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Following the Innovations in A Learning Organization Perspective: To Follow, or Not to Follow

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The purpose of this study was to investigate school administrators and teachers' following innovations in pre-school education in terms of the learning organization perspective. We examined their following the innovations in terms of Information and Communication Technology (ICT) Competencies, 21st Century Skills, and Innovative School. A total of 207 participants (School Administrators N =33 & Teachers N = 174) were recruited in this research. The data collections tools were Information and Communication Technology Competency Scale (ICTC), Multidimensional 21st Century Skills Scale, and Innovative School Scale (ISS). Our results have shown that school administrators and teachers have positive attitudes towards following innovations in education. Participants, however, have some concerns over innovative atmosphere and organizational impediments in terms of the innovative school. Further, the results in innovative school showed a statistically significant difference in favor of male participants. The results of the regression analysis have revealed that there is a significant relationship between multidimensional 21st century skills and the innovative school variables at a high level. Although the participants' multidimensional 21st century skills significantly predicted their innovative school scores, we found that the ICT Competence variable alone did not predict or affect it. Limitations and recommendations for future research are provided, as well.

Introduction

Pre-school education is of great importance to all-round development in children. High quality pre-school education especially is linked to better intellectual and social development for children (Sammons, 2010). For the past few decades, research has unearthed the benefits of pre-primary education on children's physical and mental well-beings, cognitive skills and academic achievements (Roebers et al., 2014). Every individual's right to education

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starts from birth. The first educational step where every individual meets with education is pre-school education. Preschool education is a planned process that takes into account the developmental levels of children and offers a rich stimulating environment (Aktan & Akkutay, 2014). “The adolescents of 2030 are now in their early childhood years, still on the threshold of entering primary school. Quality pre-primary education is one of the best investments available for ensuring their future success and that of those who will follow in their footsteps” (United Nations Children’s Fund [UNICEF], 2019, p. 11). Upon examining the issue in terms of Türkiye, preschool education is one of the main priorities in several policy documents including 2023 Education Vision Document. There have been improvements in pre-school education across Türkiye. Progress reports are issued by the European Commission each year. In the latest one called Türkiye 2021 Report, it is noted that the net enrolment rate for pre-school education (aged 5) further increased from 68.3 % to 71.2 % during the 2019-2020 school year (European Commission, 2021, p. 97). According to the data on access to education for the 3-5 age group, which is the pre-school education period, Türkiye is the OECD country with the lowest schooling rate (39%).

Countries across the world, including Türkiye, has been investing the infrastructure to improve pre-school education. However, it is not enough to build school facilities to improve preschool education. It is also essential to improve the administrative and instructional capacities of these institutions. In Türkiye, especially in recent years, more importance has been given to pre-school education and activities have been carried out for its dissemination. However, the majority of the studies conducted are generally quantitative studies such as increasing the number of schools and classrooms and meeting the need for teachers (Sezer, 2017). Studies show that this quantitative development should be supported by qualitative development (Usluel & Mazman, 2010). This requires policy makers, practitioners and researchers to delve into the skills of school administrators and teachers. This is because it has been noted that most 21st-century students are still being taught by teachers who use the 20th-century pedagogical and teaching practices in 19th-century school organisations (Schleicher, 2018). In this sense, it is considered important for institutions providing pre-school education to increase their organizational learning capacities and to follow the innovations in their fields in order to keep up with the development of the age (Başara-Baydilek, 2015). Considering the 21st century information age, individuals who think innovatively are creative, produce technology and have 21st century skills are needed.

In the 21st century, there is a rapid change and transformation in all areas, including our daily life, especially with industry 4.0. Because the technological evolution, which has been going on for years, has caused a paradigm shift with industry 4.0 (Keser & Semerci, 2019). In recent years, some inventions such as artificial intelligence, internet of things, cloud technology, which we did not know before, but whose importance will increase rapidly in the coming years, have occurred. Especially in our age, these sharp changes in technology and industry do not occur independently of education. All educational stages from pre-school to higher education have had their share of this change and transformation, and it is thought that today learning will not be limited to schools and lifelong learning will be the understanding of education of our age (Alda, Boholono & Dayagbil, 2020). According to Fisk (2017), it is predicted that 65% of primary school students will work in jobs that have not yet been invented. According to Drucker (1992), due to the information and technology age we live in, children who will live in the world fifty years later will have difficulty imagining the world their grandfathers lived in. In the report prepared by the OECD (2018), it is predicted that children who are currently students will become adults in 2030 and new professions will be invented in which some professions will disappear.

Instead of individuals who protect traditions and values in the 21st century, it is aimed to raise individuals with high-level skills who can produce and transfer information, use digital technologies effectively, and think innovatively (Uçak& Erdem, 2020; Wright & Lee, 2014; World Economic Forum, 2016). Today, with the rapid introduction of technological innovations into both our social and educational lives, the concept of innovation in preschool education increases its importance (Gök, Turan & Oyman, 2011). Considering the studies and predictions, it seems inevitable to take into account the realities of our age such as technology, innovation, information and communication technologies and innovation in preschool education (Alda, Boholano & Dayagbil, 2020; Cvetkovic, Tomic, &Vukic, 2018; Hussin, 2018; Öztemel, 2018; Thorsteinsson& Page, 2012).

Effective and efficient use of information and communication technologies (ICT) in education is at the forefront of innovation in education (Ratheeswari, 2018). Information and communication technologies are (ICTs) defined as tools and equipment that are effective in collecting, processing and transmitting information. With the widespread use of ICTs in every field, it has become easier to access information. Tools such as the internet, software, online tools and computers used in educational environments are among the most effective ICTs (Bağcı, Üngören, Horzum & Ünsal, 2020). In order for these technologies to be useful, it is important for people to use ICTs efficiently.

In a comparison of society, industry and education in terms of organisations in education across the 19th, 20th and 21st centuries, there is evidence to suggest that there were changes in compulsory education in 19th century, while the main focus was universal public schooling in the 20th century. In the 21st century, however, we are talking about emerging networks and partnerships of schools as well as collaboration among schools (Organisation for Economic Co-operation and Development [OECD], 2018). With the rapid development of ICTs, the concept of "digital natives" has emerged in the literature (Prensky, 2009). The concept of digital natives refers to individuals who start their lives with today's technologies and have these technologies at the center of their lives (Öner, 2020). Based on the definitions, preschool students are included in the digital native classification. Educational environments should be enriched in terms of ICT for these individuals who opened their eyes to the digital world, and it is important for teachers to be competent in these areas (Hew & Leong, 2011).

