# TEACHERS' OPINIONS ON TECHNOLOGY LEADERSHIP ROLES OF SCHOOL PRINCIPALS DURING THE COVID-19 PANDEMIC

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**Received:** 01/06/2023 **Accepted:** 27/07/2023

## ABSTRACT

The main purpose of this study is to examine the opinions of teachers about technology leadership roles of school principals during the Covid-19 pandemic. The study, which utilized qualitative research methods, was designed as a survey study. Sample group of the study constituted of 259 teachers. Data of the study was collected with "Elementary School Principals' Technology Leadership Role Scale" and analyzed via descriptive statistics, independent sample t-test, one-way ANOVA and Mann Whitney-U test. According to the results, both elementary school teachers and subject matter teachers think that school principals successfully demonstrated the role of technology leadership roles during the Covid-19 pandemic. As a result of the analyses conducted to determine whether teachers' opinions vary according to various variables, it was concluded that there are no differences in terms of the entire scale and its dimensions based on genders and seniority of teachers. In terms of the working domain, it was seen the opinions of elementary school teachers on vision dimension are higher than those of subject matter teachers. Based on the results, some recommendations which can contribute to both implementation and theory have been developed. Accordingly, conducing researches which employ multiple data collection methods and tools to investigate technology leadership roles of school principals is considered important.

**Keywords:** Technology leadership, school principals, Covid-19 pandemic.

## INTRODUCTION

Technology, which has become a sine qua non for the 21st century, is in continuous and mutual interaction process with various fields such as art, science, health, culture, and education. Education, as one of these fields, both constitutes the source of technological advancements and is transformed under the effect of technology (OECD, 2019; Selwyn and Facer, 2014). Technology, fundamentally rooted in the Greek language, is composed of the syllables "tekhne," meaning craftsmanship, and "logia," referring to knowledge (Tulley, 2008). Technology is seen as an entity which integrates knowledge, skills, methods, techniques, and which are utilized by human beings to achieve their goals rooted from their interests, needs, and desires.

While these tools and processes are utilized to modify and transform the environment, the changes and transformations occurring in the environment necessitate the continuous renewal of technological tools and processes. Thus, technology itself inevitably becomes a constant state of transformation.

The purpose of technology usage is to facilitate human life. Individuals who lead this facilitation process are generally "leaders," and more specifically "technology leaders". Leadership behaviors performed by these leaders are called as technological leadership (Anderson & Dexter, 2005; Flanangan & Jacobsen, 2003; Fletcher, 2009). Yee (2000) states that technological leadership is alike to transformative leadership in terms of its characteristics. Therefore, it is possible to say that the technological leadership is arisen from the motivation of anticipating and utilizing changes and transformations for the benefit of the organization. Technological leadership refers to the leadership roles exhibited by leaders who enable both their followers and themselves to benefit from technology while directing these followers' potential to the common good of the organization (Can, 2003). Considering this definition and explanations about technology leadership, it becomes apparent that only using digital technologies effectively in daily life is not sufficient for individuals taking on the role of technology leadership. Accordingly, it is possible to assert that technology leadership includes the ability to integrate technology with all organizational processes and it also includes such behaviors as motivating and guiding other members of the organization in utilizing technology in these processes.

Due to the integrated nature of technology with everyday life, it gains increasing importance for all social institutions and it inevitably becomes a significant part of teaching and learning processes (Chang, Chin, & Hsu, 2008). Particularly, the necessities brought by Covid-19 pandemic, the effects of which have been strongly felt worldwide, have led to a period through which education is predominantly carried out with the help of technology. The report published by World Bank (2020) on school closures during the Covid-19 period highlights that schools in 180 countries had to close during this period. Going through such a period has demonstrated that keeping up with technology has transitioned from being an alternative educational approach to a necessity (Deniz & Teke, 2020). While this period has turned the school into technology, it has also emphasized the importance of utilizing technological resources at the highest level in order to establish and maintain an effective teaching and learning process.

Technology-driven transformations happening today support the notion that the life is evolving towards a technology dependent future (Raja & Nagasubramani, 2018). The institutions which are responsible for training people who will participate in constructing such a future or can survive in such a future are schools (OECD, 2018). So, school administrators are expected to have technological competencies to ensure that these schools can integrate technology with education (Mok & Moore, 2019; Karakose, Polat ve Papadakis, 2021). Athough schools now need technology leaders more than before, there still are some factors that limit the technology leadership of school administrators. Among these factors, the inadequacy of technology education, bureaucratic structures, and limited resources are particularly notable (Flanagan & Jacobsen, 2003; Leonard & Leonard, 2006; Sincar, 2013). Nevertheless, in recent years, the dominance of a technology-focused way of life and the increased accessibility of technology both have eliminated these limitations and have made technology leadership one of the priorities in the professional development of school administrators.

