The relationship between Turkish high school administrators' technology leadership self-efficacies and their attitudes and competencies towards technology use in education

Niyazi Aktaş

Ministry of National Education, İstanbul, Turkey ORCID: 0000-0002-3080-5091

Feride Karaca [*]

Computer Education and Instructional Technologies Department, Marmara University, İstanbul, Turkey ORCID: 0000-0001-6342-4976

A correlational study was conducted to examine the relationship between high school administrators' technology leadership self-efficacies and their attitudes and competencies towards technology use in education. The participants were 338 school administrators (67 administrators and 271 vice administrators) working in 112 high schools located in the Anatolian side of Istanbul and the data were collected through a questionnaire. According to the findings, the school administrators' technology leadership self-efficacies were all sufficient and they had positive attitudes and sufficient competencies towards using technology. In addition, there were positive relationships between school administrators' technology leadership self-efficacies, their attitudes towards the use of technology and their competencies in using technology in education. Similarly, there was a positive relationship between the attitudes and the competencies of school administrators towards using technology. Conducted with a group of school administrators, accepted as the technology leaders of the school, this study sheds light on the relationship between the necessary school administrator characteristics in technology integration processes. The present study is indeed valuable in exploring the relationship among these three critical factors influencing the school principals' effectiveness in the technology integration process. Examining these important school administrator characteristics, this study will cast light on the ways through which creating a digital school culture by improving their leadership qualifications may become possible.

Introduction

Technology-driven paradigms appear to be at the center of many innovations that have emerged in today's global world. Frequently used in every field of human life, technological innovations are inevitably utilized in educational environments, and today's learning environments have been moved to network environments where computers, internet,

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[*] Correspondency: krcferide@gmail.com

projections, or interactive whiteboards are used extensively (Apsorn et al., 2019; Çakır, 2013; Eren & Kurt, 2011; Gün & Çoban, 2019; Karataş & Sözcü, 2013; Pollock & Hauseman, 2019; Raman et al., 2014; Yahşi, 2020) Though technology is integrated within all the processes of the education today, some obstacles are also encountered in this process (Hacıfazlıoğlu et al., 2011a). Flanagan and Jacobsen (2003) examined the issues that would be a source of these obstacles under four headings: Pedagogical Issues, Equity Concerns, Inadequate Professional Development, and Insufficient Technology Leadership. They pointed to the fact that these problems are exactly rooted in "Insufficient Technology Leadership" as the success of most change efforts in educational institutions highly depends on the management issues of the institutions (Flanagan & Jacobsen, 2003). Thus, the school administrators have to find new ways to implement and maintain technological innovations in the schools. In fact, technology leadership is crucial for effective technology integration in the schools so every school administrator is required to be a technology leader, coordinator, and supporter (Weng & Tang, 2014). Examining school administrators' positions and roles, it is possible to refer to them as "school technology leaders", which being defined as a person who is responsible for managing and directing technology integration processes in their schools (Anderson & Dexter, 2005 ; Çakır, 2013).

So, what do we mean by "technology integration"? Wachira and Keengwe (2011) define technology integration as combining technology and technology-based applications within all aspects of teaching and learning. As can be understood from this definition, the most striking aspect of technology integration is the provision of appropriate technology support at all stages of the teaching and learning processes. As technology leaders, the school administrators are expected to manage this process in the best way possible. One of the biggest steps toward technology integration in education in Turkey was carried out with the Movement of Enhancing Opportunities and Improving Technology project, whose acronym in Turkish is FATİH. With the FATİH project, the expectations from school administrators in the case of technology leadership were both increased and diversified (Karataş & Sözcü, 2013). In this project, broadband internet infrastructure services were provided to the schools with various hardware and software supports (Taşdemir, 2018). This project was firstly implemented in the high schools, the educational institutions which the individuals who have successfully completed a 4-years of secondary school education (Beytekin, 2014). As a matter of fact, in the technology-oriented integration process in educational institutions, ICT technologies have revealed a new paradigm for the ideal of transforming into an information society in the context of making it easier to access, produce and disseminate information. In order to realize the ideal of transformation into an information society, it is considered essential to train individuals with 21st century skills by providing technology integration in education. Although the integration of technology into education is a very important issue in this sense, the key role in ensuring technology integration belongs to technology leaders in schools (Taşdemir, 2018). They are responsible for implementing and maintaining technological innovations and developments in schools in accordance with the needs of the information age. Consequently, technology leadership in schools is very important for the integration of technology in education (Weng & Tang, 2014). In this context, considering the positions, roles, authorities, and responsibilities of school administrators who are in the position of natural leaders of schools, school administrators are defined as "school technology leaders", who are responsible for managing and directing technology integration in schools (Anderson & Dexter, 2005; Çakır, 2013). Furthermore, technology integration in the schools was accelerated with the FATIH project, and new roles were added to the current duties and responsibilities of school administrators within the scope of technology leadership roles. Started in high schools, the FATİH project put the high school administrators in a more