Teachers are expected to follow innovations, increase their level of knowledge, train students who compete with the world, and use technological innovations in education effectively and efficiently in order to provide education in accordance with the requirements of the age (OECD, 2018). In this chaotic information age, the concepts of cooperative learning, collective learning and learning as an organization are needed rather than individual learning (Hussin, 2018). So how do organizations learn? With the "System Theory" that emerged in Japan in the early 1950s, it was started to be thought that there were organisms living in their organizations. Peter Senge, one of the MIT professors, introduced the concept of "learning organizations" by adapting "system theory" to the learning process (Bayraktaroğlu & Özen Kutaniş, 2002).

When the above-mentioned innovation, technological revolutions, ICTs, and the concept of innovation are evaluated in terms of their relationship with education and school, it is thought that individual learning will not be sufficient (Hussin, 2018). It seems important that individual learning is accompanied by the concepts of collective learning, learning together and learning as a team (Öztemel, 2018). It is stated that the disciplines of personal mastery and team learning, which are the basic principles of learning organizations, are valuable in

terms of following and using innovations in schools (Cvetkovic, Tomic, &Vukic, 2018). Considering today's information and technology age, it is emphasized that the members of an organization or institution can learn with each other and increase their information capacity, with the concept of learning organization, which will be more productive (Thorsteinsson, 2012).

The Importance of the Study

Previous literature has revealed that there have been studies on prepre-school teachers' thoughts about computer-assisted instruction (Bayhan, Olgun, & Yelland, 2002), pre-school teachers' metacognitive awareness (Bulut, 2018), life skills of pre-service pre-school teachers (Kasapoglu & Didin, 2019), internet self-efficacy of pre-school teachers (Liang & Tsai, 2008), application of ICT in pre-school education (Pohradský, Londák, & Čačikova, 2010), pre-school teachers' attitudes to inclusion and their self-efficacy (Sari, Celikoz, & Seçer, 2009), ICT in pre-school settings (Stephen & Plowman, 2003). Given all issues mentioned above, we can note that school administrators and teachers must develop their ICT competencies to be able to respond the demands of the 21st century. In this sense, focusing on school administrators and teachers' ICT competencies, 21st century skills, and innovative school perceptions will contribute to the literature by providing evidence so that some interventions can be made by policy makers or practitioners. Upon examination of previous literature, we can found no studies on ICT competencies, 21st century skills, and innovative school perceptions. Accordingly, this study is expected to contribute to literature by filling this gap.

The Purpose of the Study

The purpose of this study was to investigate school administrators and teachers' following innovations in pre-school education in terms of the learning organization perspective. We examined their following the innovations in terms of ICT Competencies, 21st Century Skills, and Innovative School. The research questions below guided this present study.

(1) At what level are the mean scores of the participants' responses to ICT Competencies, Multidimensional 21st Century Skills and Innovative School measured?
(2) Is there a statistically significant difference in the participants' ICT Competencies, Multidimensional 21st Century Skills and Innovative School mean scores in terms of gender variable?
(3) Is there a statistically significant difference in the participants' ICT Competencies, Multidimensional 21st Century Skills and Innovative School mean scores?
(4) Does the innovative school variable predict ICT Competency and Multidimensional 21st Century Skills variables?

Conceptual Framework

Information and Communication Technology Competencies

When we talk about ICT, we talk about all forms of technologies employed to create, store, share or transmit, and exchange information (Owusu-Ansah, & van der Walt, 2021). One of the fundamental things for teachers is competency in ICT use. ICT is conceptualized as "...an umbrella term that includes any communication device or application encompassing: radio, television, cellular phones, computer, and network hardware and software, satellite

system, and so on; as well as the various services and applications associated with them, such as videoconferencing and distance learning" (Kondra, 2020). ICT can be seen as a mediator for changes in educational practices (Santos, 2022). ICT usage skills are seen as teaching skills in a sense today (Voogt & Roblin, 2012).

21st Century Skills

The 21st century skills are the skills set including life skills, non-cognitive skills, workforce skill, as well as interpersonal skill (Liesa-Orús, Latorre-Cosculluela, Vázquez-Toledo, & Sierra-Sánchez, 2020).These 21st Century Skills encompass creativity and innovation skills within a comprehensive skills framework (Piirto, 2011).Any skills that are fundamental to navigating the 21st century can be considered as 21st century skills. For instance, the need to access and process information in the work environments refers to analysing the credibility and utility of information, assessing its appropriateness and intelligently applying it (Griffin, Care, & McGraw, 2012).On the other hand, 21st century skills fall into four subtitles with ten skills as follows: Ways of Thinking (Creativity and innovation; Critical thinking, problem solving, decision making; Learning to learn, Metacognition), Ways of Working (Communication; Collaboration (teamwork); Tools for Working (Information literacy; ICT literacy), and Living in the World (Citizenship – local and global; Life and career; Personal and social responsibility – including cultural awareness and competence) (Binkley, Erstad, Herman, Raizen, Ripley, Miller-Ricci, & Rumble, 2012, p. 18)

Innovative School

In order for a school organization to innovate and therefore to be innovative, it must be creative, produce original ideas and successfully apply these creative ideas (Aslan & Kesik, 2016). Innovative schools are organizations that do not remain indifferent to the changes in their environment or that concern or affect them, and that innovate together with their environment (Bodur, 2019). Innovative schools are defined by the OECD (2013) as the application of a new method. Innovation in the school is the making of changes and developments such as input, output, service, process, technique, and their inclusion and interaction of innovation processes in all areas. Innovations made in educational organizations are made in order to increase satisfaction, organize the conduct of work, and improve learning. Organizing information in order to be accessible, creating a database of best courses, practices and information are examples of innovations and changes in schools. In addition, innovations are aimed at ensuring decision-making and distribution of responsibilities (Bodur, 2019). In innovative learning environments, a term used by OECD to refer to innovative schools, educators makes learning central, encourage participation, and be where learners come to understand themselves as learners (OECD, 2013).The concept was developed by OECD (2017) as “the Innovative Learning Environments (ILE) framework (ILE “7+3” framework)”, based on the 7 Learning Principles with 3 fundamental areas of innovation: the pedagogical core, learning leadership and partnerships. The 7 Learning Principles by OECD (2017) describe an ideal learning environment that places learners at its center, fostering their active engagement and self-awareness. It emphasizes the social nature of learning through cooperative efforts and is attuned to learners' motivations and emotions. Recognizing individual differences and prior knowledge, it offers challenging yet manageable workloads, clear expectations, and consistent assessments with formative feedback. Additionally, it promotes interconnectedness across various knowledge areas and the broader community.

