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The Relationship Between the Technological Leadership Levels of School Heads and the Levels of Learning Schools[1]

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Abstract

The purpose of this research is to determine the relationship between school heads' technological leadership levels and learning school levels. In the research, descriptive relational survey model, one of the quantitative research methods, was used. The population of the study consists of 11094 teachers and school administrators working in schools affiliated to the Ministry of National Education in the central district of Onikişubat in Kahramanmaraş in the spring semester of the 2020-2021 academic year. The sample of the study consists of 421 teachers and school administrators determined by convenience sampling method. As data collection tools in the study, the "Technological Leadership Roles of School Administrators Scale" developed by Sincar (2008) within the scope of his doctoral thesis and the "Learning School Scale" developed by Uğurlu, Doğan, and Yiğit (2014) were used.

As a result of the analyzes, it was found that the technological leadership levels and learning school levels of the educators participating in the study were at high levels. It was seen that the technological leadership levels and learning school levels of educators (Teacher-School Administrators) differed significantly according to the independent variables of the type of school they work in and the type of duty. The high level of technology leadership behaviors of school administrators has a great effect on learning school levels. School administrators' realization of their technological leadership roles can bring the stakeholders in the school together in a collective way. will lead to action and purpose, make positive judgments on personal and organizational development, and develop personal talents. positive effects on his/her development.

Keywords: Leadership, Technological Leadership, Learning School.

Article Type Research article

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Introduction

Technological Leadership

People live in communities in line with many needs such as nutrition, protection, shelter, and communication. These communities need guidance to meet their needs and these needs constitute the leader. An individual who reveals the group's unrevealed needs, thoughts and wishes in an adoptable manner and enables these wishes to be put into action by its members is called a leader (Celep, 004). According to Şişman (2004), a leader is a pioneer who influences and mobilizes the group to realize common goals and objectives. It is the individual who observes and evaluates the experiences and experiences of the group and directs the power of the group with these evaluations (Bursalıoğlu, 2008). It is seen that the concepts of leader and leadership are approached by researchers from different points of view. It is stated that different leadership characteristics are expected with the time, needs and expectations of the society. According to Tengilimlioğlu (2005), maintaining the position of organizations by adapting to the needs and expectations of the society will cause the organization to cease to exist. Because of this situation, the need for a leader will be greater over time. In addition, society is experiencing rapid social, cultural, economic and technological changes, transformations and developments more than previous societies. This situation requires the transformation of schools, which are the face of society. It has made it compulsory to redefine the duties and qualifications of school administrators who are responsible for maintaining the existence of schools (Gümüşeli, 2001).

It is the duty of school administrators to provide the integration of technology into the education and training process and management work to increase the efficiency of the school (Tanzer & Can, 2004). It is emphasized that school administrators can only increase school efficiency by having sufficient knowledge and skills (Turan, 2002). According to Can (2003), a technology leader is an individual who uses technology effectively and directs employees to use technology within the organization.

With the realization of the importance of technological leadership roles of school administrators day by day, technological leadership roles of school administrators leadership standards have been tried to be determined. The American-based International Society for Technology in Education (ISTE) set standards for teacher technological competencies in 2000. The National Educational Technology Standards for Administrators (NETS-A) for school administrators was first published in 2002. It is aimed that school administrators have adopted the school model targeted in information societies, can provide change and development in this direction, are aware of technological needs in the education and training process, can create resources for technological needs, produce solutions to technological problems and increase educational and instructional efficiency (ISTE, 2002). Developed in 2002, NETS-A standards were updated by ISTE in 2009 and reformatted from six to five dimensions (ISTE, 2009). These are;

Visionary Leader: School administrators are responsible for establishing and implementing a common purpose for the integration of technology within the organization. They should create the vision that will realize this goal and lead its implementation (Sezer, 2011).

Digital-Age Learning Culture: School administrators should make plans and practices by ensuring the effectiveness of technology in teaching environments in accordance with the digital age learning culture. Considering the needs of learners, they should provide teaching environments supported by technological infrastructure. They should ensure the maintenance of the dynamically created digital age learning culture (Eren, 2011).

Excellence in Professional Practice: As technological leaders, stakeholders of school administrators should organize trainings improving their use of technology and assess of that. They should ensure and encourage the use of digital age tools in communication in the organization. They should create the necessary plans, time, and budget for the integration of technology (Çakır, 2013; Görgülü, Küçükali, & Ada, 2013).