critical position in the process of technology integration. Thus, it became especially important to investigate the school administrators' leadership roles in the high school context.

Expectations for leadership also changed over time in a reflection of the developments in the society and education system throughout the 20th century (Sproule & Mombourquette, 2020). Furthermore, it led to different definitions of leadership throughout the time. While Eraslan (2006) defined traditional leadership as the ability to gather a group of people around some determined goals and to activate them for achieving these goals, he stated that leadership has become much more functional and complex today. Furthermore, Gün and Çoban (2019) defined it as being able to prepare the organization for the future, setting the goal and visions for the forthcoming days of the institution, and convincing and guiding people in line with these goals. In addition to these definitions, previous literature indicates that leadership has a wide variety of application areas and one of them is school leadership. School leadership emerges as a key component in guiding the teaching and learning process in order to provide today's students with the necessary knowledge and skills. Cushman (2016) defined school leadership as a collective activity or a multi-faceted phenomenon shared and distributed within the school community (cited in Sproule & Mombourquette, 2020). The natural leaders of the schools are the school administrators, and their leadership skills have the power to continuously improve the quality of education.

In fact, technology is a key issue in terms of school leadership and it created an inevitable change regarding the roles of school administrators in terms of the areas of infrastructure, resources and materials, member relations, and working styles (Weng & Tang, 2014). These changes have had significant influences on school leadership in a relatively short time (Sterrett & Richardson, 2019) and have revealed the importance of the school administrators' technology leadership roles and these roles have been added to the school administrators' duties and responsibilities (Sheninger, 2019). In this context, strong technology leadership skills are expected from the school administrators, who can develop a shared vision of technology initiatives that have a potential to organize resources, increase academic rigor, maintain professional development, and support learning communities. School administrators are expected to be aware of these new duties and responsibilities and to demonstrate appropriate behaviors, attitudes, and skills in order to meet the 21st century necessities (Anderson & Dexter, 2005; Apsorn et al., 2019; Beytekin, 2014; Çakır, 2013; Eren & Kurt, 2011; Esplin et al., 2018; Görgülü et al., 2013; Hacıfazlıoğlu et al., 2011b; Helvacı, 2008; Sezer & Deryakulu, 2012; Ulukaya et al., 2017).

Accordingly, technology leadership gains more importance every passing day as 21st century school administrators have an important role in ensuring the integration of technologies into teaching and learning pedagogies (Raman et al., 2019). To do this, the school administrators are expected to have the necessary technology leadership skills, to lead the implementation and follow-up of innovations offered by technology, to encourage all the stakeholders to use technology, to meet the needs of the digital age, and to successfully integrate the technology (Benedetto, 2006; Çakır, 2013; Gün & Çoban, 2019; Pollock & Hauseman, 2019; Topçu & Ersoy, 2020; Weng & Tang, 2014). To meet these expectations, it is important to examine and understand three important factors that are likely to have an influence on the school administrators' technology leadership roles: their technology leadership self-efficacies, their attitudes, and their competencies towards the use of technologies.

Before explaining the school administrators' technology leadership self-efficacies, let's look at how the concept of self-efficacy is defined in the literature. According to Bandura (1982),

self-efficacy is someone's own judgment about whether he has the capacity to organize and successfully implement the necessary activities (cited in Kansu & Sayar, 2018). In a more specific way, technology leadership self-efficacy is defined as the self-belief that you have the capacity to make the necessary positive behaviors and efforts for the utilization, dissemination, and creation of technological environments. Having technology leadership self-efficacy is very critical for technology leadership as individuals with high technology leadership self-efficacies are likely to show the necessary effort and determination to continue what needs to be done within the scope of technology leadership from beginning to the end, as they believe in their success. In fact, the school administrators with high technology leadership self-efficacies are more likely to positively affect the school climate and create a culture of technological infrastructure (Çalık et al., 2019; Gün & Çoban, 2019).