Learning Organizations and schools within the scope of learning organizations

Learning organizations are the ones in which all organizational members increase their capacities to achieve the desired successful results, new and broad mental models are developed, a common vision is formed, and joint learning is created (Senge, 1990). It is a term that Peter Senge, a professor at the Massachusetts Institute of Technology (MIT), first used and brought to the literature in his/her book "The Fifth Discipline" in 1990. Senge defines learning organizations in his book as "organizations where people constantly have the opportunity to develop themselves to achieve the results they want to achieve, supported by new and human-developing education and thinking methods, and trying to implement learning strategies together" (Senge, 1990). According to Yazıcı (2001), learning organizations are constantly encouraging and nurturing development of employees, they are the ones that see learning as an investment to increase capacity of an enterprise and enable development. According to Öztemel (2018), on the other hand, it is a whole of a structure, rules and processes formed by people who come together to realize a common purpose of an organization.

Senge considered learning organizations as five basic disciplines. These disciplines are personal mastery, mental models, shared vision, team learning and systems thinking discipline that includes all these disciplines (Senge, 1990). Personal mastery (competence) is a discipline in which the individual is open to learning, constantly improving him/herself, deepening his/her horizons and seeing reality objectively. It is a discipline of mental models, stereotypes, and generalizations. Shared vision is the ability of employees to come together within the framework of the same vision (Yazıcı, 2001). Team learning is the capacity to engage in the act of "thinking together" (Çalık, 2003). Systems thinking, on the other hand, is the combination of these four disciplines in a single pot. It is the unifying factor that fuses other disciplines with each other and turns it into a consistent theory (Yazıcı, 2001).

School administrators are required to be leaders for all teachers in personal learning, determining goals of school jointly, including them in decision-making processes and representing the vision of the institution (Çakır & Yükseltürk, 2010). If teachers do not have as high a perception of being a learning organization as the administrators, thismay be commented that there may be a lack of leadership. This is because all stakeholders must act jointly and find an opportunity to increase their knowledge in order for a school to be a learning organization (Ünal, 2016). Also, importance of the concept of synergy emerges from the basic principles of learning organizations. In organizations where only managers have a say and do not have a synergetic working environment, desired levels of success may not be achieved. It is thought that joint action of all organizational stakeholders, their openness to innovations, their leadership qualities and openness to innovations will increase the success of the organization.

Schools need to learn regularly from the world around them. In order to prepare students for the future, they need to keep up with changes. The concept of learning organizations has been successfully applied to the world of business and industry. Debates still continue regarding its implementation in schools. Because researchers have not been able to find a common typology. In addition, although the concept of learning organization is generally viewed from the perspective of producing positive results for organizations, some researchers think differently (Gandolfi, 2006).

Despite being on the agenda for the last 25 years, it seems that not much progress has been made regarding schools becoming learning organizations. Since there are not many empirical studies (Senge et., al, 2012), it is not clear whether schools are learning organizations. Many authors such as Senge (1990), McGill Slocum and Lei (1992) and Garvin (1993) assume that the most important concept of the learning organization is organizational culture.

Watkins and Marsick (1996) revealed that schools have seven important dimensions regarding being a learning organization. These include; Continuous learning, inquiry and dialogue, team learning, embedded system, empowerment, system connection, strategic leadership. All stakeholders of the school (administrators, teachers, parents, students, local communities, etc.) should adopt and focus on these seven dimensions. For schools to become learning organizations, a vision centered on students must be put forward (Paraschi, Draghici, & Mihaila, 2019). Schools should provide continuous learning opportunities, encourage collaboration with all stakeholders, foster a culture of questioning, and have an educational leader to effectively manage the process, ensuring that all students can learn.

Cognitive abilities like literacy are crucial, but 21st-century students also need creative, critical, and problem-solving skills (Kolls, Stoll, Gerorge, & Sterjin, 2020; Kolls & Stoll, 2016). The traditional approaches with a single teacher in the classroom is inadequate to meet the demands of these 21st-century skills (Sawyer, 2008)

Senge et., al (2012) emphasizes that schools should be learning organizations, attributing this to five main reasons: the rapid spread of information, globalization, economic difficulties and social uncertainties, the rapid development of technology, and the quality of education. As information and technology evolve rapidly and globalization brings diverse cultures together, the nature of the workforce changes, presenting new challenges for schools. Senge et., al (2012) suggests that by adopting learning organization disciplines, schools can more effectively implement the educational reforms they seek. Moreover, Silins and Milford (2002) stress that schools must inevitably become learning organizations, highlighting four key elements for this transformation: a collaborative school climate, risk-taking, a common vision, and professional development. Brandt (2003) emphasized that schools are in relationship with the changing economic, social and political issues around them and therefore schools should be learning organizations.

The concept of learning organizations has been on the agenda of not only educators and academics but also policy makers in recent years. For example, Singapore published the "Vision Thinking Schools Learning Nation" program in 1997 (Kolls and Stoll, 2016). Deputy Prime Minister of Singapore, Lee, stated, "Our schools should become learning organizations, not teaching organizations." In a school that is a learning organization, teachers also follow other good practices and can adapt to innovations. Singapore's aim in implementing this program is to support lifelong learning. They want to create a workforce suitable for today's economic conditions by raising questioning and thinking individuals (Ünsal and Koyuncu, 2023). However, in order for the school to become a learning organization, it needs a national mentality and social support (Kools and Stoll, 2017). The most comprehensive study on the school as a learning organization approach was conducted by the OECD in Wales, spanning from 2011 to 2021 (Ünsal and Koyuncu, 2023). This 10-year education reform aimed at implementing a new curriculum, improving school quality, and achieving large-scale reform (OECD, 2014). A "professional learning passport" has been developed for teachers to improve their professional standards (Kools and Stools, 2016). Additionally, the "National Educational Leadership Academy" was established for administrators (OECD, 2014). In

conclusion, the concept of schools as learning organizations has received significant attention globally. Efforts made in many developed and developing countries have highlighted the importance of being a learning organization in creating adaptive and forward-thinking educational systems that meet the demands of today's economy, through lifelong learning and innovative practices

Method

Research Design

This research was designed as a correlational survey model from quantitative research models as we examine the relations among ICT Competencies, 21st Century Skills, and Innovative School in terms of the learning organization perspective. The correlational survey model is the one in which researchers determine the change occurring simultaneously or the degree of the change between two or more variables (Bahtiyar & Can, 2016). Through this model, we aimed at to see if there is a joint change between variables and if so, to determine the degree of so-called change

Population and Sampling

We employed simple random sampling method while recruiting school administrators and teachers working at pre-schools affiliated to Ministry of National Education (MoNE). A total of 708 teachers and school administrators (N=663 female; N=45 male) were listed in Tokat province, Türkiye which is the research area. We listed 662 teachers and 46 school administrators across the research area. We sent the data collection instruments to all participants in the population via digital platforms including social media platforms, email accounts and a total of 207 respondents were replied. Table 1 displays the demographic information pertaining to the respondents.