Systematic Development: School administrators should exhibit digital age leadership roles by using technological resources effectively to keep the organization in a continuous development process. In order to maintain this continuity in the institution, he/she leads the process of continuously collecting, analyzing, evaluating and giving feedback to the data of stakeholders such as teachers, students, parents, etc. in a dynamic structure. The school administrator displays a supportive and collaborative attitude for the systematic development of stakeholders (Bülbül & Çuhadır, 2012; Çakır, 2013).

Digital Citizenship: School administrators create rules that will enable stakeholders in the institution to use digital ethical technologies within ethical norms, ensure their implementation and exhibit model behaviors. They ensure that stakeholders benefit equally from technological infrastructure (Eren, 2011).

Learning School

Societies, which are in constant change, expect their schools, which are their reflections, to adapt to this situation dynamically. Schools aim to produce the individuals that society needs by meeting these expectations. Schools need to be open to learning in order to gain this structure. This necessity necessitates schools to be learning schools. In order for the learning culture to be formed and established in schools, institutional stakeholders should be open to learning (Şimşek & Yıldırım, 2004). In order to establish a culture of change and development in schools, first of all, change and development should be determined as a vision and stakeholders should be emphasized as a part of this vision (Özdemir, 2006).

Learning schools motivate the continuous development and success of stakeholders. As a result of the developments within the school, the learning school organizes and improves itself. With these characteristics, learning schools are structures that create an environment to increase the success of the organization by motivating stakeholders for continuous development and change (Ünal, 2006).

In this century, when society meets and produces knowledge in the fastest way, it is inconceivable that schools have not gained an organizational learning structure. Schools should be in a structure that produces, processes, and disseminates knowledge. In order to become a society based on knowledge, it is necessary to gain the characteristics of a learning society. In order for the society to gain the desired characteristics, learning schools should be created (Ada & Akan, 2007).

The purpose of this study is to determine the relationship between school administrators' and teachers' technological leadership levels and learning school levels. For this main purpose, this research seeks answers to the following problems:

1. What are the technological leadership levels of the educators (teachers and school administrators) participating in the study and their levels of learning school?

2. Is there a significant difference between the independent variables of school type and job type between the technological leadership levels and learning school levels of the educators participating in the study?

3. What is the relationship between educators' "Technological Leadership Levels" and "Learning School" levels?

Method

In the study, the relationship between the technology leadership levels of teachers and school administrators working in Kahramanmaraş province and the learning organization levels of schools was tried to be determined, and the research was conducted in the descriptive relational survey model from quantitative research methods. In descriptive research, it is aimed to define a given situation about the population.These are the studies conducted on the selected sample. In descriptive relational

survey model studies, it is revealed whether the variables change together or not, and if there is a change together, in which direction it takes place (Karasar, 2005).

Population and Sample

The study population consists of 11094 teachers and school administrators working in the central district of Onikişubat in Kahramanmaraş province in the spring semester of the 2020-2021 academic year. According to Can (2019), even if the universe of 10000 to 25000 people does not show a homogeneous distribution, a sample of 370 people has the power to represent the universe.

A sample was formed from the universe of the research with the convenience sampling method. A sample size of 447 people was formed due to the estimated missing data that may occur in the sample. In the study, 500 scales were distributed to schools and 447 of them were returned. Of the 447 sample data sets, 26 were excluded from the scope of the study because they were not filled out in accordance with the instructions. Information about the sample is presented in Table 1.

Table 1

Demographic Information of the Sample

Variables	***Variable Subgroup***	***n***	***%***
Type of School			
	Primary Schools	108	25.7
	Middle School	265	62.9
	High School	48	11.4
Mission Type			
	Director	19	4.5
	Deputy Director	35	8.3
	Teacher	367	87.2
Professional Experience			
	0-5 Years	33	7.8
	6-10 Years	88	20.9
	11-15 Years	88	20.9
	16-20 Years	91	21.6
	Over 21 Years	121	28.7

N=421

Data Collection Tools

The scale used in the research takes place in 3 sections. The first part is the demographic information form, which includes questions about gender, position, school type, school type, professional seniority, length of service in the school and length of time working with school principals. The second part includes the 29-item "Scale of Technology Leadership Roles of Primary School Principals" developed by Sincar (2008) In the last section, the "Learning School Scale", a 20-item scale developed by Uğurlu, Doğan and Yiğit (2014) is in place.