Schools with administrators who easily value innovative technologies and support the effective usage of these technologies in the teaching and learning processes will have an easier adaptation to technology, which is seen as an anticipated outcome. Yet, it is a known fact that a value or a norm that school administrators do not prioritize will not easily penetrate the school, while the values and norms they prioritize can easily spread within the school (Simsek, 2005). School administrators who believe that the technology will determine the quality of education are responsible for creating technological learning environments are expected to develop themselves in this regard (Sisman-Eren, 2010). The inclination of administrators towards technological development, their sensitivity and openness to development, inevitably influence the school personnel directly or indirectly over time. In schools, administrators are the individuals that teachers see as role models and want to get their support. This situation clearly demonstrates the importance of the technology leadership roles of school administrators not only for the development of students and the improvement of teaching but also for the professional development of teachers.

Technology leadership of school administrators is considered an important tool for the success and effectiveness of a school. This is also accepted as a sign of managerial competencies of the school administrator (Chang and Tseng, 2005; Dexter, 2011; Flanagan and Jacobsen, 2003). The development of information and internet technologies, which have gained momentum especially with the Covid-19 pandemic in recent years, has influenced many stakeholders of the school, including teachers, students, and administrators. The increase in actions and efforts such as leveraging effective technology usage in educational institutions necessitate school administrators performing their technology leadership roles effectively. Technology leadership represents the decisions, policies, and actions that facilitate the efficient use of information technology throughout educational organizations (Anderson and Dexter, 2005). When examining the fundamental dimensions that constitute technology leadership, it is clearly seen technology leadership encompasses all elements of the school. These dimensions are identified by Sincar (2009) as human-centeredness, vision, communication and collaboration, and support. Human-centeredness refers to adopting an approach that prioritizes the interests and needs of school stakeholders when integrating technology into the school. Vision means school administrators' having a future vision in which the school is integrated with technology. The dimension of communication and collaboration is explained as engaging stakeholders in open communication and establishing a technology-focused communication network. Finally, the support dimension is summarized as encouraging school stakeholders to acquire technology usage habits and facilitating their access to technology.

Remote learning, digital communication, and internet-based technologies have gained significant importance in education with the Covid-19 pandemic. The pandemic, which led to partial and fully school closures in many countries including Turkiye, necessitated rapid adaptation to technological tools and processes in schools (UNESCO, 2021). All stakeholders of educational processes, regardless of their readiness level, have found themselves involved in distance learning activities since that time. Consequently, one of the main actors of this digital transition period has been school administrators even if they have not volunteered (AlAjmi, 2022). Schools whose administrators effectively use technology, communicate with parents, teachers, and students through social media and other tools during remote or hybrid education processes are one step ahead. These have made the technology usage level of a school an important criterion for the effectiveness (Dare & Saleem, 2022; Karakose, Polat & Papadakis, 2021).

The Covid-19 pandemic, which caused prolonged school closures and digital based educational processes, has functioned as a test for the quality of education in a sense. Research conducted during this process has revealed that administrators with better technological and digital competencies have managed this process more effectively (AlAjmi, 2022; Antanopoulou et al., 2021; Hamzah, Nasir, & Wahab, 2021; Karakose, Polat, & Papadakis, 2021). In this regard, it is expected that studies highlighting the technological leadership capabilities of school administrators will contribute to the improvement of current practices. Assessing the abilities of school administrators to use technology and integrate it into school management processes has the potential to identify areas in need of development. Additionally, such studies are believed to provide guidance in processes such as the training, selection, and evaluation of school administrators. Indeed, there are numerous studies focusing on the characteristics of school administrators within the scope of technology leadership in the literature (Anderson & Dexter, 2005; Banoglu, 2011; Chang, 2012; Hacifazlioglu, Karadeniz, & Dalgic, 2011; Sincar, 2009; Sincar, 2013; Weng & Tang, 2014; Zhong, 2017). However, Covid-19 pandemic which necessitated transition to distance education for a prolonged time period, made the direct observation of the technological leadership competencies of school administrators possible especially for teachers. Teachers had the chance to observe the strengths and weaknesses of school administrators during this period. In this context, one of the distinctive features of this study which has been conducted to examine the technological leadership roles performed by school administrators during the Covid-19 pandemic, is making this examination by taking the opinions of teachers who have been the closest observers of school administrators and have been affected from school administrators' decisions more than any other school stakeholder. In this framework this study is expected to serve as a guide in the professional development of school administrators by identifying the areas need to be developed and open to improvement based on its findings.