Table 1. Characteristics

		N	**%**
Gender	Female	169	81,6
	Male	38	18,4
	Total	207	100
Work Experience	1-5 years	40	19,3
	6-10 years	63	30,4
	11-15 years	71	34,3
	16-20 years	17	8,2
	20 years and above	16	7,7
	Total	207	100
Position	School Administrator	33	15,9
	Teacher	174	84,1
	Total	207	100

Data Collection Tools

Information and Communication Technology Competency Scale (ICTC). Originally developed by Tondeur et al. (2015) to measure preservice teachers' ICT competencies in education. ICTC was adapted to Turkish by Gökçearslan, Karademir Coşkun, and Şahin (2019).Having a two-factor structure which was labelled as "Competencies to support pupils for ICT-use in class" (ICT competence Pupil Use: ICTC-PU" and "Competencies to use ICT for Instructional Design" (ICT competence Instructional Design: ICTC-ID)", ICTC includes

16 items towards determining teachers' perceptions on the use of ICT in education, and is a Likert-type which offers a range of answer options from "1-Certainly Disagree" to "5-Certainly Agree". Cronbach alpha coefficient for each factor and concluded that it was 0.919 for the ICTC-ID and 0.884 for the ICTC-SP. Based on this, it is seen that there is a high-level internal consistency of the scale (Gökçearslan, Karademir Coşkun, and Şahin, 2019).

Multidimensional 21st Century Skills Scale. It was developed by Cevik and Sentürk (2019), Multidimensional 21st Century Skills Scale includes 35 items in five factors which were labelled as Knowledge and Technology Literacy Skills (15 items), Critical Thinking and Problem-Solving Skills (10 items), Entrepreneurship and Innovation Skills (4 items), Social Responsibility and Leadership Skills (6 items) and Career Consciousness (6 items). It is a Likert-type which offers a range of answer as follows: "Strongly disagree (1), Disagree (2), Neither agree nor disagree (3), Agree (4) and Strongly agree (5)." According to the opinions of the field experts in this present study, the career consciousness subdimension wasn't used. The researchers who developed the scale performed confirmatory factor analysis (CFA) to verify the scale items and the five-factor structure of the scale was confirmed. The Cronbach's Alpha value of the scale is 0.86 and the value of each sub-factor is over 0.70.

Innovative School Scale (ISS). ISS was developed by Aslan and Kesik (2016), Innovative School Scale (ISS) includes 19 items in five factors which were labelled as Administrative Support (7 items), Innovative Atmosphere (6 items) and Organizational Impediments (6 items). It is a Likert-type which offers a range of answer a range of answer options from "1-Always" to "5-Never". The Cronbach's Alpha value of the scale is 0.85 and it was concluded that ISS is a reliable instrument. The cumulative *variability explained* by three factors was 62.70%.

Data Analysis

Before deciding which statistical analyses should be done, we tested the normality distribution of the data set and concluded that the skewness coefficients of the data sets were between -1 and +1. George and Mallery (2014) notes that a skewness value between -1 and +1 is regarded excellent for most psychometric purposes. We used parametric tests in the study because the data sets had a normal distribution. In the research, independent sample t-test (independent sample t-test) for gender, position and professional development variable, one-way analysis of variance (ANOVA) for internet use time and work experience variable, Pearson correlation analysis to find the relationship between variables. Further, we used "Linear regression analysis" to find out to what extent the variables predicted each other.

Findings

Research Question 1

Table 2. The mean scores of participants' responses to the scales

	N	$\bar{X}$	SS
ICT Competencies (Total)	207	3,765	,762
ICT competencies to support pupils for ICT use	207	3,744	,771
ICT competencies for instructional design	207	3,786	,812
Multidimensional 21st Century Skills (Total)	207	3,740	,455
Knowledge and technology literacy skills	207	4,259	,665
Critical thinking and problem-solving skills	207	2,928	,299
Entrepreneurship and innovation skills	207	3,908	,720
Social responsibility and leadership skills	207	3,865	,661
Innovative School (Total)	207	3,028	,696
Administrative Support	207	2,978	1,274
Innovative Atmosphere	207	2,992	1,185
Organizational İmpediments	207	3,113	1,092

When the mean scores of the scales are examined in Table 2, it is seen that the mean of the answers given to the "ICT Competencies Scale "were close to the "Agree" answer in the 5-point Likert type scale($\bar{X}$=3,765). Averages close to each other were determined in the sub-factors of the scale. There were close mean scores in the subdimensions of the scale. Accordingly, it can be noted that the participants'' ICT Competencies were at a medium level. When the "Multidimensional 21st Century Skills" scale was examined, it is seen that the mean of the answers given to the " Multidimensional 21st Century Skills" were close to the "Agree" answer in the 5-point Likert type scale ($\bar{X}$=3,740). When the sub-dimensions of the scale are examined, it is seen that the lowest mean score was found in the "Critical thinking and problem-solving skills" subdimension ($\bar{X}$=2.928), whereas the highest mean score was measured in the "Knowledge and technology literacy skills" subdimension ($\bar{X}$=4.259). Further, when the mean scores of the "Innovative School" scale are examined, it is seen that the mean of the answers given to the "Innovative School" were close to the "undecided" answer in the 5-point Likert type scale ($\bar{X}$=3.028). It was determined that the sub-factors of the scale were close to each other. There were close mean scores in the subdimensions of the scale.

Research Question 2

4.2.1. Gender Variable

Table3. The mean scores of participants' responses to the ICT Competencies, Multidimensional 21st Century Skills and Innovative School scales in terms of gender

Variables	Gender	N	$\bar{X}$	SS	Sd	t	P
ICT Competency Scale (Total)	Female	169	3,731	,771	205	-1,737	,084
	Male	38	3,958	,699			
ICT competencies to support pupils for ICT use	Female	169	3,697	,783	205	-1,836	,068
	Male	38	3,950	,684			
ICT competencies for instructional design	Female	169	3,745	,817	205	-1,517	,131
	Male	38	3,966	,776			

Multidimensional 21st Century Skills Scale (Total)	Female	169	3,726	,466	205	-,977	,330
	Male	38	3,805	,400			
Knowledge and Technology Literacy Skills	Female	169	4,252	,684	205	,324	,747
	Male	38	4,291	,584			
Critical Thinking and Problem-Solving Skills	Female	169	2,920	,296	205	,831	,407
	Male	38	2,964	,317			
Entrepreneurship and Innovation Skills	Female	169	3,894	,739	205	,614	,540
	Male	38	3,973	,635			
Social Responsibility and Leadership Skills	Female	169	3,837	,679	205	-1,317	,189
	Male	38	3,993	,564			
Innovative School Scale (Total)	Female	169	2,951	,691	205	-3,442	,010*
	Male	38	3,370	,618			
Administrative Support	Female	169	2,875	1,178	205	-3,044	,030*
	Male	38	3,511	1,088			
Innovative Atmosphere	Female	169	2,857	1,268	205	-2,939	,040*
	Male	38	3,510	1,170			
Organizational Impediments	Female	169	3,120	1,109	205	,188	,851
	Male	38	3,083	1,025			