Findings

Findings from the statistical analysis of the data obtained from teachers and administrators comments are given below.

Findings Related to the First Sub-Problem

The arithmetic averages and standard deviations of the dimensions of the relationship between technological leadership and learning school levels of teachers and administrators are given in the tables below.

Table 2

Technological Leadership Roles of Educators Score Distribution of Levels Scale

Technological Leadership Roles	***X̄***	***Ss***
Human Centeredness	4.07	.59
Vision (Foresight for the Future)	4.02	.68
Communication and Cooperation	4.05	.66
Support	4.11	.65
Total	4.068	.59

As stated in Table 2, the mean levels of the sub-dimensions of the technological leadership role levels of school administrators are Support (X̄=4.11), Human Centeredness (X̄=4.07), Communication and Cooperation (X̄=4.05) and Vision (X̄=4.02). According to the results, school administrators' technological leadership levels of Human Centeredness, Vision, Communication and Cooperation, and Support dimensions are at the level of "I agree".

The highest level of the Human Centeredness sub-dimension belongs to the item "They use the internet service to ensure in-school communication with all members of the school." belongs to the item and its value is Agree (X̄= 4.43). The item with the lowest level is "They consult the opinions of students for the effective use of educational technologies at school" with the value of Undecided (X̄=3.50).

It is seen that the item "They support the opinions on the implementation of educational technology plans in the school." has the highest value with the value of Agree (X̄=4.13). The item "They have long-term technological development plans." has the lowest value with the value of Undecided (X̄ =3.80).

In the Communication and Collaboration sub-dimension, the item "They use technology to ensure the development and innovation of the school." has the highest value with the statement "Agree" (X̄=4.20), while the item "They form a technology board to represent all members of the school in order to apply educational technology plans to learning-teaching processes." has the lowest value with the statement "Undecided" (X̄ =3.71).

It was found that the item "They enable teachers to benefit from the opportunities brought by technology in order to enrich learning-teaching environments" had the highest value with the value of Agree (X̄ =4.20), while the item "They organize technological environments to meet the needs of students" had the lowest value with the value of Undecided (X̄=3.99).

Table 3

Distribution of Educators' Learning School Scale Scores

Learning School Scale	***X̄***	***ss***
Team Learning Sub	4.17	.65
Mental Models	4.13	.70
Shared Vision	4.14	.71
Personal Dominance	4.39	.59

TOTAL	4.12	.57

As it is stated in the table, when the mean levels of the sub-dimensions of the learning school levels are ranked from higher to lower, it is seen as Personal Dominance Sub-dimension ($\bar{X}$ =4.39), Team Learning Sub-dimension ($\bar{X}$ =4.18), Shared Vision Sub-dimension ($\bar{X}$=4.14) and Mental Models Sub-dimension ($\bar{X}$ =4.13). According to the results, it is seen that the Learning in Teams, Mental Models, Shared Vision and Personal Dominance sub-dimensions of the Learning School Scale are at the level of "I agree". They state.

It was found that the item "As I share my experiences and what I have learned with my fellow teachers, new information emerges." received the highest value with Agree ($\bar{X}$=4.37), while the item "Every teacher in our school supports each other in team learning." received the lowest value with Agree ($\bar{X}$=4.05).

Mental Models sub-dimension "Every teacher in our school is accepted as an equal and respected individual. The item "In our school, there are opportunities to increase the learning opportunities of teachers." and the items "In our school, every teacher can easily criticize the work done by the administrators." received the highest value with the statement "Agree" ($\bar{X}$=4.26), while the items "In our school, there are opportunities to increase the learning opportunities of teachers." and "In our school, every teacher can easily criticize the work done by the administrators." received the lowest value with the statement "Agree" ($\bar{X}$=4.06).

The item "The vision of our school is based on "Lifelong Learning"" of the Shared Vision sub-dimension received the highest value with the value of Agree ($\bar{X}$=4.19); the item "The vision of our school is known by teachers" received the lowest value with the value of Agree ($\bar{X}$=4.083). was found.

It was found that the item "I do not hesitate to learn about the vision of our school by asking my fellow teachers about the subjects I do not know" received the highest value with the value of Agree ($\bar{X}$=4.52), while the item "I exchange information by discussing with my colleagues in other schools" received the lowest value with the value of Agree ($\bar{X}$=4.24).

