology self-efficacy and high technology self-efficacy are compared, teachers with high self-efficacy beliefs are more efficient in the use of technology in education, and they include these activities in the classroom (Kutluca & Aydın, 2016).

The perception of the use of technology by teachers and the teachers' views on the use of technology can be considered an essential tool in predicting progress in learning with the support of information technologies. For this reason, choosing technology and technological tools as educational materials is one of the properties that teachers should have in developing and changing educational understanding. Identifying, developing, and evaluating technology self-efficacy perceptions of teachers is essential for them to use information technologies in their teaching processes. For this reason, this study is important for determining teachers' self-efficacy beliefs in the use of technology.

METHODOLOGY

Research Pattern

This research, which aimed to examine the purposes of using technology in the teaching of preschool teachers in terms of technology self-efficacy levels, is a mixed type of research in which quantitative and qualitative research patterns were used together. This combination of use covers a broader area than the use of a qualitative or quantitative method alone (Creswell, 2015). In this study, which combined both quantitative and qualitative methods simultaneously, the qualitative data was collected and analyzed and then studied in depth according to the scores obtained from the quantitative data collection tool. The pluralism and selectivity of the mixed method make it superior to the other methods. In the mixed method, qualitative and quantitative methods were used together in a study or ongoing successive studies. This combination of use covers a broader area than the use of a qualitative or quantitative method alone (Maxwell, Fuller, Brooks & Watson, 2016). In this way, both the credibility and diversity of the research increase, and it develops and expands. Thus, the research reached a level that can obtain enriched data (Johnson & Onwuegbuzie, 2004). In addition, an extensive and deep process was carried out.

Study Group

This research was carried out with 80 female preschool teachers who are currently working in preschool educational institutions affiliated with the Ministry of National Education in the European side of Istanbul. Participants in the study were determined by the extreme case sampling method, one of the purposive sampling methods. The purposive sampling method

enables identifying the people who will provide rich data required by the research and communicate with them (Bernard & Ryan, 2010).

Subsampling

Preschool teachers in the study were divided into two subgroups (lower and upper) according to the scores they received from the Use of Technology in Education Self-Efficacy Scale (TESS) to determine their perspective on technology and their competence in practice. In light of the extreme case sampling, which is one of the purposive sampling methods, the lower group appears less effective at using technology, and the upper group is more effective at using technology. This research followed below ways to determine the lower and upper groups:

1. The TESS was applied to 80 preschool teachers.
2. The average and standard deviations of the Self-Efficacy Scale of Technology Usage scores were calculated, and two formulas were used (Fraenkel, Wallen & Hyun, 2011).

Mean + Standard Deviation / 2 < **High Group**

Mean – Standard Deviation / 2 > **Low Group**

3. As can be seen from the formulas, the scores above the score obtained from the sum of half of the arithmetic average and standard deviation are in the upper sample group, and the scores below the score obtained from the difference of half of the arithmetic mean and standard deviation are in the lower sample group.
4. According to the formula, eight participants were selected from the lower and upper groups representing at least 10% of the participants, and qualitative processes were carried out with the participation of these teachers (Corbin & Strauss, 2014). Participant information is shown in Table 1.

Table 1. Participant features

Teacher	Age	Education Level	Seniority	Scale Score
T_{2upper}	22-27	Postgraduate	1-5 year	240
T_{3upper}	22-27	Undergraduate	1-5 year	240
T_{1upper}	22-27	Postgraduate	1-5 year	240
T_{4upper}	22-27	Postgraduate	1-5 year	234
T_{1lower}	35-40	Undergraduate	11-15 year	195
T_{2lower}	28-34	Undergraduate	1-5 year	191
T_{3lower}	22-27	Undergraduate	1-5 year	183
T_{4lower}	22-27	Undergraduate	1-5 year	172

Data Collection Tools

In this study, two different data sources were used to answer the sub-problems. These sources are the Use of Technology in Education Self-Efficacy Scale (TESS), which allowed the participant to measure their knowledge of technology and noticed their use, and semi-structured interview questions. In addition, the data collection tools mentioned were detailed.

The Use of Technology in Education Self-Efficacy Scale (TESS): It is developed by Doğru (2017). There are 48 clauses on the scale, and clauses 39 and 48 are coded as the reverse item. High scores from the scale consisting of five-point Likert structures indicate that teachers' technology self-efficacy is high, while low scores indicate that teachers' technology self-efficacy is low. The highest possible score from the scale, which is scored between 1 and 5, is 240, while the lowest score is 48. The average value for this scale is 144.