When the mean scores of the participants' "Information and Communication Technologies Competencies", "Multidimensional 21st Century Skills" and "Innovative School Scale" competencies are examined in terms of gender, it is seen that the mean scores of male participants is higher than female participants. The independent sample t-test results indicated that the mean scores of male participants in ICT Competency Scale and Multidimensional 21st Century Skills Scale were at high level, but showed no statistically significant difference. In the innovative school scale, there was a statistically significant difference in favor of male participants. (ICT Competency Scale, t(205)=-1.737; Multidimensional 21st Century Skills Scale p>0.05, t(205)= -.977; p>0.05, Innovative School Scale t(205)= -3.442; p>0.05). When the "Innovative School Scale" subdimensions are examined, it is seen that the male participants' mean scores of the "Innovative Atmosphere" and "Administrative Support" are higher than the female participants. The independent sample t-test results indicated that a statistically significant difference in favor of male participants ((t(205)=-2.939 for Innovative Atmosphere; p<0.05, t(205)= -3.044 for Administrative Supportt; p<0.05).

4.2.2. Position Variable

Table 4. The mean scores of participants' responses to the ICT Competencies, Multidimensional 21st Century Skills and Innovative School scales in terms of position

Variables	Position	N	$\bar{X}$	SS	Sd	t	P
ICT Competency Scale (Total)	School Administrator	33	4,162	,578	205	3,349	,010*
	Teacher	174	3,689	,771			
ICT competencies to support pupils for ICT use	School Administrator	33	4,178	,545	205	3,633	,000*
	Teacher	174	3,661	,781			
ICT competencies for instructional design	School Administrator	33	4,147	,682	205	2,831	,005*
	Teacher	174	3,717	,818			
Multidimensional 21st Century Skills Scale	School Administrator	33	3,877	,424	205	1,898	,059

(Total)	Teacher	174	3,714	,457			
Knowledge and Technology Literacy Skills	School Administrator	33	4,371	,579	205	1,056	,292
	Teacher	174	4,238	,680			
Critical Thinking and Problem-Solving Skills	School Administrator	33	2,904	,279	205	-,507	,613
	Teacher	174	2,933	,304			
Entrepreneurship and Innovation Skills	School Administrator	33	4,075	,724	205	1,456	,147
	Teacher	174	3,877	,718			
Social Responsibility and Leadership Skills	School Administrator	33	4,159	,579	205	2,824	,005*
	Teacher	174	3,810	,660			
Innovative School Scale (Total)	School Administrator	33	3,164	,809	205	1,228	,221
	Teacher	174	3,002	,672			
Administrative Support	School Administrator	33	3,424	1,468	205	2,212	,028
	Teacher	174	2,893	1,221			
Innovative Atmosphere	School Administrator	33	3,190	1,307	205	1,047	,296
	Teacher	174	2,954	1,161			
Organizational Impediments	School Administrator	33	2,878	,942	205	-1,349	1,79
	Teacher	174	3,158	1,115			

When the mean scores of the participants' "Information and Communication Technologies Competencies", "Multidimensional 21st Century Skills" and "Innovative School Scale" competencies are examined in terms of position, it is seen that the mean scores of school administrators are higher than those of teachers. The independent sample t-test results indicated that in the "ICT Competencies" scale, there is a statistically significant difference in favor of the school administrator participants ($t(205)= 3.349$; $p<0.05$). There was no significant difference in "Multidimensional 21st Century Skills" and "Innovative School Scale"(Multidimensional 21st Century Skills ($t(205)=1.898$, $p>0.05$;Innovative School Scale, $t(205)= 1.228$; $p >0.05$). When the subdimensions are examined in terms of position variable, the mean scores of the administrator participants in the subdimension of “ICT competencies to support pupils for ICT use”, ICT competencies for instructional design”, “Social Responsibility and Leadership Skills” and “Innovative Atmosphere” are higher than the mean scores of those of teachers. The independent sample t-test results indicated a statistically significant difference in favor of the administrators (ICT competencies to support pupils for ICT use, $t(205)= 3.633$ for ICT-OT, $p<0.05$; ICT competencies for instructional design, $t(205)= 2.831$ for ICT-TOY; $p<0.05$;Social Responsibility and Leadership Skills, $t(205)= 2.824$, $p<0.05$; Innovative Atmosphere $t(205)= 2.212$; $p<0.05$ for Innovative Atmosphere).

4.2.3. Professional Development Variable

Table 5. The mean scores of participants' responses to the ICT Competencies, Multidimensional 21st Century Skills and Innovative School scales in terms of professional development

Variables	Professional Development	N	$\bar{X}$	SS	Sd	T	P
ICT Competency Scale (Total)	Yes	183	3,815	,766	205	2,673	,008*
	No	24	3,379	,621			
ICT competencies to support pupils for ICT use	Yes	183	3,796	,770	205	2,754	,006*
	No	24	3,342	,659			
ICT competencies for instructional design	Yes	183	3,834	,821	205	2,395	,018
	No	24	3,416	,645			
Multidimensional 21st Century Skills Scale (Total)	Yes	183	3,752	,466	205	1,036	,302
	No	24	3,650	,353			
Knowledge and Technology Literacy Skills	Yes	183	4,291	,678	205	1,936	,054
	No	24	4,013	,508			
Critical Thinking and Problem Solving Skills	Yes	183	2,928	,288	205	-,383	,969
	No	24	2,930	,383			
Entrepreneurship and Innovation Skills	Yes	183	3,921	,744	205	,694	,488
	No	24	3,812	,505			
Social Responsibility and Leadership Skills	Yes	183	3,868	,686	40,512	,248	,862
	No	24	3,843	,428			
Innovative School Scale (Total)	Yes	183	3,029	,710	205	,064	,949
	No	24	3,019	,591			
Administrative Support	Yes	183	2,992	1,290	205	,449	,654
	No	24	2,868	1,168			
Innovative Atmosphere	Yes	183	3,010	1,210	205	,593	,554
	No	24	2,857	,987			
Organizational Impediments	Yes	183	3,084	1,068	205	-1,049	,296
	No	24	3,333	1,262			

As shown in Table 5, when examining the mean scores of the participants' "ICT Competencies", "Multidimensional 21st Century Skills" and "Innovative School Scale" in terms of professional development (symposium, congress, workshop, in-service training, etc.), it is seen that there is a difference in professional development activities. Accordingly, we found that the mean scores of the participants who have involved in professional development activities are higher than those who have not. The independent sample t-test analysis results indicated a statistically significant difference in favor of the participants participating in professional development activities according to the "ICT Competencies" scale ($t(205)= 2.673$; $p<0.05$). There was no statistically significant difference according to the mean scores of "Multidimensional 21st Century Skills" and "Innovative School Scale" ($t(205)=1.036$; $p<0.05$, $t(205)= .064$; $p<0.05$). The results of the independent sample t test analysis indicated a statistically significant difference in favor of the participants who answered yes according to the sub-factors of " ICT competencies to support pupils for ICT use" and " ICT competencies for instructional design " ($t(205)= 2.754$; $p<0.05$, $t(205)= 2,395$; $p<0.05$).