Findings Related to the Second Sub-Problem

In this section, the second sub-problem of the study, which is the second sub-problem of the research, the findings obtained from the opinions of the teachers regarding the independent variables (type of school, position in the organization), technological leadership levels and learning school levels are given.

Findings Related to the Independent Variable of School Type

One-way ANOVA analysis was applied to determine whether there was a significant relationship in the sub-dimensions of the technological leadership levels of the teachers and administrators participating in the study according to the independent variable of school type. Post Hoc Bonferroni test values were examined for the findings expressing significant results (p<.050) as a result of the analyzes. The results of the findings are presented in Table 4. School types were defined as 3 different groups as primary school A, middle school B and high school C.

Table 4

ANOVA Test Results of Educators' Technological Leadership Levels with the Independent Variable of the Type of School They Work in

Dimensions	***Categories***	***X̄***	***Ss***	***F***	***p***	***Significant Difference***
Human Centricity						
	Primary School(A)	4.15	.59			A and C
	Secondary School(B)	4.03	.61	4.55	.007	Meaningful
	High School(C)	4.30	.58			Difference

Vision						
	Primary School(A)	4.13	.65			A-B and C
	Secondary School(B)	3.94	.68	5.89	.001	Meaningful
	High School(C)	4.25	.71			Difference
Communication and Cooperation						
	Primary School(A)	4.13	.62			A and C
	Secondary School(B)	3.98	.65	4.26	.006	Meaningful
	High School(C)	4.23	0.71			Difference
Support						
	Primary School(A)	4.19	.65			A-B And C
	Secondary School(B)	4.05	.64	3.44	.014	Meaningful
	High School(C)	4.26	.66			Difference

N (Primary School)=108,N(Secondary School)=265,N(High School)=48 p<.050* p<.010** p<.000***

When the findings in Table 4 were examined, it was found that there was a significant difference with the independent variable of school type (F=4.55; p<0.050) by comparing the means of the Human Centeredness sub-dimension of the technological leadership scale of the educators (teachers and school administrators) participating in the research with one-way ANOVA. As a result of the multiple comparisons made with the Post Hoc Bonferroni test to determine from which group the difference originated, it was seen that this difference showed a significant difference between the A and C groups. According to the findings, it was seen that the Human Centeredness sub-dimension scores of educators working in primary school ($\bar{X}$=4.15) were higher than those of educators working in high school ($\bar{X}$=4.30). As a result of the test, the scores of the vision sub-dimension of the educators with the type of school they work in were compared with Post Hoc Bonferroni and a significant difference was found (F=5.89; p<0.050). As a result of the multiple comparisons made with the Post Hoc Bonferroni test in order to determine which group caused the difference between the groups, it was found that the scores of the educators' Secondary School ($\bar{X}$=3.94) type were lower than the scores of the other two school types, High School ($\bar{X}$=4.25) and Primary School ($\bar{X}$=4.13) was found to be.

When the findings were examined, the mean of the Communication and Collaboration sub-dimension of the technological leadership scale of the educators (teachers and school administrators) participating in the study was compared by one-way ANOVA and it was determined that there was a significant difference with the independent variable of school type (F=4.26; p<0.050). As a result of the multiple comparisons made with the Post Hoc Bonferroni test to determine from which group the difference originated, it was seen that this difference showed a significant difference between the A and C groups. According to the findings, it was seen that the Communication and Cooperation sub-dimension was higher in high school educators ($\bar{X}$=4.23) and primary school educators ($\bar{X}$=4.13).

The averages of the Support (F=3.44; p<0.050) sub-dimension of the technological leadership scale of the educators (teachers and school administrators) participating in the study were compared with one-way ANOVA and it was determined that there was a significant difference with the independent variable of school type. According to the findings, it was seen that the Support sub-dimension scores were higher than the educators working in high school ($\bar{X}$=4.26), primary school ($\bar{X}$=4.19) and secondary school ($\bar{X}$=4.05).

In the research, one-way analysis of variance (one-way ANOVA) was performed to determine whether there was a significant difference between the data obtained according to the dependent variable of learning school and the independent variable of school type. For significant differences between the values (p<.050), the values of the PostHoc Bonferroni test were examined. The results of the findings are presented in Table 5. School types were defined as 3 different groups as primary school A, middle school B and high school C.