Semi-Structured Interview Questions: The researcher prepared these questions by receiving expert opinions. To ensure the internal validity (Yıldırım & Şimşek, 2008) of the interview questions, expert opinion was received from two faculty members specialized in preschool, technology, and qualitative study. After the necessary corrections were done on questions according to expert opinions, a pilot study was carried out with a preschool teacher who was not in the participant group, has a master's degree and two years experience, in order to determine the clarity, meaning, and suitability of the questions, and to strengthen the internal validity. The final version of the questions was prepared together with an expert. Questions are provided below.

Table 2. Semi-structured interview form questions and characteristics

	Question	Characteristics
Q-1	For what purpose do you use technology in your teaching? Why is that?	Technology intended use
Q-2	During which instructional activities do you use technology more? *Why is that?*	Type of instructional activities
Q-3	Do you feel yourself competent to include technology in teaching? *Why is that?*	Technology self-efficacy
Q-4	How would you use technology in your teaching? *Give an example.*	Techno-pedagogical strategies

Data Collection Process

The data collection process of the research was carried out in two stages. It took about five weeks for all the data to be collected. Data was obtained through the Self-Efficacy Scale of Technology Usage, and semi-structured questions asked to preschool teachers.

Collection Process of Quantitative Data

In the first stage of the data collection process, a total of 80 preschool teachers working in kindergartens affiliated with the Ministry of National Education in the European side of Istanbul were reached. When determining the people who will provide the rich data required by the research using the purposive sampling method, ease of accessibility communication to the sample group was considered. After obtaining the necessary permission from the ethics committee and informing the participants that volunteering was essential and that they do not have to participate, the TESS was presented to the participants. The scale took about 10-15 minutes to fill.

Collection Process of Qualitative Data

For the second part of the research involving the qualitative data collection, approvals of the ethics committee, the Ministry of National Education, and the participants were received. At this stage, the scores of 80 preschool teachers working in kindergartens affiliated with the Ministry of National Education in the European side of Istanbul were calculated and transmitted to the participants. A total of eight preschool teachers, four of them in the lower group and four of them in the upper group, were contacted. At the scale application stage of the research, participants were asked to add full names, making it easier to reach them. After arranging appointments with the participants, semi-structured interviews were conducted on the appropriate date and time. Interviews were recorded with a voice recorder to ensure that transcription was complete and healthy. Each teacher's interview lasted about 6 to 10 minutes.

Analysis of The Data

The data analysis process of the conducted research consisted of two stages. In the first stage, the data collected to determine the self-efficacy levels of the preschool teachers involved in the research for the use of technology was analyzed with the social science data analysis program SPSS 20 (Statistical Package for the Social Sciences). With this program, the data was analyzed using descriptive statistics. After calculating the scores obtained from this scale, the people who will be included in the lower and upper groups were determined based on the participants' scores. Then, through the same program, it was attempted to determine the differentiation between the total score obtained by preschool teachers from the TESS and the independent variables of age, professional seniority, and level of education. For this purpose, the ANOVA test, which was used in cases where the number of independent variables is more than two, was used. In addition, the Kolmogorov-Smirnov Test for Normality was applied to test the normal distribution of the data (Büyüköztürk, 2012).

The inductive content analysis and the constant comparative method were used to analyze the data obtained from the participants included in the lower and upper groups created by using the data obtained after quantitative analysis. Data analysis is a complex and challenging process that continues by interacting between data and findings from deductive and inductive approaches (Merriam, 1998). Before applying the analysis, the data obtained from the preschool teachers with whom the pilot study is carried out are turned into a document, expert opinion is taken, and then the analysis is carried out. After this stage, the data was first transcribed for inductive content analysis and then continued in stages based on the study of Yıldırım and Şimşek (2008). These stages consisted of open coding, category creation, and summarization. In the first stage, meaningful concepts were created by dividing the data into sections for content analysis. Based on these concepts, themes were created with the necessary arrangements, and thus the second stage was completed. In this way, similar answers among the participants' answers to semi-structured questions were collected together and regulated to make them suitable for interpretation (Zhang & Wildemuth, 2009). These answers were then compared in-depth and in detail according to the purpose of the research with the answers given by the participants to semi-structured questions in the use of technology through the constant comparative method (Glaser & Strauss, 1967). Then the themes were made into propositional sentences, and hypothesis sentences were created.

FINDINGS

In this part of the research, the results obtained from the analysis of the TESS and Semi-Structured Interview Questions Answered by preschool teachers are presented. First, the normality test results are included, which showed whether the scale scores are generally distributed according to the participants' responses to the TESS (Table 3). After that, findings of the descriptive

analysis showing the level of self-efficacy of technology use of preschool teachers and results from the ANOVA test are presented. Finally, the results of inductive content analysis and constant comparative method performed based on the participants' responses in the subsample to semi-structured interview questions are included. Data from preschool teachers and quotations from their responses to semi-structured interview questions are encoded independently of the research to ensure that credentials are kept confidential.