## PURPOSE OF THE STUDY

The main purpose of this study is to examine teachers' opinions on the technological leadership roles performed by school administrators during the Covid-19 pandemic in terms of various variables. To achieve the main purpose of the study, following research questions were addressed:

1. What are the opinions of classroom teachers regarding the technological leadership role of school administrators?
2. What are the opinions of branch teachers regarding the technological leadership role of school administrators?
3. Are there statistically significant differences among the views of teachers regarding to the technological leadership roles of school administrators in terms of teachers' gender, branches and seniorities?

## METHOD

The study is designed with survey research model which is one the research models of quantitative research method. The survey model is generally used to define attitudes or opinions of a population by describing it wit numeric data (Creswell, 2014). It allows researchers to collect a large amount of data to make generalizations (Cohen, Manion & Morrison, 2005). Based on this advantage of survey model, it was used for this study which aims to investigate teachers' opinions on the technology leadership roles of school administrators performed during the Covid-19 period.

### Participants

The study population of this research consisted of 545 teachers working in elementary and secondary schools located in Karacabey, Bursa. Simple random sampling method which ensures equal probabilities for each individual to be selected from the population to the sample group (Buyukozturk et al., 2018; Hsu, 1989) was preferred to determine individuals who were included in the sample. Accordingly, 122 teachers from 6 elementary schools and 137 teachers from 7 secondary schools were selected through simple random sampling. Thus, 259 teachers were included in the sampling. Demographic information regarding these teachers is presented in Table 1.

**Table 1.** Demographic information about the sample group

| Variables | Category | n | % |
|---|---|---|---|
| Cinsiyet | Male | 131 | 50,6 |
| | Female | 128 | 49,4 |
| Branch | Classrom Teacher | 85 | 32,8 |
| | Branch Teacher | 174 | 67,2 |
| Seniortiy | 1-5 years | 17 | 6,6 |
| | 6-10 years | 58 | 22,4 |
| | 11-15 years | 79 | 30,5 |
| | 16-20 years | 55 | 21,2 |
| | 21 years and more | 50 | 19,3 |
| | **Total** | **259** | **100,0** |

As can be seen in Table 1, 49.4% of the teachers are female, while 50.6% are male. Among them, 32.8% are classroom teachers, and 67.2% are branch teachers. In terms of teaching experience, 6.6% of them have 1 to 5 years of experience, 22.4%of them have 6 to 10 years, 30.5% of them have 11 to 15 years, 21.2% of them have 16 to 20 years, and 19.3% of them have 21 years and above of professional experience.

## Data Collection and Analysis

Before proceeding with the analysis, the distribution of the data was examined to determine the appropriate analysis techniques. In order to analyze whether the data exhibited a normal distribution, skewness and kurtosis coefficients were examined, and the results are presented in Table 2.

**Table 2.** Descriptive statistical values obtained from the scale

| | Skewness | | Curtosis | |
|---|---|---|---|---|
| Variables | Value | SE | Value | SE |
| Human-centeredness | -0,73 | 0,15 | 0,35 | 0,30 |
| Vision | -0,49 | 0,15 | -0,27 | 0,30 |
| Communication and collaboration | -0,38 | 0,15 | -0,31 | 0,30 |
| Support | -0,57 | 0,15 | -0,08 | 0,30 |
| Total | -0,52 | 0,15 | -0,04 | 0,30 |

The data of the respondents who completed the scale were evaluated, and based on this evaluation, it was determined that the skewness and kurtosis values fell between +1 and -1 as seen in Table 2. Therefore, it can be concluded that both the overall scale and its dimensions exhibited a normal distribution of data. (Hair et al., 2014).

## Data Collection Tools

The "Primary School Administrators' Technology Leadership Roles Scale" developed by Sincar (2009) was used as the data collection tool in this study with the necessary permissions obtained. The scale consists of 4 dimensions and 29 items and is in a five-point Likert format. Additionally, a "Personal Information Form" was used to determine the participants' demographic characteristics. Ethical committee approval was taken from Anadolu University Ethical Committee for conducting the research (Date: 28.01.2022, Decision No: 259017).

The 4-factor scale structure of "Scale of Technology Leadership Roles of Primary School Administrators" which was resulted from the exploratory factor analysis (EFA) was tested with confirmatory factor analysis (CFA) within the scope of this study to enhance the validity of the findings. The purpose of using confirmatory factor analysis was to demonstrate the fit between the items and dimensions in the scale, which had a pre-determined factor structure, with data. In this regard, it was necessary to conduct this analysis to determine whether the 4-dimensional structure of the scale, developed through studies conducted on different samples, was confirmed for the sample of this study.

To determine the construct validity of the scale, confirmatory factor analysis was conducted using the Jamovi 2.2.5 program developed by Jamovi.org. In the confirmatory factor analysis, the suitability of the data for factor analysis was first assessed using the Bartlett's sphericity test. According to the results obtained from the Bartlett's sphericity test (Table 3), it can be concluded that the data are has a multivariate normal distribution and factor analysis can be applied to this structure since the p-value is < 0.01.