One of the important factors affecting the school administrators' technology leadership skills is their attitudes towards the use of technology in education. According to İnceoğlu (2011), attitude is defined as an individual's tendency to react to any phenomenon or object around him or the behavior style that should be shown in the face of a situation, an event, or a fact. Examining the literature, it is seen that the school administrators mostly display positive attitudes toward technology use, and they frequently benefit from information technologies in their daily life and in learning environments (Helvacı, 2008; Karataş & Sözcü, 2013). According to Eren and Kurt (2011), the school administrators benefit from these technologies as they think that the use of educational technologies is likely to improve the quality of education. In this context, it is thought that school administrators with positive attitudes will be more successful in the technology integration process (Helvacı, 2008). Thus, it can be inferred from here that school administrators' attitudes towards technology are also likely to affect their technology leadership skills.

Another important factor affecting the school administrators' technology leadership is the competence in using technology in education. First of all, the school administrators must have the necessary technology related competencies to perform the roles expected from them in the context of technology leadership (Sincar, 2013). School administrators who are proficient in the use of technologies are more likely to create a shared vision for implementing technologies, manage the successful integration of technologies in their schools, and contribute to the development of digital school culture, in which the teachers and students benefit from technologies more effectively (Karaca, Can & Yıldırım, 2013).

According to Çakır (2013), it is possible to define the school administrators as the 21st-century technology leaders of the school in terms of their duties and positions. The necessary knowledge and skills for being a technology leader have been determined by various international organizations. Among these, the most comprehensive and recognized one is the technology standards developed by ISTE (International Society for Technology in Education) and these standards were called as NETS-A "National Educational Technology Standards for Administrators" (ISTE, 2009). They have become a guide to many researchers in different countries and they have been used after the necessary adaptations were made (Raman et al., 2014). First published by ISTE Institute in 2002, the NETS-A standards were updated in 2009 and reviewed under 5 dimensions: (1) Visionary Leadership, (2) Digital Age Learning, (3) Excellence in Professional Practices, (4) Systematic Development, (5) Digital Citizenship (ISTE, 2009). As can be understood from these standards, the school administrators are responsible for starting, managing, and implementing any kinds of change processes in the school setting (Çakır, 2013; Sterrett & Richardson, 2019). Furthermore, the duties and responsibilities of school administrators change dynamically due to the rapid developments in

technologies or the extraordinary conditions such as epidemics, which we face today. As a matter of fact, with the recent COVID-19 pandemic, face-to-face training has interfered around the world, and distance education practices have taken a relative liberator role in this environment. Especially at that time, the school administrators have had to assume various responsibilities in the context of technology leadership and the school administrators who have the necessary leadership skills are likely to become more successful in such extraordinary conditions. (Keleş et al., 2020).

These tasks and responsibilities, which are examined under the concept of school technology leadership, have managed to attract the attention of many researchers. Although it is observed that research on the technology leadership of school administrators has increased in recent years, the current studies in this field are still not sufficient and this deficiency should be addressed with new studies. To answer this need, this study is conducted to reveal the relationship between high school administrators' technology leadership self-efficacies and their attitudes and competencies towards technology use in education. The school administrators in this study refers to both the school principals and assistant principals. This study, which was carried out on the basis of multiple factors (technology leadership self-efficacy, attitude and competence towards technology use), is very valuable in terms of understanding the school administrators' technology leadership roles and characteristics from a larger picture. In addition, these three factors that support the school administrators' technology leadership make this study valuable in terms of predicting the success of technology integration processes in the schools. Though this study is limited to high school administrators, it is seen that the high schools come into prominence considering the use and intensity of technology in educational institutions in Turkey (Karataş & Sözcü, 2013; Taşdemir, 2018). Thus, this study is also valuable in in terms of its context. In addition, the sample of the study consists of school administrators, a group of people that is relatively difficult to reach. When the literature is examined, it is seen that school administrators are one of the sample groups in which very few studies have been done in the field of instructional technologies (Küçük et al., 2013). In this respect, this study also provides valuable information about the school administrators who have a critical importance in the technology integration process in the schools. Furthermore, examining the important school administrator characteristics, this study will shed light on how to create a create a digital school culture by improving their qualifications. Considering all these aspects, it is thought that the study will make rich contributions to the literature and will support the researchers who are planning to work in the field.