Table 3. Kolmogorov-Smirnov normality test results

TESS	N	$\bar{X}$	SD	Z	p
Total	80	207.37	19.22	.09	.169

In Table 3, it is found out that the data collected from the preschool teachers in the sample group (total score) showed a normal distribution (p>, 05). In the study, the normal distribution of the data emphasizes that the tests to be applied to the data must be parametric. Therefore, the significance of the difference between the self-efficacy beliefs of preschool teachers in the use of technology and the variables of age, professional seniority, and level of education was determined using the ANOVA test.

Findings on the Level of Technology Self-Efficacy

Descriptive analysis findings to determine the level of self-efficacy beliefs of preschool teachers participating in the study for the use of technology in education are given in Table 4.

Table 4. TESS descriptive analysis findings

TESS	N	Minimum	Maximum	$\bar{X}$	Standard Deviation
Total	80	160	240	207.37	19.215

According to the descriptive statistical values given in Table 4, it is found that the average score received by preschool teachers from the self-efficacy scale for the use of technology in education was (X=207.37). It is found that the minimum score was 160, and the maximum value was 240 in terms of the total scores that preschool teachers received from the scale. It is discovered that the total average scores received by participants were well above the average value. This finding revealed that preschool teachers have high self-efficacy for the use of technology in education.

Findings on Change of Level of Technology Self-Efficacy

Table 5. ANOVA test results for the change of self-efficacy beliefs for technology use in teaching by age

	Age	N	$\bar{X}$	SD	F	p
	22-27	53	208.28	19.749	.569	.637
	28-34	12	210.42	11.000		
TESS	35-40	9	202.33	22.215		
	40 and over	6	200.83	24.359		
	Total	80	207.38	19.215		

In Table 5, it is found that there was no significant difference between the age-independent variable of preschool teachers and the self-efficacy beliefs of the use of technology in education (p= .637). However, although there was no significant difference, there was a descriptive difference between the age of 40 (X=200.83) and the age range of 28-34 (X=210.42). Preschool teachers with an age range of 28-34 years have firmer self-efficacy beliefs in the use of technology in education than preschool teachers with an age of 40 years and older. ANOVA was also applied to the data to determine the significance of the statistical change of self-efficacy beliefs of preschool teachers in the use of technology according to the professional seniority variable. The findings can be seen in Table 6.

Table 6. ANOVA test results for the change of self-efficacy beliefs about technology use in teaching by seniority

	Seniority	N	$\bar{X}$	SD	F	p
	1-5	55	207.84	19.476	1.729	.168
	6-10	9	213.67	10.817		
TESS	11-15	6	212.83	13.790		
	15 and over	10	195.90	23.412		
	Total	80	207.38	19.215		

As shown in Table 6, there was a significant difference between the preschool teachers' professional seniority variable and the self-efficacy beliefs in the use of technology (p=.168), which were obtained from the scale for evaluation of self-efficacy beliefs in the use of technology in education. In addition, the self-efficacy beliefs of preschool teachers with professional seniority of 6-10 years in the use of technology in education (X=213,67) was more than the preschool teachers with professional seniority over 15 years (X=195.90). In other words, the self-efficacy beliefs of the teachers with professional seniority of 6-10 years in the use of technology in education differed from the preschool teachers who have 15 years or more professional seniority. Based on these

findings, the teachers with the lowest self-efficacy belief in the use of technology in education were the ones whose professional seniority was over 15 years. ANOVA was also applied to the data to determine the significance of the statistical change of self-efficacy beliefs of preschool teachers in the use of technology according to the level of education variable. The findings can be seen in Table 7.

Table 7. ANOVA test results for the change of self-efficacy beliefs about technology use in teaching according to education level

	Education Level	N	$\bar{X}$	SD	F	p
TESS	Associate Degree	11	207.91	19.486	1.831	.167
	Undergraduate	52	204.79	18.724		
	Postgraduate	17	214.94	19.629		
	Total	80	207.38	19.215		

As shown in Table 7, there was no significant difference between the preschool teachers' level of education independent variable and self-efficacy beliefs in the use of technology (p= .167), which were obtained from the scale for evaluation of self-efficacy beliefs in the use of technology in education. In other words, it was found that the level of education of preschool teachers did not have any effect on self-efficacy beliefs in the use of technology in education. However, the group consisting of the preschool teachers with graduate education had the highest score on the scale for the use of technology in education (X=214.94). The group with the lowest self-efficacy belief in the use of technology in education was preschool teachers who have a bachelor's degree (X=204.79). In other words, preschool teachers with the highest level of education had the firmest belief in self-efficacy in the use of technology in education.