**Table 3.** Bartlett's sphericity test

| $\chi^2$ | df | p |
|---|---|---|
| 8798 | 406 | <0.001 |

Another tool which is used to test the suitability of a structure for factor analysis is the Kaiser-Meyer-Olkin (KMO) sampling adequacy test. The KMO results should be greater than 0.50 to accept the data suitable for factor analysis (Guris & Astar, 2015). When the KMO test was applied to the data obtained in this study, it was observed that the sampling adequacy results ranged between 0.921 and 0.989 for each item, and no item was found to be removable from the scale. The average item suitability was found as 0.970 (KMO value) which indicated that the entire set of items was suitable for factor analysis. After these tests, confirmatory factor analysis (CFA) was performed. In this analysis, the $\chi^2$/df value was examined first. It is stated in the literature that a value below 5 is indicative of an acceptable fit (Sumer, 2000). In this regard, the $\chi^2$/df value obtained from this study (1293/371 = 3.485) indicates an acceptable fit. Subsequently, the factor loadings of the obtained data were examined. It was observed that the factor loadings of the scale consisting of 29 items and 4 factors (People-Centeredness, Vision, Communication, and Collaboration with Support) ranged between 0.720 and 0.914. Then the fit indices were examined. Table 4 presents the fit index scores of the scale.

**Table 4.** Fit indices of the scale

| CFI | TLI | SRMR | RMSEA |
|---|---|---|---|
| 0.895 | 0.885 | 0.042 | 0.098 |

As seen in Table 4, commonly preferred fit indices in the literature, which are CF, TLI, RMSEA, and SRMR, were examined to interpret the CFA results. In the literature, it is suggested that CFI and TLI values should be above 0.90 as a criterion for good fit (Hair et al., 2014). In this study, the CFI value was found as 0.895, and the TLI value was found as 0.885. Therefore, it can be said that these values are acceptable. Regarding the SRMR and RMSEA values, the recommendation in the literature is that they should be less than 0.08 (Hair et al., 2014). Accordingly, the obtained SRMR value (0.042) indicates a good fit within the scope of the research. However, concerning the RMSEA value, it was determined that this value exceeded the acceptable threshold. Therefore, in the framework of CFA, modifications were made by creating covariances between items which have high covariances. So, covariances were created between items 19 and 20, and items 22 and 23 based on expert opinions. As a result of these modifications, the $\chi^2$/df value decreased to 2.91, indicating a good fit. The fit indices obtained after the modifications are presented in Table 5.

**Table 5.** Fit indices after modifications

| CFI | TLI | SRMR | RMSEA |
|---|---|---|---|
| 0.920 | 0.912 | 0.038 | 0.085 |

As seen in Table 5, the CFI value increased to 0.920, and the TLI value increased to 0.912, the SRMS value decreased to 0.038, and the RMSEA value decreased to 0.085 after modifications were created. These results indicate an improvement in the fit values of the scale as a result of the modifications. Thus, it is confirmed that the scale is in an acceptable structure for the research sample.

## Data Analysis and Interpretation

The data collected from teachers were analyzed with SPSS 22.0 and Jamovi 2.2.5 software packages. Descriptive statistics were calculated to reveal teachers' opinions on school administrators' technology leadership roles. Before examining the relationships between teachers' opinions and demographic variables, the "Levene's test for homogeneity of variances" was initially conducted for each variable. Then, independent sample t-tests and one-way ANOVA (analysis of variance) were utilized to compare the opinions of teachers according to their gender, branch and seniority.

To ensure an objective interpretation of the data, the boundaries of the statements in the 5-point Likert scale were determined. Accordingly, scores below 3.40 were interpreted as "mediocre or in need of improvement in technology leadership," scores between 3.41 and 4.20 were interpreted as "successful technology leadership," and scores between 4.21 and 5.00 were interpreted as "excellent technology leadership."

## FINDINGS

In this section, the findings obtained from the research have been presented under three separated headings in line with the research questions. Firstly, the findings revealing the opinions of classroom teachers regarding the technology leadership roles of school administrators are presented, then the findings that reveal the opinions of branch teachers on the technology leadership roles of school administrators are presented. Finally, the findings which reveal whether there are statistically significant differences between teachers' opinions according to genders, branches and seniorities.

### The Opinions of Classroom Teachers Regarding the Technology Leadership Roles of School Administrators

The first sub-purpose of this study is to reveal the opinions of classroom teachers regarding the technology leadership roles of school administrators. The data obtained from the technology leadership roles scale which were conducted to the sample were analyzed in terms of the overall scale and its sub-dimensions. Findings are presented in Table 6.