4.2.4. Internet Use Time Variable

Table 6. The mean scores of participants' responses to the ICT Competencies, Multidimensional 21st Century Skills and Innovative School scales in terms of time spent on the internet

Variables	Internet Use Hours	N	$\bar{X}$	SS	F	p	Statistical Difference
ICT Competency Scale (Total)	less than 1	22	3,499	,508	1,172	,321	
	between 1-3	129	3,783	,694			
	between 4-6	42	3,864	,797,			
	more than 6	14	3,716	1,373			
Multidimensional 21st Century Skills Scale (Total)	less than 1	22	3,669	,281	1,657	,177	
	between 1-3	129	3,756	,431			
	between 4-6	42	3,804	,423			
	more than 6	14	3,515	,821			
Innovative School Scale (Total)	less than 1	22	3,047	,548	,382	,766	
	between 1-3	129	3,029	,684			
	between 4-6	42	3,074	,732			
	more than 6	14	2,846	,925			

As shown in Table 6, the mean scores of the participants who spend time between 4-6 hours were at a high level. The one-way analysis of variance (ANOVA) test results showed no statistically significant difference between groups (p>0,05).

4.2.5. Work Experience Variable

Table 7. The mean scores of participants' responses to the ICT Competencies, Multidimensional 21st Century Skills and Innovative School scales in terms of work experience

Variables	Work Experience	N	$\bar{X}$	SS	F	P	Statistical Difference
ICT Competency Scale (Total)	1-5 years	40	3,619	,851	1,076	,369	
	6-10 years	63	3,804	,864			
	11-15 years	70	3,724	,614			
	16-20 years	18	3,850	,784			
	21 years and above	16	4,051	,638			
Multidimensional 21st Century Skills Scale (Total)	1-5 years	40	3,522	,567	3,944	,004	between 1-5 years and 6-10 years in favor of 6-10 years
	6-10 years	63	3,868	,351			
	11-15 years	70	3,722	,423			
	16-20 years	18	3,774	,518			
	21 years and above	16	3,821	,403			
Innovative School Scale (Total)	1-5 years	40	2,834	,652	3,294	,012	
	6-10 years	63	3,224	,687			
	11-15 years	70	2,950	,686			
	16-20 years	18	2,837	,727			
	21 years and above	16	3,292	,655			

As shown in Table 7, the mean scores of the participants with 6-10 years work experience were at high level. When the one-way analysis of variance (ANOVA) test results were examined, we found no statistically significant difference in the "ICT Competencies Scale" and "Innovative School Scale" (p>0.05). However, the mean scoresof the "Multidimensional 21st Century Skills" variable differed significantly (F(4, 202)=3.944, p<0.05). Tukey test, one

of the Post Hoc tests, was used to determine the source of the difference. We concluded that the direction of the difference was (20-25 years) – (31-35 years old) and in favor of 31-35 years.

Research Question 3

Table 8. The correlations of participants' responses to the ICT Competencies, Multidimensional 21st Century Skills and Innovative School scales

Variables		ICT Competency Scale (Total)	Multidimensional 21st Century Skills Scale (Total)	Innovative School Scale (Total)
ICT Competency Scale (Total)	R	1	,585**	,148*
	P		,000	,034
	N	207	207	207
Multidimensional 21st Century Skills Scale (Total)	R	,585**		,285**
	p	,000	1	,000
	N	207	207	207
Innovative School Scale (Total)	R	,148*	,285**	1
	p	,034	,000	
	N	207	207	207

*p<0,05, **p<0,01

In order to investigate the correlations between ICT Competency Scale, Multidimensional 21st Century Skills Scale and Innovative School Scale, *we performed the Pearson correlation* analysis. Accordingly, we found a positive, strong, statistically significant relationship between the mean scores of the "ICT Competence Scale" and the "Multidimensional 21st Century Skills Scale" (r = ,585; p<0.01). In addition, the results indicated a positive, statistically significant correlation between "ICT Competency Scale" and "Innovative School Scale" (r = ,148; p<0.05). When the relationship between the "Multidimensional 21st Century Skills Scale" and the "Innovative School Scale" is examined, it is seen that there was a positive, strong, statistically significant relationship (r = .285; p<0.01).

Research Question 4

Table 9. Prediction levels of innovative school variable of ICT competence and Multidimensional 21st century skills variables

Variable	B	SE	Beta	t	p	Paired r-	Partial R-
Innovative School Scale	1,401	0,387	-	3,617	,000	-	-
ICT Competency Scale	-0,026	0,076	0,029	-0,347	,729	0,148	-0,024
Multidimensional 21st Century Skills Scale	0,462	0.127	0,301	3,643	,000	0,285	0,247

Innovative School = 1,401+ -0,026 ICT Competency + 0,462 Multidimensional 21st Century Skills = R^2=0,073.

As shown in Table 9, in the regression model, we found that "Innovative School Scale" (the dependent variable) predicted "ICT Competency Scale" and "Multidimensional 21st Century Skills Scale" (the independent variables) (F = 9,058, p < .05) as a whole. When the variables that form regression model are examined, it is seen that the constant term is significant.

Multidimensional 21st Century Skills Scale variable shows a statistically and high significant difference with the innovative school scores of teachers and administrators (R=0.286, R^2=0.073, p<.01). Innovative School Scale, ICT Competency Scale, and Multidimensional 21st Century Skills Scale scores of teachers and school administrators *predicted* 7% of the total variance. Participants' Multidimensional 21st Century Skills Scale scores significantly predicted Innovative School Scores. However, it is seen that the ICT competence variable alone does not predict or affect Innovative School Scores.