Findings on Change of the Purpose and Situations of Using Technology According to Self-Efficacy

Quantitative findings of this study, which aimed at investigating preschool teachers' self-efficacy beliefs in the use of technology in education, revealed that participants' self-efficacy was generally high and also closed to each other. However, although not meaningful, significant differences were found between some values, and semi-structured interviews were conducted with 8 participants, while half of them had received the highest scores, the other half had received the lowest scores, to investigate the research in-depth. The results obtained from the analysis of preschool teachers' responses to semi-structured interview questions were collected under four main headings. The results of the inductive content analysis on the responses to semi-structured interview questions are described in detail in Table 8.

Purpose of Using Technology in Education

To determine their conceptualizations of the use of technology in education, the question of *for what purpose do you use technology in education? Why?* was asked to the preschool teachers participating in the study. According to answers, while the teachers of the upper group with high self-efficacy scores concentrated on two different themes, the teachers in the lower group concentrated on a single theme. The theme on which both groups concentrated consisted of the examples the teachers give on *enriching education*.

> ***T_{4upper}:*** Writing and hearing are more permanent for adults, but children's visual memory is stronger, and they can transfer it to other things. They can combine what they see with other processes they have learned. They can make some analogies such as we learned this, we saw that. I can say that I use technology for these purposes because they are more permanent.

> ***T_{3lower}:*** We also know that visuality especially has gained significant importance today. Therefore, to enrich the course, short videos, printed materials, photos, blackboard, computer, projector, which we also call overhead projector, internet, I use the technology in this way.

As can be seen in the example quotations from the teacher statements given above, both the teacher in the upper and lower groups emphasized enriching the activity environment by using the visualization of technology features. In addition, while the teacher in the upper group mentioned that they aim for permanence by increasing the visuality, the teacher in the lower group makes no such comment.

> ***T_{2upper}:*** Now children's interests are more in this direction; I think it is better to use a teaching tool to do something in the direction in which they are interested. I think the reason is that children are already born into technology, and their interest is entirely in this direction because they are constantly interacting with technological tools.

> ***T_{2lower}:*** Verbal lecturing can be insufficient in some subjects; sometimes, an image, a video, an audio recording is necessary for effective learning. For example, when I tell a forest, I tell it verbally, but the children cannot visualize it. It is more permanent when I show them a visual, a video. Or sometimes, I need to make them listen to the voices of different animals living in that forest. We do not always have the opportunity to make a trip to the forest and observe it, or when I tell a historical artifact, I cannot take the kids to see that historical artifact. When we show them with an image or a video, we save time and show the kids these real images. So I frequently use technology in education.

As we continued to examine the answers given by teachers in-depth, it has been stated that teachers in the upper group turn to the use of technology to increase children's interest and that this was because children are born into a world where technology exists. Teachers in the upper group emphasized that in addition to *enriching education*, they also tried to use technology in educational settings to *ensure children's motivations* towards education. Teachers in the lower group said that they used it to

make children listen to different sounds and see images during activity exercises, that is, to include them in their work to *enrich the learning process*.

> ***T_{3upper}:*** I know that visuals are of great importance in education since the age group we work with cannot always make sense with verbal expressions. For this, and because I have children who appeal to visual memory, I use technology in education because I know that learning is more permanent when visual and verbal guidelines are combined.
> ***T_{2lower}:*** I most often use technology to appeal to children's sense organs. As for a reason, the more I appeal to the child's sense organs, the more concrete learning I perform.

According to these statements, it is found that teachers who scored high on the scale view technology more broadly and evaluated it under two different headings. While the teachers in the lower and upper groups shared a heading, the teachers in the upper group mentioned another heading.

Table 8. Teacher conceptualizations for the use of technology in teaching

Question Characteristics	Upper		Lower	
	Theme	**Concept**	**Theme**	**Concept**
Technology Purpose of Use	Enriching Teaching	Concretization Visualization Permanence	Enriching Teaching	Auditory Reinforcement Strengthening Activities Concretization Strengthening Activities Method Technique Providing Diversity
	Providing Motivation	Research Attention Gathering Attention Technological Game Conversation Compliance with Interests		
Type of Instructional Activities	Activity Type	Reading-Writing Activities Science Activities Mathematics Activities All Events	Enriching Teaching	Concretization Using the Auditory Side Zoom to Real Life Visualization Strengthening Efficiency
	Enriching Teaching	Visualization Concretization Strengthening the Work	Activity Type	Cognitive Domain Turkish Activities Art Activities Science Activities Music Activities Literacy Activities
	Continuity-Continuity	Permanence Setting Up My Compatibility		
	Participation	Attention Attention Gathering		
Technology Self-Efficacy	Strengthening Participation	Active Child Technology Requirement Practicality	Technological Possibilities	Poor Vision Material Shortage Lack of Materials
	Technological Possibilities	Material Shortage Lack of Possibilities Smartborad		
Techno/Pedagogical Strategies	Enriching Teaching	Visualization Concretization Persistence in Mind Show and Make. Instant Feedback Use in the Listening Direction	Enriching Teaching	Using the Auditory Side Strengthening Activities Visualization Including Everyday Life Permanence
	Strengthening Participation	Active Child Attention Curiosity Awakening Inclusion in Progress		