**Table 6.** Classrom teachers' opinions on technology leadership roles of school administrators

| Dimensions | n | $\bar{x}$ | ss |
|---|---|---|---|
| Human-centeredness | 85 | 4.00 | .09 |
| Vision | 85 | 3.80 | .09 |
| Communication and collaboration | 85 | 3.92 | .09 |
| Support | 85 | 3.96 | .10 |
| Total | 85 | 3.93 | .09 |

It can be observed from the Table 7 that the opinions of classroom teachers regarding the technology leadership roles of school administrators are as follows: The overall mean score ($\bar{x}$) is 3.93, mean score of ($\bar{x}$) "human-centeredness" sub-dimension is 4.00, mean score ($\bar{x}$) of "vision" sub-dimension is 3.80, mean score of ($\bar{x}$) of "communication and collaboration" sub-dimension is 3.92, and mean score of ($\bar{x}$) "support" sub-dimension is 3.96. These findings indicate that classroom teachers evaluate the technology leadership competencies of school administrators high and think that their school administrators have performed technology leadership roles successfully during the Covid-19 pandemic.

### The Opinions of Branch Teachers Regarding the Technology Leadership Roles of School Administrators

The second sub-purpose of this study is to reveal the opinions of branch teachers regarding the technology leadership roles of school administrators. The data obtained from the technology leadership roles scale which were conducted to the sample were analyzed in terms of the overall scale and its sub-dimensions. Findings are presented in Table 7.

**Table 7.** Branch teachers' opinions on technology leadership roles of school administrators

| Dimensions | n | $\bar{x}$ | ss |
|---|---|---|---|
| Human-centeredness | 174 | 3.87 | .06 |
| Vision | 174 | 3.56 | .07 |
| Communication and collaboration | 174 | 3.75 | .06 |
| Support | 174 | 3.73 | .07 |
| Total | 174 | 3.75 | .06 |

It can be observed from the Table 7 that the opinions of branch teachers regarding the technology leadership roles of school administrators are as follows: The overall mean score ($\bar{x}$) is 3.75, mean score of ($\bar{x}$) "human-centeredness" sub-dimension is 3.87, mean score ($\bar{x}$) of "vision" sub-dimension is 3.56, mean score of ($\bar{x}$) of "communication and collaboration" sub-dimension is 3.75, and mean score of ($\bar{x}$) "support" sub-dimension is 3.73. These findings indicate that branch teachers evaluate the technology leadership competencies of school administrators high and think that their school administrators have performed technology leadership roles successfully during the Covid-19 pandemic.

## The Opinions of Teachers Regarding the Technology Leadership Roles of School Administrators in Terms of Demographic Variables

The third sub-purpose of this research is to determine the opinions of teachers regarding the technology leadership roles of school administrators based on such demographic variables as gender, branch, and seniority. In this context, firstly, independent sample t-test was conducted to see whether there were significant differences in the opinions of teachers regarding the technology leadership roles of school administrators based on their genders. While reporting and interpreting the results of independent sample t-test, varience homogeneity of the data were controlled with Levene's test. Since Levene's test indicated that the data had not equal variances ($p<.05$), results of t-test in case of equal variances not assumed were reported. The findings are presented in Table 8.

**Table 8.** Independent sample t-test results for teachers' gender

| Variables | Gender | n | $\bar{x}$ | ss | T | sd | p |
|---|---|---|---|---|---|---|---|
| Human-centeredness | Male | 131 | 3.86 | .88 | -1.066 | 248.776 | .287 |
| | Female | 128 | 3.97 | .71 | | | |
| Vision | Male | 131 | 3.55 | 1.05 | -1.481 | 245.992 | .140 |
| | Female | 128 | 3.73 | .83 | | | |
| Communication and collaboration | Male | 131 | 3.75 | .92 | -1.052 | 251.665 | .294 |
| | Female | 128 | 3.86 | .78 | | | |
| Support | Male | 131 | 3.75 | .98 | -.982 | 252.672 | .327 |
| | Female | 128 | 3.86 | .84 | | | |
| Total | Male | 131 | 3.74 | .91 | -1.229 | 245.744 | .220 |
| | Female | 128 | 3.87 | .71 | | | |

When Table 8 is examined, it can be observed that there is no statistically significant difference in the opinions of teachers regarding the technology leadership roles of school administrators based on their genders in terms of the overall scale (t=-1.229; p=.220) and the dimensions of the scale which are human-centeredness (t=-1.066; p=.287), vision (t=-1.481; p=.140), communication and collaboration (t=-1.052; p=.294), and support (t=-.982; p=.327). Therefore, it is possible to say that regardless of their genders, all teachers have positive opinions about the technology leadership roles of school administrators.