Results & Discussion

Results on the first research question

The results obtained from the statistical analyses on ICTC, Multidimensional 21st Century Skills Scale, and ISS have shown that school administrators and teachers have positive attitudes towards following innovations in education. These findings suggest that participants consider themselves competent in ICT and 21st Century Skills, so they are open to innovations in education. However, there is evidence that participants have some concerns over innovative atmosphere and organizational impediments in terms of innovative school. This can be caused by the fact that school organizations in Türkiye may not support innovative perspectives as expected. This finding of us is in line with Bodur (2019) who concluded that innovativeness in schools is not very high. Considering the concerns of the participants, we can infer that there are organizational obstacles and an innovative atmosphere in the schools they work. Considering the learning organization experiences of schools, we can note that the disciplines of "team learning" and "shared vision" are insufficient. Further, an innovative atmosphere is supported in schools with"team learning", one of the elements of learning organizations. In addition, considering the "shared vision", organizational obstacles will decrease if the administrators and teachers collaborate in determining the vision of the school. McChanen, Song and Martens (2011) stated that there is a positive and significant relationship between teachers' creativity and adaptation to innovations in schools with a learning organizational culture. In addition, Bae, Song, and Kim (2012) found that schools as learning organizations increase teachers' collaborative learning and support an innovative atmosphere. Considering the findings from this research question, we can suggest that school administrators and teachers have positive attitudes towards ICT technologies and using ICT in education. Accordingly, they may see ICT fundamental in education. In addition, school administrators and teachers have a positive attitude towards "Multidimensional 21st Century Skills". In terms of the innovative school variable, there are organizational barriers in the case of administrators and teachers following innovations and that the atmosphere in the institution is not innovative.

Results on the second research question

There is evidence to suggest that male participants had higher scores in all scales and their subdimensions than female ones. Although there were no statistically significant differences in terms of ICT competencies and Multidimensional 21st Century Skills, the results in innovative school showed a statistically significant difference in favor of male participants. Further, there were statisticaly significant differences in the sub-dimensions of "administrative support" and "innovative atmosphere" in favor of male participants. These results corroborate those of previous studies. Holyoke, Sturko, Wood, and Wu (2012) found that male academics are more willing than females to create continuous learning opportunities in terms of innovative thinking within learning organizations.Kara (2011)

obtained statistically significant results in favor of boys in primary school teachers' ICT use competency. Similarly, Alp (2007) concluded that primary school teachers' scores on learning organization disciplines were higher in favor of male participants. Sağlam (2007) found that male teachers' self-efficacy in using information technologies in education is higher than female teachers and there is a statistically significant difference in favor of males. However, Bodur (2019) did not find a statistically significant difference between male and female teachers from different branches in terms of innovative school. There are other studies in the literature that do not find a significant gender difference in this way (i.e. Bilir & Arslan, 2016; Şad & Nalçacı, 2015). When the findings of this study and the findings of the studies in the literature are evaluated together, it can be seen that male participants are more interested in technology because of the fact that male participants have higher scores in terms of gender in the variables of ICT Competencies and 21st Century Skills. Considering today's conditions and the rapid progress of technology, it is important for the quality of education that both male and female participants follow technology and innovations more closely and increase their experience in these fields. The male participants also had higher scores in Innovative School scale. This may have derived from the fact that there has been male dominance in organizations and gender inequality still exists. It can be noted that women's positions or the glass ceiling for women in working life has a negative effect in terms of innovative thinking. The reason why technology proficiency between men and women is better in favor of men may be one of the results of the inequality between men and women in access to technology in Türkiye. In addition, female teachers are more conservative in terms of innovation in schools and women are raised with more traditional methods in society.

The results of this research show that school administrators achieve higher scores in ICTC, Multidimensional 21st Century Skills Scale, and ISS when compared to teachers. According to VanNiekerk (2009), considering the rapid changes in technology, principals should be creative and innovative in the effective use of technology and information and ICT in education. In addition, Mestery (2017) emphasizes that school principals should be open to innovations in order to respond to the demands of the 21st century. The literature includes similar results that are in line with this present study (i.e., Güçlü & Türkoğlu, 2003; Güleş & Çağlayandereli, 2012). All these results show that administrators have better perceptions than teachers in terms of perceiving the learning organization, following innovations and caring about ICT compared to teachers.

We found that there was no statistically significant difference in terms of 21st century skills and innovative school variable in terms of professional development (symposium, congress, in-service training, and so on.). Considering the research findings, there is evidence to suggest that the participants who answered “Yes” to professional development in terms of 21st century skills and innovative school variables had higher scores even though there was no statistically significant difference. When the ICT competencies variable and its sub-dimensions were examined, the professional development variable resulted in a statistically significant difference. We concluded that among the administrators, those who answered "I agree with professional development" were more sufficient in terms of ICT competencies compared to those who did not. According to Uysal (2005), teachers who received in-service training had a significant difference in perception of learning organizations compared to teachers who did not. Further, Atalay and Atagün (2014) concluded that classroom teachers working in rural areas consider themselves competent to use ICT and that the reason why rural teachers consider themselves are competent may have derived from the fact that they give importance to professional development and in-service training.

Based on the results from this present study and those from the previous literature (i.e. Hew & Leong, 2011), we can suggest that pre-service education is insufficient considering today's technology development. In addition, according to Cha & Ham (2012), teachers who attach importance to professional development reveal that the learning motivation of their students increases significantly. This is because the knowledge, skills and equipment acquired in higher education become obsolete in a very short time and the rapid dissemination of new knowledge adds importance to professional development (Prensky, 2009). We can suggest that in-service training, professional development and refreshment of knowledge are important. So much so that educators and administrators must be aware of the paradigm shifts in education and science which have had an impact, as has never been seen before.

In this study, no significant difference was found in terms of the time spent by the participants on the Internet. However, in our findings, it is seen that the participants who spend for 4-6 hours on the internet have the highest mean score in all scales. According to this, insufficient internet use and excessive internet use during the day may have had negative effects on the learning of the participants compared to the mean score internet use. Similarly, Şad and Nalçacı (2015) concluded in their research that there is no statistically significant difference between the duration of internet use and ICT competence. However, it is seen that the perception averages of the participants who stayed more than 2 hours in the findings part of the study were high. From this point of view, it can be concluded that our study is parallel to the results of our study.

Sağlam (2007) concluded that teachers who use information technologies more frequently have higher self-efficacy than teachers who use less information technologies. Those who use ICTs every day are significantly different from those who use it less frequently. Demiralay (2008) found a significant relationship with the increase in the frequency of internet use by pre-service teachers in terms of using ICTs and information literacy. In addition, Kara (2011) also found that the ICT use competence of those who stay on the Internet for more than 3-4 hours in a day is significantly higher than those who stay on the Internet for 1-2 hours.

Based on the findings of this study, teachers and administrators have insufficient time to stay on the Internet, but negative situations are also encountered when they spend a long time on the Internet. In this context, it can be thought that spending 6 hours or more on the internet negatively affects learning and makes it difficult for them to use what they have learned in education.