Method

Research Design

This study utilized the correlational research method, which "involves collecting data to determine whether, and to what degree, a relationship exists between two or more quantifiable variables" (Gay et al., p.191). Thus, a correlational research method has been used to investigate the relationship between a set of variables involving high school administrators' technology leadership self-efficacy, attitudes, and competencies towards technology use in education. The research questions of the study are given below.

(1) What is the school administrators' level of technology leadership self-efficacy?
(2) How are the school administrators' attitudes towards technology use in education?

(3) What are the school administrators' competencies regarding technology use in education?

(4) Is there a meaningful relationship between the school administrators' technology leadership self-efficacy and their attitudes towards technology use in education?

(5) Is there a meaningful relationship between the school administrators' technology leadership self-efficacy and their competencies about technology use in education?

(6) Is there a meaningful relationship between the school administrators' attitudes and competencies towards technology use in education?

Working Group

The population of this study involved school administrators (principals and assistant principals) in charge of the entire state high schools in the Anatolian side of Istanbul, Turkey. The participant schools were determined using the random cluster sampling method, which involves a random selection of stacks or groups, called clusters, aimed at reaching the full range of selected clusters to form at least 20% of the research population (Fraenkel et al., 2012). In this context, the study sample is composed of 8 districts (Adalar, Kartal, Maltepe, Pendik, Sancaktepe, Sultanbeyli, Şile and Tuzla) out of 14 districts in the Anatolian side of the Istanbul. There were 132 schools in the selected districts and the questionnaires were sent to all the schools in these districts. Among these schools, administrators from 112 schools completed the questionnaire with a return rate of 84.84%. In more detail, the questionnaires were sent to 603 school administrators, and a total of 347 school administrators completed the questionnaire with a return rate of 57.35%. As the school administrators are a relatively difficult group to reach, the return rate was somehow low. Though the initial sample size was 347, nine administrators who have outlier data were discarded from the data set. In summary, the participants of the study involved a total of 338 school administrators from 112 high schools in 8 districts in the Anatolian side of Istanbul.

As shown in Table 1, most of the school administrators participating in the survey (50.30%) were working in Vocational and Technical Anatolian High Schools. The lowest level of participation was from Multi-Program Anatolian High Schools (9.20%). The vast majority of school administrators were composed of assistant administrators (80.20%) and the rest of them were administrators (19,80%). According to their genders, it is understood that the number of male administrators (77.20%) are more than three times the number of female administrators (21,60%). Furthermore, it is noteworthy to state that the administrators are mostly from the age groups of 31-40 (46.70%) and 41-50 (37.60%). A very large part of the administrators is from bachelor's degrees (66.3%). One third of the participants are postgraduate graduates. In addition, most administrators (%71.8) have an administrative experience of 1 to 10 years.

Table 1. *School Administrators' Demographics*

		N	%
School Type	Anatolian High School and others.	62	18.30
	Anatolian Imam Hatip High School	75	22.20
	Vocational and Technical Anatolian High School	170	50.30
	Multi-Program Anatolian High School	31	9.20
	Total	338	100.00
Title	School Administrator	67	19.80
	Assistant School Administrator	271	80.20
	Total	338	100.00

Gender	Male	261	77.20
	Female	73	21.60
	Missing Data	4	1.20
	Total	338	100.00
Age Group	30 and below	15	4.40
	31- 40	158	46.70
	41- 50	127	37.60
	51 and above	33	9.80
	Missing Data	5	1.50
	Total	338	100.00
Education Level	Bachelor's Degree	224	66.30
	Graduate Degree	114	33.70
	Total	338	100.00
Administrative Experience	1-10	243	71.80
	11-20	63	18.60
	21 and above	20	5.90
	Missing Data	12	3.50
	Total	338	100.00

Data Collection Tools

In this study, the instrument used to collect data consists of four sections: (1) Personal Information Form, (2) Technology Leadership Self-Efficacy Scale, (3) School Administrators' Attitudes towards Technology Use Scale, (4) School Administrators' Competencies for the Use of Technology Scale.

Personal Information Form:

This section involved 11 questions about the demographic characteristics of school administrators (gender, age, subject field, title, administrative experience), educational status (education level, IT in-service training status), and institutional information (school type, school district).