After the gender variable, opinions of teachers regarding the technology leadership roles of school administrators were compared according to their branches were by using independent sample t-test. While reporting and interpreting the results of independent sample t-test, varience homogeneity of the data were controlled with Levene's test. The results of this test indicated that the data showed homogeneity for the overall scale, the human-centeredness dimension, the communication and collaboration dimension, and the support dimension (p>.05). However, it did not show homogeneity for the vision dimension (p<.05). T-values, sd values and p values were reported according to the results of Levene's test. The findings are presented in Table 9.

**Table 9.** Independent t-test results for teachers' branches

| Variables | Branch | n | $\bar{x}$ | ss | t | sd | p |
|---|---|---|---|---|---|---|---|
| Human-centeredness | Classrom teacher | 85 | 4.00 | .81 | 1.246 | 257 | .214 |
| | Branch teacher | 174 | 3.87 | .80 | | | |
| Vision | Classrom teacher | 85 | 3.80 | .87 | 2.010 | 183.949 | .046 |
| | Branch teacher | 174 | 3.56 | .97 | | | |
| Communication and collaboration | Classrom teacher | 85 | 3.92 | .86 | 1.471 | 257 | .143 |
| | Branch teacher | 174 | 3.75 | .84 | | | |
| Support | Classrom teacher | 85 | 3.96 | .88 | 1.874 | 257 | .062 |
| | Branch teacher | 174 | 3.73 | .92 | | | |
| Total | Classrom teacher | 85 | 3.93 | .80 | 1.685 | 257 | .093 |
| | Branch teacher | 174 | 3.75 | .82 | | | |

It can be observed from Table 9 that there were no statistically significant differences in teachers' opinions about school administrators' technology leadership roles in terms of the overall scale (t=1.685; p=.093), the human-centeredness dimension (t=1.246; p=.214), the communication and collaboration dimension (t=1.471; p=.143), and the support dimension (t=1.874; p=.062) based on their branches. However, the results showed that there were statistically significant differences in teachers' opinions about school administrators' technology leadership roles in terms of vision dimension (t=1.874; p=.046) based on their branches. When the mean scores of classroom teachers ($\bar{x}$=3.80) and branch teachers ($\bar{x}$=3.56) were examined, it was seen that classroom teachers that classroom teachers perceived school administrators more visionary in the context of technology leadership.

Finally, the investigation of whether there was a significant difference in teachers' opinions on school administrators' technology leadership roles in terms of the overall scale and its sub-dimensions based on the seniority variable was conducted. Prior to conducting the analyses, the homogeneity of the data was examined using the Levene's homogeneity test. Since the results of the Levene's test indicated that the data was distributed homogeneously (p>.05) for both the overall scale and all of its sub-dimensions, the comparisons based on the seniority variable were conducted using one-way analysis of variance (ANOVA) test. The findings are presented in Table 10.

**Table 10.** One-way ANOVA results for teachers' seniorities

| Variables | Seniority | n | $\bar{x}$ | ss | F | p |
|---|---|---|---|---|---|---|
| Human-centeredness | 1-5 years | 17 | 3.84 | .84 | .983 | .417 |
| | 6-10 years | 58 | 3.87 | .91 | | |
| | 11-15 years | 79 | 4.00 | .71 | | |
| | 16-20 years | 55 | 3.77 | .79 | | |
| | 21 and more | 50 | 4.01 | .80 | | |
| Vision | 1-5 years | 17 | 3.55 | 1.07 | .382 | .822 |
| | 6-10 years | 58 | 3.60 | 1.04 | | |
| | 11-15 years | 79 | 3.70 | .87 | | |
| | 16-20 years | 55 | 3.54 | .95 | | |
| | 21 and more | 50 | 3.72 | .94 | | |
| Communication and collaboration | 1-5 years | 17 | 3.66 | 1.02 | .832 | .506 |
| | 6-10 years | 58 | 3.81 | .91 | | |
| | 11-15 years | 79 | 3.89 | .77 | | |
| | 16-20 years | 55 | 3.65 | .83 | | |
| | 21 and more | 50 | 3.87 | .89 | | |
| Support | 1-5 years | 17 | 3.74 | .90 | .687 | .602 |
| | 6-10 years | 58 | 3.79 | 1.03 | | |
| | 11-15 years | 79 | 3.90 | .83 | | |
| | 16-20 years | 55 | 3.65 | .94 | | |
| | 21 and more | 50 | 3.86 | .88 | | |
| Total | 1-5 years | 17 | 3.71 | 0.93 | .782 | .538 |
| | 6-10 years | 58 | 3.78 | 0.92 | | |
| | 11-15 years | 79 | 3.89 | 0.73 | | |
| | 16-20 years | 55 | 3.67 | 0.79 | | |
| | 21 and more | 50 | 3.89 | 0.82 | | |

When Table 10 is examined, it can be seen that there is no statistically significant differences in teachers' opinions on school administrators' technology leadership roles based on their seniorities in terms of both the overall scale (F=.782; p=.538) and the dimensions of human-centeredness (F=.983; p=.417), vision (F=.382; p=.822), communication and collaboration (F=.832; p=.506), and support (F=.687; p=.602). In this context, it was determined that the seniority of teachers did not have a significant impact on their positive opinioms on school administrators' technology leadership roles.