According to Nevgi, Virtenam, and Neimi (2006), sufficient use of technology in education positively supports collaborative and collective learning within the organization. Considering today's technology age, it can be said that staying on the internet for 1-2 hours or less causes insufficient learning. In-service trainings can be organized for teachers and administrators in order to use the Internet more effectively and efficiently and to integrate it into education. Managers and teachers can be supported by the MoNE regarding safe and conscious internet use.

As a result of the findings, among the groups formed according to the working time of the participants in the profession (1-5 years, 6-10 years, 11-15 years, 16-20 years, more than 20 years) in terms of ICT Competence, 21st Century Skills and Innovative School variables. The mean scores of the participants with a seniority of 6-10 years was high. No significant difference was found in terms of ICT Competence and Innovative School variables. However, in terms of 21st century skills variable, we found that the participants with 6-10 years of work

experience significantly differed from the newcomers. Young teachers have more open attitudes in the disciplines of individual learning and common vision development than former senior teachers. Likewise, Uysal (2005) concluded that new teachers' perceptions of learning organizations are higher than that of senior teachers. Bozan (2020) found a significant difference between 20-25 years and 1-5 years in terms of seniority of administrators and concluded that the level of being a learning school increases with the increase in seniority of school administrators. Similarly, Subas (2010) found that when the learning organization disciplines of teachers with a seniority of 26 years and above are taken into account, a significant result was found in favor of teachers with a seniority of 1-5 years compared to those with 1-5 years of seniority. Kara (2011) concluded that teachers with 6-20 years of work experience have higher ICT Competence compared to teachers with more years of experience. Hursen (2011) reveals that teachers with a seniority of 20 years or more are more inadequate in using technology in education and using ICT more effectively compared to younger teachers.

When the research results in the literature that pertain to the work experience variable are examined, diverse results emerge. Based on these results, it can be thought that the participants who have a certain period of service in their duties, who are experienced and who have gained experience, but who have not worn out in their profession, have higher scores than the others.

In the results of this present study, participants with 5 years or more and 20 years or less work experience have higher scores on ICT Competencies, 21st Century Skills and Innovative School scales compared to other participants. The main reason for this can be shown as the fact that younger school administrators and teachers adapt faster to the technology age we live in. On the other hand, it can be thought that the participants with less than 5 seniority years do not have enough experience in their profession in order to have low perceptions. In cases where the seniority year is 20 or more, it can be assumed that there is a problem of adaptation with the rapidly changing technological innovation.

Results on the third research question

The findings obtained from the analyses have shown that there is a positive statistically significant relationship between ICT Competencies and innovative school as it does between Multidimensional 21st Century Skills and innovative school. Based on these findings, we can note that there is a relationship between 21st Century Skills and ICT Competencies. These results match those observed in earlier studies. For example, Gülen (2013) found a moderately significant and positive relationship between students' levels of supporting 21st century skills and ICT. Ratheeswari (2018) suggest that teachers should use ICT so that they can effectively develop their students'21st century skills. Similarly, Maryuningsih, Hidayat, Riandi, and Rustaman (2019) stated that teachers with good ICT skills can develop students' 21st century skills more easily. One of the issues that emerges from these findings is that, considering the rapid development of technology and the revolutions in education in the 21st century, we can think that learning and using ICTs effectively are used by individuals who are open to innovations as a natural result. Being open to innovations is inevitable in the fast-changing 21st-century world.

Results on the fourth research question

The results of the regression analysis have revealed that there is a significant relationship between multidimensional 21st century skills and the innovative school variables

at a high level. Although the participants' multidimensional 21st century skills significantly predicted their innovative school scores, we found that the ICT Competence variable alone did not predict or affect it. Based on this finding, we can suggest that teachers and school administrators need to master multiple 21st century skills in order to create an innovative school atmosphere. According to Uçak and Erdem (2020),the educational approach of the 21st century suggests innovation and creativity as well as increasing the level of knowledge and revealing the talent of the individual. Wright and Lee (2014) draw attention to the fact that in the 21st century education approach, it is of great importance to raise individuals who can use ICT technologies effectively and who think innovatively. World Economic Forum (2016) considers innovation and adapting to innovations as an important task of the education approach of the 21st century.

Conclusion

Based on the results from this study, there is evidence to suggest that male school administrators and teachers have higher levels of knowledge and skills in ICT and 21st Century Skills and display more positive attitudes towarda innovative school. In this sense, this may have drawn from some cultural issues in Turkish culture in such a way that societal roles assigned to women may hinder their professional development. The position held in the school organization, either school administrator or teacher seems to have an impact on the development of in ICT. This may be partly due to the fact that school administrators use such digital database “e-Okul” designed by MoNE. There is also evidence that those school administrators and teachers who have attended professional development activities have better skills in terms of ICT skills, 21st century skills, and innovatives in education. Then, it would be wrong to say that professional development activities are worth to invest.

Practical and Theoretical Implications

There have been several theoretical and practical implications from this present study. The findings of this study have a number of important theoretical implications for future practice. There may be other related themes that affect the results of this present study and of previous ones in the literature. Accordingly, researchers can delve into the theoretical relationships among concepts that impact the ICT skills, 21st century skills, and innovations in educational organizations. There may be grounded theory studies which can unearth hidden or implied factors affecting the variables addressed in this present study. The findings of this study, on the other hand, have a number of practical implications. First, given that school administration and teaching are professional expertise, they need to be motivated to develop their professional skills through several incentives. Otherwise, individuals may not be always self-motivated to develop their professional knowledge and skills and therefore do not catch up with the latest developments. Considering the context of Turkish Education System (TES), school administrators and teachers work for government and have job guarantee unlike the private sector. Accordingly, some of them may feel that it is not necessary to develop themselves for further improvement. On the other hand, if there are attractive incentives or motivational factors, their attitudes towards ICT skills, 21st century skills, and innovations may change in a positive way. Further, school principalship is not a separate position in TES. Each individual is officially regarded as a teacher in the system. However, there would be different results if school principals were a career pathway.

Limitations and Recommendations for Future Studies

No study was except from research limitations. This present study itself has some methodological limitations in its nature. For example, this study is unable to encompass the entire teacher population in the research area even if it is beyond the scope of this study to examine. However, there would be different and comprehensive results if more participants had been able to recruit from different school types such as primary, secondary, and high school. Then, what is now needed is a study involving a wider population to be able to make comparisons. Another methodological limitation is the research area of this present study. There would be different findings if this study had been conducted in bigger cities. This is because there may be more professional development opportunities for school administrators or teachers to develop themselves. In this sense, it is recommended that further research be undertaken in the bigger cities in Türkiye. This present study has delved into the variables ICT Competencies, 21st Century Skills, and Innovative School in terms of learning organizations. We suggest that the association of these factors with other concepts school leadership style, organization commitment, and school culture is investigated in future studies. This present study is a quantitative in its nature. Further investigation and experimentation via qualitative research models are strongly recommended.

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