Rationale for Use	Learning Differences Learning by Doing and Living Incomplete Completion Accessibility Suitability for Different Purposes

Usage Area of Technology in Education

To learn the preschool teachers' usage area of technology in activities, a second question, which is *In what educational activities do you use technology more? Why?* has been asked, and the analysis on the answers abiding by the scores received on the scale showed that the teachers in the upper group make conceptualizations such as *activity type, enriching education, continuity, and participation*. In addition, conceptualizations provided by inference from the answers given by the teachers in the lower group were *enriching education and activity type.*

> ***T_{2upper}:*** It depends on the topic I am lecturing on. Because I apply different techniques for each topic. Sometimes I may need to show it when I tell it. I might use the show and tell technique. And sometimes, I may need to support it after I tell it. So that can change. But I am trying to use technology in all areas.
> ***T_{3lower}:*** Likewise, we can do this in mathematical activities such as addition and subtraction. We can study numbers, like drawing on the board and using visuals. I think that technology gives benefits in all other areas, whether in Turkish or in art and science activities.

As can be seen from the example quotations from the statements shown above, all teachers in the upper and lower group said that the technology could be used in all activities implemented in the classroom. It can be seen that all teachers agreed regarding the benefits of technology.

> ***T_{1upper}:*** Therefore, we need to do the activity of preparing for reading and writing either by using a toy that will appeal to five sense organs or with a technological tool that can draw their attention rather than doing it, for example, on paper, so that it has more permanence. So we use technology more in situations where children cannot focus.
> ***T_{4upper}:*** Because the age group we address is quite young and their attention is very short, their attention span is very short. For this reason, such technological products, technological tools become very interesting and attractive for them. For this reason, what I do is using, as much as possible, for example, story activity, for example, there are audio slides or storytelling in the form of videos, or for example, there can be a program where you can create your own story. These kinds of things are more attractive to children, and I use them more in Turkish language activities.

However, the preschool teachers in the upper group added two different concepts to the question of *In which educational activities do you use technology more? Why?* As can be understood from the above examples, one of these concepts is *participation.* The other concept, which is *continuity*, can be seen in the examples below:

> ***T_{3upper}***: To be more exact, it is true that I use it in book exercises because I know that their attention is short, and I want to increase their attention a little more by differentiating the exercises with visuals, adapt them with the topic, make it permanent in memory.
> ***T_{4upper}***: I mean it becomes much more permanent when the child learns the concept of old and young by establishing connections on the two topics he/she has learned, rather than giving it on a photocopy and hanging it in the air. So I can say that I think it is effective in this regard; I think it is effective to use technology during educational activities.

Looking at the answers to the semi-structured questions here, teachers in the upper group approach the use of technology in education more broadly and in detail, while teachers in the lower group view it more superficially.

Teacher Efficacy

Eight preschool teachers have answered the following question under a common heading: *Do you consider yourself efficient to incorporate technology into teaching? Why?* In addition, the upper group added another different answer. Examples of this are presented below.

> ***T_{1upper}:*** Because the technological opportunities provided by the school are not very sufficient compared to today. I mean, while technology advances so much every day, the technological tools that we use are very inadequate for us. Sometimes we even use the internet with limited opportunities. And the interactive whiteboards, too. Therefore, I think that while technology is advancing at this rate, if there is an improvement or diversity in the tools used in kindergartens, primary schools, we can incorporate more technology into education.
> ***T_{2upper}***: Within current opportunities, yes, I consider myself efficient. I try to evaluate all the opportunities I have. But I have limited opportunities. For example, I have a laptop, and I have a small sound system. I mean, it has a speaker, but the sound is hard to hear because the number of children is too high. I do not have an interactive whiteboard in class, and when I want to show them a video, I show it on my laptop, and after a while, the children get bored.
> ***T_{2lower}:*** I consider myself efficient in terms of the opportunities I have. Because unfortunately, we do not have an interactive board, an internet connection, a projector at school. I can rather use a computer and speakers. So I try to use these opportunities as much as I can.

T_{4lower}: Apart from me, there are some technological tools that still have not reached us due to the physical conditions of the school. Some materials arrive, but there is no internet infrastructure, for example. I do not consider myself fully efficient, but I try to do what I can, thinking it is better than nothing.