## DISCUSSIONS AND CONCLUSION

In this research, which was conducted to examine to how well school administrators have performed technology leadership roles during the Covid-19 pandemic based on teachers' opinions, firstly the opinions of classrom teachers and secondly opinions of branch teachers are revealed. In this context, firstly, the data obtained from classroom teachers were analyzed. The results indicated that classroom teachers believed that school administrators successfully performed the technology leadership roles during the Covid-19 pandemic. After elementary school teachers, the opinions of subject teachers were examined in line with the second sub-question of the research. As a result of the analysis, it was determined that the opinions of teachers were similar to those of classroom teachers. Accordingly, branch teachers also believed that school administrators successfully performed technology leadership roles during the Covid-19 pandemic. In conclusion, it is possible to make a general inference that teachers have positive opinions about the technology leadership roles performed by of school administrators during the pandemic.

When the literature is examined, there are similar studies indicating that teachers think that school administrators perform technological leadership roles successfully (Anderson & Dexter, 2005; Bas, 2012;

Durnali & Akbasli, 2020; Olcek, 2014; Thannimalai & Raman, 2018; Ulgen, 2021; Irmak, 2015). Besides, studies examining the technology leadership competencies of school administrators during the Covid-19 pandemic, like this research, generally indicate positive results, too (Berkovich & Hassan, 2022; Hamzah, Nasir & Wahab, 2021; Karakose, Polat & Papadakis, 2021). Although these results do not demonstrate that school administrators fulfill their technology leadership roles perfectly, they are at a good place for the education system which is increasingly becoming technology-oriented, and specifically for the Covid-19 pandemic period during which almost all of the educational activities were carried out through technology.

The Covid-19 pandemic period has been a time when educational processes were largely carried out through distance learning, and dependence on technological tools and processes reached the highest level ever since. During this period, schools worldwide were partially or fully closed, and the connection between students and the educational processes could only be maintained through technological devices. Turkiye was one of the countries where schools remained closed for a long time during this period (OECD, 2022; UNESCO, 2021). Therefore, t school administrators' technology leadership roles have gained particular importance since the veriy beginning of this period. Indeed, many studies in the literature indicate that school administrators with high technological or digital competencies contribute to teachers' motivation (Lubis, 2019) as well as the overall success and effectiveness of the school (Flanagan & Jacobsen, 2003; Hamzah, Nasir & Wahab, 2021). From this perspective, it is important that school administrators effectively meet the requirements as adapting to the technological tools and processes which have been unexpectedly brought about by the Covid-19 pandemic to prevent potential learning losses that may affect students during and after such periods as Covid-19 pandemic.

According to the results obtained from the research, it is seen that the highest mean scores of both classroom teachers and branch teachers' opinions belong to human-centeredness dimension regarding the technological leadership roles of school administrators. This can be explained by the fact that technology is not tools and processes developed against human beings but it is tools and processes developed for the benefit of human beings. Particularly, understanding that human resources, with their affective and higher-order cognitive skills, are the main element that ensure the functionality of technology has contributed to the increasing significance of human-centeredness in effective technology leadership (Bhatt, 2001; Holford, 2019). This fact is particularly significant for schools since schools are the organizations where the human beings are the main actors in all processes and are at the first place among the organizations with the human-centric values. Therefore, it is critical such organizations as schools whose functions mostly depend on human beings to prioritize human-centeredness in processes which aim at increasing technology usage and effectiveness. In this sense, the results which indicate the positive opinions of teachers about human-centeredness as an important dimension of technology leadership of school administrators can be regarded as an opportunity for schools.