Technology Leadership Self-Efficacy Scale:

This scale was developed by Hacıfazlıoğlu et al. (2011b) based on NETS-A standards defined by ISTE (2009) for school administrators. This scale consists of a total of 21 items and 5 factors involving (1) Visionary Leadership, (2) Digital Age Learning Culture, (3) Excellence in Professional Practices, (4) Systematic Improvement, and (5) Digital Citizenship. Technology Leadership Self-Efficacy scale is a 6-point Likert type scale ranging from 0 (not sufficient) to 5 (very sufficient). The internal consistency coefficient for this scale was .97, ranging from .83 to .91 for the sub-factors. In this study, the internal consistency coefficient of the data collected with the Technology Leadership Self-Efficacy scale applied to school administrators was found to be .96, while the internal consistency coefficient values of the factors ranged from .83 to .90. Having this value above .70 is considered sufficient for the reliability of the research data (Büyüköztürk et al., 2016). In addition, confirmatory factor analyses of the scale were also performed and the results indicated acceptable fit indices (χ^2/df =2.81, NFI=.98, NNFI=.98, IFI=.98, RFI=.97, CFI=.98, GFI=.88, AGFI=.84, RMR=.041 and RMSEA=.073). Thus, the factor structure of the Technology Leadership Self-Efficacy scale was confirmed (Seçer, 2015).

School Administrators' Attitudes towards Technology Use Scale:

This scale was developed by the researchers using two existing scales developed by Akbaba-Altun (2002), and Karaca, Can and Yıldırım (2013). The researchers developed a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). To assess the face and content validation, the draft instrument was reviewed by 5 experts, involving 2 experts from Computer Education and Instructional Technologies department, 1 expert from the Guidance and Psychological Counselling department, and 1 expert from Educational Administration and Supervision department, 1 expert from Measurement and Evaluation in Education department. According to expert reviews, 3 items were eliminated from the scale. Then, a Turkish Philology and Literature expert reviewed the language of the scale. To assess the construct validity of the scale, Exploratory Factor Analysis was applied. KMO (0.879), and Barlett (x^2 = 1225.387, p = .000) tests results indicated that the data were suitable for factor analysis. In order to determine the factor structure of the scale, eigenvalues and Scree Plot were considered together to decide that the scale had a single factor structure. The internal consistency coefficient of the scale was found as .86. In addition, confirmatory factor analyses of the scale were also performed, and the results indicated acceptable fit indices (χ^2/df =2.95, NFI=.97, NNFI=.97, IFI=.98, RFI=.95, CFI=.98, GFI=.96, AGFI=.92, RMR=.044 and RMSEA=.076). Thus, the factor structure of the School Manager Attitudes towards Technology Use scale was confirmed.

School Administrators' Competencies for the Use of Technology Scale:

This scale was developed by the researchers, using the Technology Competencies Scale developed by Karaca, Can and Yıldırım (2013). This scale involved 15 items based on a 5-point Likert scale ranging from 1 (not competent) to 5 (very competent). The face and content validation of the scale was assessed by 5 experts in the field of education and 2 items were excluded from the scale accordingly. Then, a Turkish Philology and Literature expert reviewed the language of the scale. Exploratory Factor Analysis was applied in order to determine the construct validity of the scale. The results of KMO (0.885) and Barlett Test (x^2 = 2272.688; p = .000) indicated that research data were suitable for factor analysis. Eigenvalues and scree plot were examined to decide on the number of factors and accordingly, 4 factors emerged, involving (a) Hardware usage, (b) Internet usage, (c) Software usage, and (d) Use of school management applications. The internal consistency coefficient of the scale was found very high as .895, ranging from .75 to .88 for the sub-factors. In addition, confirmatory factor analyses of the scale were also performed and the results indicated acceptable fit indices (χ^2/df =2.40, NFI=.97, NNFI=.98, IFI=.98, RFI=.96, CFI=.98, GFI=.95, AGFI=.91, RMR=.045 and RMSEA=.065). Thus, the factor structure of the School Manager Competencies for Technology Use scale was confirmed.

Data Analysis

Using SPSS V.22, the data were analyzed by correlation analysis, and the parametric Pearson correlation coefficient was used when the normality assumption met. To examine normality; the histograms, skewness, and kurtosis values and the Kolmogorov-Smirnov and Shapiro Wilk tests were used, and the results were shown in Table 2. The non-parametric Spearman-Brown Sequence Correlation Coefficient was used in cases where the normality assumption was violated. Though the sample size was 347, nine school administrators were discarded from the data set because of being outliers. Thus, the data analysis process was conducted with the remaining 338 administrators.