As an answer to the question, teachers in both the lower and upper groups attributed their level of efficacy in technology to the physical conditions of schools. In light of these, it is seen that all eight participants meet under a common theme. The theme that includes all these concepts is *technological possibilities.*

***T_{4upper}*:** If I had an interactive whiteboard, it would be more attractive because the screen is large, and children have little chance of doing anything on the laptop, but on the interactive whiteboard, at least I could get children to play games that I designed myself in class. We could draw pictures on the interactive whiteboard. I would involve the kids in it. I could attract the attention of the kids by using different software.

***T_{2UPPER}*:** As far as possible, I already prefer more practical platforms, in which I can do something quickly,

In the quotations given above, teachers in the upper group talked about the insufficiency they experienced in technology and the insufficiency it gave to the children while using. In this regard, it is rationally mentioned that technology teaches by making the child active, and the use of technology facilitates teachers' work.

Usage Method of Technology in Education

It is a source of data related to the usage area of technology in the education of preschool teachers participating in this study. For this purpose, all the participants' answers from the lower and upper groups to this question were analyzed: *How do you use technology in education? Please give an example.* According to the answers, while the teachers in the upper group draw attention to strategies related to *enriching education, improving participation*, and *usage reasons* for technology usage methods, the teachers in the lower group draw attention to the issues of *enriching education*.

***T_{1upper}*:** We can use the technology on the interactive whiteboard, projector, or stereo as audial. For instance, we want children to find images on a subject that we want children to research and bring them in flash memory. Then we can collect them all in a file and show them on the interactive whiteboard in slides. Or, in a preparation exercise for reading and writing, we create a matching or grouping page, and using the interactive whiteboard pen, we can turn this activity into a process that includes children. Or, as I said, We can investigate the science experiment, the science activity, an activity or experiment that we cannot do in the classroom and watch the video and visualize it. Or we can research a subject we are curious about and concretize it.

***T_{3upper}*:** We have book exercises. Since our book exercises are interactive, we also upload them to our interactive whiteboards. We project them from it; we make implementations on it. Let's say we have a matching question on the page. Instead of telling it completely, first, I am doing one example on the board to show it. After that, they come one by one and do the matching on the board. If they make it wrong, the word wrong appears on the board. If it is true, applause appears.

T_{4lower}: I record it so that the child can hear his/her voice; I make the child listen. Apart from the instruments I play myself, I make the child listen to an instrument in music activities. We can make them listen to animal sounds, nature sounds. I use the sound system a lot in that sense.

As can be seen from the example quotations given above, it was observed that teachers in the lower group and upper group used the auditory and visual aspects of technology to enrich education and thus included children in education.

***T_{2upper}*:** Now, children's learning methods are different from each other. Some learn by doing, some learn by watching, some learn by listening. We are already using learning by doing, experiencing more in kindergarten. But sometimes, it can really work to make them watch a video on the internet. For instance, if we are doing an activity related to planets, if I am also telling it, it can better stick in the mind when I show this video over the internet, and it already draws their attention. In this way, children's learning levels also increase, or if I give missing information, the missing learnings are completed.

***T_{4upper}*:** It is not like suddenly saying we are looking at this today; first, I show it with my own means and then include the technology.

As can be seen from the sample answers shown above, the teachers in the upper group also cared about the learning methods and styles of the children. It was observed that they applied technology and tried different methods. As can be seen from the example statements, the teachers in the upper group mentioned strategies related to *enriching education, improving participation*, and *usage reasons* for technology usage method, while the teachers in the lower group only mentioned the topic of *enriching education*. At this point, it can be stated that both the lower and upper groups of teachers agreed on the theme of enriching education as a usage area of technology in education. In addition, it was observed that the teachers in the lower group did not express their opinion on the subjects of *improving participation and usage reason*.

DISCUSSION, CONCLUSION, AND SUGGESTIONS

This study aimed to investigate the self-efficacy beliefs of 80 preschool teachers who are currently working in preschool education institutions affiliated with the Ministry of National Education in the European side of Istanbul in the use of technology in education. The results obtained from the data analysis are listed below.

1. All preschool teachers have firm self-efficacy beliefs in the use of technology.
2. No significant difference was found between preschool teachers' self-efficacy beliefs in the use of technology in education and age, professional seniority, and educational level.
3. The preschool teachers who were in the upper group, due to their high technology self-efficacy, mention more justified, rational themes than the teachers in the lower group.

4. Unlike teachers in the lower group, teachers in the upper group also referred to the themes of motivation, continuity, participation, improving participation, and usage reason.

A theoretical discussion is made according to these results while also considering the results obtained in theoretical studies.

Levels of Preschool Teachers' Self-Efficacy Beliefs in The Use of Technology

In this study, preschool teachers' views on the use of technology in education were investigated, and interview questions back these views. When the national and international literature is examined, no study can be found conducted with people who are already working as preschool teachers and includes quantitative and qualitative analyses on the self-efficacy of using technology in teaching. Additionally, there are many technologies and computer-based studies conducted with preschool teacher candidates, science teachers, class teachers, teachers working in different branches, and lecturers in different disciplines of the faculty of education.