Another question that was explored within the scope of this research is whether teachers' opinions on school administrators' technology leadership roles during the Covid-19 pandemic differed based on their genders, branches, and seniorities. In this regard, firstly the gender variable was examined and it was found that being a female or a male teacher did not lead to any differentiation in their opinions on school administrators' technology leadership roles. This finding aligns with the findings of other studies conducted in the literature (Bas, 2012; Deniz & Teke, 2020; Engur, 2014; Hayytov, 2013; Olcek, 2014; Oztas, 2013; Sincar, 2009). However, when examining the mean scores of female and male teachers, it is observed that the mean scores of female teachers are higher than those of male teachers. A similar difference indicating higher mean scores for female teachers' opinions on technology leadership roles of school administrators was also found in a study conducted by Gercek (2016). This situation can be associated with the differentiation in knowledge and expectations of females and males regarding technology use. In fact, studies on technology acceptance (Akturk & Delen, 2020; Sirakaya, 2019) have found that male teachers have a higher level of technology acceptance compared to female teachers.

According to the results of this study regarding teachers' opinions of school administrators' technology leadership roles during the Covid-19 pandemic, no differentiation was observed for the total of technology leadership scale, including the human-centeredness dimension, communication and collaboration dimension, and support dimension, based on their branches. Similar studies in the literature also indicate that there is no differentiation in teachers' opinions based on the school level (Deniz & Teke, 2020; Sincar & Aslan, 2011; Ulgen, 2021). Comparisons conducted between primary school and secondary school teachers within the

context of school level give some clue about the comparisons of branch and classroom teachers since classroom teachers generally work at primary schools and branch teachers generally work at secondary or high schools. So, the studies examining the differences of teachers according to school level can be accepted as similar to this study. Although no difference was found in teachers' opinions for human-centeredness, communication and collaboration, and support dimensions, a statistically significant difference was found for vision dimension. Accordingly, classroom teachers hold more positive opinions regarding the vision dimension than branch teachers. Besides, it is seen that classroom teachers' mean score is higher than those of branch teachers for technology leadership roles of school principals in total even though this difference is not statistically significant. Similarly, Engur (2014) also found that the overall mean scores of primary school teachers regarding school administrators' technology leadership were higher than those of secondary school teachers. The researcher relates this finding to the increased level of technology usage among secondary school teachers since they deal with older students who are really good at technology and mostly dependent on technology during their daily lives. So, it is possible to infer that as student become older, their technology related expectations from teachers and schools get higher and as students' technology related expectations from teachers get higher, teachers' technology related expectations from school administrators get higher, too. As a supporting research finding for this inference, Sirakaya (2019) found in his study that the technology acceptance level of secondary school teachers was higher than that of primary school teachers. Such a research finding can also be accepted as a supporting evidence for the inference that classroom teachers may have lower expectations from school administrators in the context of technology leadership.

Finally, within the scope of the research, an investigation was conducted to determine whether there was differentiation in teachers' opinions on school administrators' technology leadership roles during the Covid-19 pandemic based on their seniority. According to the results, it was found that there was no differentiation. Similar studies in the literature also indicate that there is no differentiation in teachers' opinions based on their seniorities (Deniz & Teke, 2020; Durnali, 2019; Ulgen, 2021). In summary, these findings indicate that teachers, regardless of their demographic characteristics, find school administrators successful in performing technology leadership roles during the Covid-19 pandemic. When the results obtained from this study and findings of other researches which were conducted before 2020 (Anderson & Dexter, 2005; Bas, 2012; Durnali & Akbasli, 2020; Olcek, 2014; Thannimalai & Raman, 2018) and after 2020 (Berkovich & Hassan, 2022; Hamzah, Nasir & Wahab, 2021; Karakose, Polat & Papadakis, 2021) are evaluated together, it can be seen more clearly that school administrators have successfully fulfilled their technology leadership roles, which have gained critical importance especially during the Covid-19 period. Indeed, school administrators' technological leadership roles became more critical than ever during the Covid-19 period, and teachers had the opportunity to observe school administrators more closely in this context. So, teachers' positive opinions on school administrators' technology leadership roles in such a context has become more valuable because of the importance of providing support to school members for technology adaptation and usage for being an effective technology leader (Banoglu, 2011; ISTE-A, 2009; Sugar & Holloman, 2009). It should also be noted that Covid-19 period has been a time when teachers have needed more support than ever for technology usage in education processes and study findings indicate that school administrators mostly could have met this need.

## Recommendations

Based on the results obtained from the research, several recommendations that are believed to contribute to both the implementation and the literature have been developed. In this regard, it is considered important to implement a selection process that takes the technological competencies of school administrators into account so that they perform technology leadership roles more effectively especially when needed. Similarly, prioritizing the development of technological competencies school administrators in professional development activities can be used as a tool that will enhance their technological leadership competencies. In addition to these recommendations for implementations, some recommendations that may contribute to the development of the literature have been formulated by considering the limitations of the study. The most significant limitation of this is the fact that data were obtained from a single source due to the cost-effectiveness principle. Therefore, it is deemed important in future studies on school administrators' technology leadership to work with sample groups representing different geographical regions or cities and to collect data from multiple sources using multiple data collection methods and instruments.

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