Table 2. *Normality Test Results*

Name of the Scale	N	Kolmogorov-Smirnov	Shapiro-Wilk	Skewness	Kurtosis
Technology Leadership Self-Efficacy Scale	338	.000	.000	-.667	.224
Attitudes towards Technology Use Scale	338	.000	.000	-1.371	2.143
Competencies for Technology Use Scale	338	.000	.000	-.917	.328

Results

School Administrators' Technology Leadership Self-Efficacy Levels:

As shown in Table 3, the school administrators were found to be sufficient in technology leadership self-efficacy (*M*= 3.60, SD=.744). All the sub-items of technology leadership were also found sufficient. The school administrators found themselves most sufficient in Excellence in Professional Practice (*M* = 3.87, SD=.835) and Visionary Leadership (M=3.82, SD=.911). On the other hand, among all the sub-dimensions, the school administrators found themselves least sufficient in the Systematic Development (M = 3.65, SD=.930).

Table 3. *Average Scores of Technology Leadership Self-Efficacy and Competencies for Technology Use Scales*

	Number of Items	Score Range	N	$\bar{X}$	M	SD
Technology Leadership Self-Efficacy						
Visionary Leadership	3	0 – 15	338	11.48	3.82	.910
Digital Age Learning Culture	5	5 – 25	338	19.04	3.80	.890
Excellence in Professional Practice	4	3 – 20	338	15.50	3.87	.835
Systematic Improvement	5	3 – 25	338	18.26	3.65	.930
Digital Citizenship	4	0 – 20	338	15.22	3.80	.860
Total	21	11-105	338	79.5	3.60	.740
Competencies for Technology Use						
Hardware Usage	3	4 – 15	338	12.10	4.03	.830
Internet Usage	3	7 – 15	338	13.65	4.55	.640
School Management Applications Usage	3	6 – 15	338	14.21	4.73	.490
Software Usage	3	3 – 15	338	12.43	4.14	.860
Total	12	20 - 60	338	52,39	4.36	.570

School Administrators' Attitudes towards Using Technology in Education:

The results of the study indicated that the school administrators have positive attitudes towards technology use in education (M = 4.62; SD = .404).

School Administrators' Competencies for Using Technology in Education:

As shown in Table 3, the school administrators found themselves completely sufficient in using technologies (M = 4.36, SD=.576). The administrators' scores for the subscales were also high, showing values of completely sufficient. They have found themselves most sufficient in using School Management Applications (M=4.73, SD=.493) and Internet Usage (M=4.55, SD=.644).

The relationship between the school administrators' technology leadership self-efficacy and their attitudes towards technology use in education:

The non-parametric correlation test (Spearman's rho) was conducted to investigate the relationship between school administrators' self-efficacy in technology leadership and the attitudes towards technology use in education and the test results are given in Table 4. A positive and moderate significant correlation was found between the mean scores (r = .415; n=338; p=.00). Accordingly, an increase in school administrators' positive attitudes towards technology use means a significant increase in technology leadership self-efficacy levels. Thus, it can be said that 17% of the variance in technology leadership self-efficacy stems from the attitude towards technology use in education.

Table 4. *The Relationship between Technology Leadership Self Efficacy and Attitudes towards Technology Use in Education*

		Technology Leadership Self-Efficacy	Attitudes towards Technology Use in Education
Technology Leadership Self-Efficacy	R	1.000	.415
	P		.000
	N	338	338
Attitudes towards Technology Use in Education	R	.415	1.000
	P	.000	
	N	338	338

The relationship between the school administrators' technology leadership self-efficacy and their competencies for technology use in education:

A Pearson Correlation test was conducted to investigate the relationship between the school administrators' technology leadership self-efficacies and their technology-related competencies. As indicated in Table 5, a positive and low-level meaningful relationship was found between two variables (r = .262; n= 338; p=.00). Accordingly, it can be seen that as the school administrators' technology-related competencies increases, their level of technology leadership self-efficacies also increases. Furthermore, it can be said that 6% of the variability in technology leadership self-efficacy arises from their technology-related competencies.