When the results of the study are examined, it is concluded that all teachers involved in the study have firm self-efficacy beliefs in the use of technology in education. With the increase of the importance given to preschool education, technology, which is a necessity of the 21st century, is also included in education (Özgül, 2011). It is argued that the teachers who participated in the research can perform simple technology operations and that their use is necessary. At this stage, the most critical point is that the teacher can transfer the technology to the child properly (Sayan, 2016). In this sense, the self-efficacy belief of the teacher should be firm (Henson, 2001). Preschool education is when children first have the opportunity to experience a different environment as a learning environment outside the home. For this reason, preschool teachers have to follow the age more closely and consciously pass on their experiences to children. One of the researches carried out on this subject with different branch teachers, Özdemir (2017), also concluded that the class teacher candidates have high technology self-efficacy beliefs. In many such studies, it has been concluded that teachers' self-efficacy beliefs in technology are firm (e.g., Eneyati, Modanloo & Kazemi, 2012; Köroğlu, 2014). The results of all these studies emphasized that teachers should be prepared to offer technology-based education practice. Teachers should use new technologies in the learning environment and in the classroom to support the education system and provide a teaching environment with more quality and facilitate the learning process.

Change of Teachers' Self-Efficacy Beliefs in The Use of Technology in Education

When the results of the research are examined, no significant differences were found between the age, professional seniority, levels of education of teachers, and the self-efficacy beliefs in the use of technology in education. However, a study carried out by Çetin and Güngör (2012) with class teachers in Niğde found a significant difference between age and technology self-efficacy and concluded that it is in favor of younger teachers. Although there was no significant difference as a result of the current research, there were descriptive differences among the data. The oldest members of the group have the lowest average. The average scores of younger teachers were higher. However, the numeric difference between them was relatively slight. Preschool teachers being older or younger may not be an essential factor for technology self-efficacy. Spiegel (2001) also concluded that self-efficacy belief in computer use has a negative relationship with age. In another study conducted in Denizli, results were obtained in favor of the group of younger teachers. Erdoğan and Erdoğan (2017), who used the *Technology Proficiency Self-Assessment Scale* in Ankara, concluded that technology self-efficacy decreases as age and seniority increase. A study conducted by Bütün-Kuş (2005) concluded that there was a significant difference between technology self-efficacy and seniority. It is in favor of the teachers with less seniority. It is thought that the reason for this is that education was different at the period when the teachers with high seniority were raised. The technology experience and knowledge of younger teachers might be more recent and advanced (Pajares, 2002).

Teachers with less professional seniority have firmer beliefs in technology self-efficacy (e.g., Sengir, 2019; Özçelik & Kurt, 2007). That being said, no significant difference was found in the research carried out by Sengir (2009) with secondary school branch teachers. Science and technology teachers present no differentiation in their attitudes towards the use of technology in the field of education, whatever their educational status might be (Barut, 2015). Although the educational levels of preschool teachers do not cause a significant difference, while the teachers at the graduate level have the highest average score, the ones at the undergraduate level have the lowest average score. Thus, the group of preschool teachers with the highest level of education has higher technology self-efficacy.

In light of all these findings, it can be thought that teachers are developing themselves to educate children and make plans accordingly. It is found that there is no link between independent variables such as age, professional seniority, and level of education of preschool teachers, and self-efficacy beliefs in the use of technology. These variables are considered as teacher qualifications, determining the quality of education (Kılıç & Acat, 2007). For the children in the age group 0 to 6, who spend the vast majority of their daily lives interacting knowingly or unknowingly with tablets, computers, smartphones, and similar technological tools, it is of great importance in technological activities in the educational environment (Kılınç, 2015). Regardless of teachers' age, professional seniority, and level of education, it can determine how to educate the rising generation of digital natives (Prensky, 2005) individuals born into the age of technology.

Change of The Purpose and State of Use of Technology According to Self-Efficacy

Eighty preschool teachers who participated in this study were made to take the TESS and ranked according to the scores they received on this scale, and two (lower-upper) groups consisting of four teachers are formed according to their self-efficacy beliefs

in the use of technology in education. The answers given by the teachers in the lower and upper groups during the implementation-data collection process were recorded and transcribed with the help of a voice recorder and analyzed using the qualitative analysis method. To strengthen the analysis carried out using the quantitative method and to be able to build it on solid ground, the qualitative analysis method was applied. The purpose was to determine how and for what preschool teachers use technology in classroom practice, which was not encountered in the national and international literature.