Table 5. *The Relationship between Technology Leadership Self-Efficacy and Competencies for Technology Use in Education*

		Technology Leadership Self-Efficacy	Competencies for Technology Use in Education
Technology Leadership Self-sufficiency	R	1.000	.262
	P		.000
	N	338	338
Competencies for Technology Use in Education	R	.262	1.000
	p	.000	
	n	338	338

The relationship between the school administrators' attitudes towards using technology and their competencies for technology use in education:

A Spearman's rho test was conducted to investigate the relationship between the school administrators' attitudes towards technology use in education and their competencies for using technologies. As shown in Table 6, a positive and moderate significant relationship was found between the mean scores of the two variables (r = .390; n=338; p=.00). According to the results, an increase in school administrators' attitudes toward using technology in education has a positive effect on their competencies in using technologies. Furthermore, it can be said that 15% of the variability in the attitudes of school administrators towards using technology in education stems from the competencies for using technology in education.

Table 6. *The Relationship between Attitudes towards Use of Technology and Competencies for the use Technologies*

		Attitudes towards Technology Use in Education	Competencies for the use of Technologies
Attitude towards Technology Use in Education	r	1.000	.390
	p		.000
	n	338	338
Competencies for the use of Technologies	r	.390	1.000
	p	.000	
	n	338	338

Discussion and Conclusions

A correlational study was conducted to investigate the relationship between school administrators' technology leadership self-efficacies, their attitudes, and competencies towards using technologies. First of all, the study results indicated that the school administrators have sufficient technology leadership self-efficacies. There are many studies supporting this finding that school administrators have the necessary technology leadership

self-efficacies and competencies (Anderson & Dexter, 2005; Banoğlu, 2011; Bülbül & Çuhadır, 2012; Can, 2003; Görgülü et al., 2013; Hacıfazlıoğlu et al., 2011b; Sezer & Deryakulu, 2012; Şahin & Demir, 2015; Ulukaya et al., 2017; Ünal et al., 2015; Yorulmaz & Can, 2016; Yu & Durrington 2006). In parallel with the emerging technological developments, it has been observed that school administrators started to show behaviors related to technology leadership roles (Eren & Kurt, 2011), such as human centeredness, vision, communication, collaboration, and support (Sincar & Aslan, 2011). To make the school administrators more sufficient in applying for these new roles, some workshops, seminars, or in-service training opportunities should be provided. These kinds of opportunities would be very valuable in improving the quality of the school administrators and consequently improving the technology integration processes as they are one of the key persons in this process (Çakır, 2013).

On the other hand, several studies indicated that teachers have some different opinions about school administrators' technology leadership self-efficacies, as they thought that the school administrators have low or intermediate self-efficacy levels (Banoğlu, 2011; Can, 2003; Cantürk & Aksu, 2017; Sincar & Aslan, 2011; Şahin & Demir, 2015). This difference between school administrators' and teachers' opinions may be interpreted as the possibility of school administrators not behaving objectively when evaluating themselves (Banoğlu, 2011). Also, there may be differences in the expectations of school administrators and teachers about their technology leadership roles. Many teachers think that school administrators are equipped with broad powers, but this may not be the actual case. While their duties and responsibilities in public schools are continuously increasing, it becomes more difficult for them to take the initiative in such kind of a centralized education system in which all educational policies are designated by the Ministry of National Education in Turkey (Silman & Şimsek, 2009). As it is possible that the school administrators may not be objective in evaluating themselves, further studies should be conducted with other stakeholders, such as teachers, students, and parents, which would provide a more objective picture of the phenomena. Furthermore, the school administrators should have more interaction with these stakeholders and take into account their opinions and suggestions about how to improve their leadership skills. In addition, like in this study, most of the studies conducted in this field generally use quantitative methods. On the other hand, it is hard to deeply analyze the opinions of the participants without the question of "Why?", which might be more effective in revealing the truths. Thus, some qualitative studies should also be conducted to make more in-depth investigations.

The study results also indicated that the school administrators had the highest scores on Excellence in Professional Practices, and the lowest score for the sub-dimension of Systematic Development. The previous literature also supports this finding as it is thought that school administrators are mostly focused on providing material support and in-service training for teachers when technology integration is mentioned (Görgülü et al., 2013). On the other hand, the school administrators might have some difficulties in managing the technology integration process, which might be a sign of comparatively low scores in systematic development in this study. Thus, they should be specifically supported about how to lead the technology integration process in the educational environments.

According to the study results, the school administrators are eager to use technology in education as they have positive attitudes towards using technologies. This finding is supported by several studies as the school principals think that the use of educational technologies is likely to improve the quality of education (Helvacı 2008; Eren & Kurt, 2011). As technology has become a necessity to enable school administrators to carry out their duties

effectively and efficiently in the 21st century, it is good news to hear about their eagerness to use technologies in educational environments.

Furthermore, the study findings indicated that the school administrators felt completely sufficient about the use of technology in education and similar study findings support this result in the literature (Cağdaş, 2019; Topçu & Ersoy, 2020). Furthermore, the school administrators were most competent in using school management applications, and least competent in using hardware. This is not a surprising result as the school principals are obligated to use school management tools, such as e-school, Mebbis, and Kurum.net while doing their administrative duties. In a similar study, Karataş and Sözcü (2013) found that the majority of school administrators used information technology tools very frequently both in their daily and school life and they frequently used Information Technology Tools, Office Software, E-mail, and Online Transactions in the official works. As the current study results indicated, the administrators generally consider themselves more adequate in terms of software and Internet usage than Hardware usage. Therefore, they should be encouraged to participate in some in-service training activities to enable them to use the necessary hardware and software more effectively.

When we come to the focal point of this study, we have found that several relationships exist between the main variables. First of all, the study results indicated that a positive relationship exists between school administrators' technology leadership self-efficacies and their attitudes towards technology use in education. It can be inferred from this finding that the school administrators who believe in the benefits of the use of technologies in education are more likely to show the technology leadership skills needed for effectively leading the technology integration process in their schools. This result was supported by a similar study conducted in 2012, as a positive relationship was found between the school administrators' technology leadership self-efficacies and their acceptance of the use of information and communication technologies (Bülbül & Çuhadır, 2012). With this result, we pay attention to the importance of improving school administrators' positive attitudes towards technology use, as it might have a power to strength their leadership roles in technology integration process. To improve the school administrators in these areas, they might be provided with some opportunities, such as organizing some visits to technology enhanced schools, and perhaps even to schools in other countries that are successful in this area. Furthermore, they should be encouraged to participate in workshops or in-service training activities, in which they would have a chance to have successful experiences about technology usage in educational environments. In addition, some activities such as conferences, panels, forums, or open sessions should be held at both local and national levels to encourage school administrators to increase their awareness about the value of technology usage in educational settings.

Secondly, the study results indicated that a positive relationship exists between school administrators' technology leadership self-efficacies and their competencies to use technologies in education. It can be inferred from here that an increase in school administrators' technology related competencies means an increase on their technology leadership self-efficacies. This is also an expected result as digital literacy skills is defined as one the necessary skills in the 21st century (Trilling & Fadel, 2009), and it might be accepted as a prerequisite that the school administrators should know how to use technologies in order to effectively lead the technology integration process. As a matter of fact, in a recent study, the majority of school administrators defined technology leaders as the person who used technology in the most efficient way (Cantürk & Aksu, 2017). Furthermore, in another study, it has been pointed out that the school administrators' technological competencies will

contribute to the school effectiveness (Kearsley & Lynch, 1994). To reveal this relationship in a more detailed way, some qualitative studies should be conducted to investigate what kind of specific competencies for the use of technology is more likely to affect the school administrators' technology leadership skills. In Turkey, the lack of actual, comprehensive, and practical technology-related in-service training activities for the school administrators might be a major shortcoming. Thus, some up-to-date in-service trainings, seminars and workshops should be organized for the school administrators.

The current study findings also indicated that a positive relationship exists between high school administrators' attitudes and competencies towards using technology in education. Though there is limited research about this relationship, several studies showed a positive relationship between teachers' attitudes and competencies for using technologies (Gulbahar & Guven, 2008). Thus, this study is valuable in filling this gap in the literature. Further studies should focus on the activities that is likely to enhance both the school administrators' and teachers' positive attitudes towards using technologies.

To sum up, the duties and responsibilities of school administrators are constantly changing due to technological innovations or to the extraordinary conditions such as the Covid-19 epidemic that we face today. Examining the literature, it is understood that although the studies for technology leadership of school administrators have increased in recent years, current studies in line with these constantly changing and developing expectations are still limited. This study will be worth in filling this gap in the literature. This study is also valuable in exploring the relationship among these three critical factors together influencing the school principals' effectiveness in the technology integration process. Examining these important school administrator characteristics, this study will shed light on how to create a digital school culture by improving their leadership qualifications. In this respect, this study's results might bring a different perspective to the literature and guide the researchers to work in this field. Since this study is only limited to quantitative methods, future qualitative and mixed methods research studies should be conducted to understand the technology leadership processes in the schools more thoroughly.

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