The results were obtained after the applied inductive content analysis. The preschool teachers in the upper group, due to their high technology self-efficacy, mentioned more justified, rationally conceptualized themes than the teachers in the lower group. In the answers to the question about *the purpose of using technology in education*, all of the teachers in the lower and upper groups emphasized that technology is suitable and necessary to *enrich education* in the educational environment. In addition, teachers in the upper group also stated that they see technology as a source of *ensuring motivation* for purposes such as drawing children's attention during education and gathering their interests. Almost all the teachers believed that children are motivated in the preschool education environment and that learning is more permanent with incorporating technology in it (Clements, Nastasi & Swaminathan, 1993). For the question regarding *the type of educational activities*, the teachers of the upper and lower groups again mentioned the titles of enriching education and the type of activity, emphasizing the need to use visualization, technology in the education of children. While the teachers of the two groups mentioned the benefits of using technology in all activities, they specifically emphasized that they used it more in the activities of preparing for reading and writing. Teachers care about visuality and being permanent for children regarding the use of technology. The high technology self-efficacy of teachers might indicate that they are actively using technology (Sezgin et al., 2016). According to different research in the literature, many teachers believe that computers will have positive effects on education (Çağıltay ve Çakıroğlu, 2001). In addition, teachers in the upper group also have different themes for this topic. These are *continuity* and *participation*. Teachers in the upper group also mentioned concepts such as permanence and drawing interests. A study conducted by Yurt and Kalburan (2010) find out that 69.5% of participating teachers used computers to *support activities in their daily plans*, and the rest use computers to *search for information*. In addition, in the same study, 62.1% used technology in musical activities, 45.3% in literacy activities, and 64.2% in cognitive development activities. 52.6% used it to improve their language skills. At this point, it can be considered that teachers use computers for educational purposes. Technological tools provide children with different musical experiences. Visual and auditory symbols offer new learning opportunities to children (McDowall, 2003). Koç (2014) emphasises that computers are often used in music events. Computers are often used in musical activities; however, they are also used in reading-writing activities. In the preschool period, skills such as story creation and learning new words can be supported by using computers thanks to some software (Yurt & Kalburan, 2010).

In answer to the question asked to measure *the technology self-efficacy*, the teachers in the lower and upper groups mentioned *the technological possibilities* by talking about the lack of technological tools and opportunities in the institution they work. However, teachers in the upper group also mentioned *improving participation*. In terms of the subject that teachers in both groups focus on simultaneously, the environment in which they can access lesson plans, materials, and activities for both their development and implementations in the classroom is provided by technology. Nevertheless, due to reasons such as lack of infrastructure in schools or lack of knowledge, in some cases, technology may not be able to be used as wanted (Akkoyunlu, 2001).

In the last question, which aimed at learning *techno-pedagogical strategies*, teachers in the lower and upper groups mentioned the theme of *enriching education*, as in the first question. Unlike the teachers in the lower group, the teachers in the upper group also emphasized *improving participation* and *usage reason*. An educational environment involving many stimulants can simultaneously activate all the senses of a child and make it permanent. Technological devices that can provide both visuality and auditory data at the same time contribute to the learning process of children and increase their motivation by ensuring that children willingly and effectively participate in the learning process (Akkoyunlu et al., 2002). In the light of all this information, teachers who are actively involved in technology and therefore have a firm belief in technology self-efficacy may be aware of the influence of technology on children and may have made statements accordingly.

Suggestions

In this part of the research, suggestions are presented considering the results obtained by the researcher.

- The sample group of this research consisted of 80 teachers working in schools affiliated with the Ministry of National Education in the European side of Istanbul. A similar study can be done by selecting different cities and reaching more teachers.
- The research was conducted only with preschool teachers. A study like this can be prepared in which preschool teachers and preschool teacher candidates are also included.
- By keeping the context of research, the same observation technique can be added to the practices of the teachers.
- Permanence can be supported by ensuring that the lessons given to teachers in technology-based in-service trainings are practical.
- The number of studies on technology self-efficacy involving preschool teachers can be increased.
- The research context can be prepared by comparing the preschool teachers working in schools affiliated to the Ministry of National Education and the preschool teachers working in private preschool education institutions.

- The data of this research were collected before the pandemic process experienced with the effect of the Covid-19 process. Therefore, the same research can be done after the pandemic period.
- New research with teacher participation can be conducted on pedagogically based preschool technology applications prepared on technology self-efficacy involving preschool teachers, and the number of such studies can be increased.

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Statements of publication ethics

We hereby declare that the study has not unethical issues and that research and publication ethics have been observed carefully.

Researchers' contribution rate

The study was conducted and reported with equal collaboration of the researchers.

Ethics Committee Approval Information

The study was approved by Istanbul Aydin University Social Sciences Ethics Committee (08.11.2019-2019/18).

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