Table 5

ANOVA Test Results Regarding Learning School Levels According to School Type Variable

Dimensions	*Categories*	*X̄*	*Ss*	*F*	*P*	*Significant Difference*
Team Learning						
	Primary School(A)	4.20	.63			
	Secondary School(B)	4.15	.64	0.21	.81	
	High School(C)	4.17	.72			
Mental Models						
	Primary School(A)	4.24	.61			
	Secondary School(B)	4.06	.70	2.96	.053	
	High School(C)	4.23	.81			
Shared Vision						
	Primary School(A)	4.21	.66			
	Secondary School(B)	4.09	.73	1.97	.141	
	High School(C)	4.27	.75			
Personal Dominance						
	Primary School(A)	4.47	.51			
	Secondary School(B)	4.33	.62	3.29	.038**	Between A-B
	High School(C)	4.52	.58			

N(Primary School)=108,N(Middle School)=265,N(High School)=48 p < .050* p < .010** p < .000***

When the findings in Table 5 are examined, the averages of the educators (teachers and school administrators) participating in the research on the Learning School scale's sub-dimensions of Team Learning (F=0.21; p<0.050), Mental Models (F=2.96; p<0.050) and Shared Vision (F=1.97; p<0.050) were compared with one-way analysis of variance (one-way ANOVA) and it was determined that there was no significant difference with the independent variable of school type.

When the findings in Table 5 are examined, the averages of the personal mastery sub-dimension of the Learning School scale of the educators (teachers and school administrators) participating in the research were compared with one-way ANOVA and it was determined that there was a significant difference with the independent variable of school types (F=3.29; p<0.050). As a result of the comparisons made with the Post Hoc Bonferroni test to determine from which group the difference originated, it was seen that this difference showed a significant difference between the A and B groups. According to the findings, it was seen that the Personal Mastery sub-dimension scores of educators working in primary school type (X̄=4.47) had higher averages than educators working in secondary school type (X̄=4.33).

Findings Regarding the Independent Variable of Task Type

In the study, one-way analysis of variance (one-way ANOVA) was applied to determine whether there is a significant relationship between the independent variable of task types and the sub-dimensions of the technological leadership dependent variable. Post Hoc Bonferroni was applied for the findings expressing significant results (p<0.050) as a result of the analysis. The results of the findings are reported in Table 6. The tasks of the educators were defined in 3 different groups as principal A, vice principal B and teacher C respectively.

Table 6

ANOVA Test Results Regarding Technological Leadership Levels According to Independent Variable of Position Type

Categories		$\bar{X}$	*Ss*	*F*	*p*	*Significant Difference*
Human Centeredness						
	Manager (A)	4.32	.55	3.64	.027	Between
	Manager Assistant(B)	4.29	.60			B-C
	Teacher (C)	4.06	.61			
Vision						
	Manager (A)	4.26	.48	3.49	.031	Between
	Manager Assistant(B)	4.25	.57			B-C
	Teacher (C)	3.99	.70			
Communication and Cooperation						
	Manager (A)	4.22	.47	3.06	.048	Between
	Manager Assistant(B)	4.27	.58			B-C
	Teacher (C)	4.02	.67			
Support						
	Manager (A)	4.29	.48	4.34	.014	Between
	Manager Assistant(B)	4.37	.59			B-C
	Teacher (C)	4.07	.65			

N(Manager)=19, N(Manager Assistant(B)=35, N(Teacher)=367 p < .050* p < .010** p < .000***

When the findings in Table 6 are examined, the mean of the human-centeredness sub-dimension of the scale of technological leadership levels of the school administrators participating in the study was compared with one-way ANOVA and it was determined that there was a significant difference with the independent variable of type of duty (F=3.64; p<.050). As a result of the analyses performed with the Post Hoc Bonferroni test to determine from which group the difference originated, it was seen that this difference showed a significant difference between the B and C groups. According to the findings, it was seen that assistant principals' Human Centeredness sub-dimension scores ($\bar{X}$=4.29) and teachers' Human Centeredness sub-dimension scores ($\bar{X}$=4.06) were high.

When the findings were examined, it was found that there was a significant difference between the mean of the vision sub-dimension of the scale of technological leadership levels of the school administrators participating in the study and the independent variable of the type of duty (F=3.49; p<.050). As a result of the analyses performed with the Post Hoc Bonferroni test to determine from which group the difference originated, it was seen that this difference showed a significant difference between the B and C groups. According to the findings, it was seen that the vision sub-dimension averages of assistant principals ($\bar{X}$=4.25) were higher than the vision sub-dimension averages of teachers ($\bar{X}$=3.99).

When the findings were examined, it was found that there was a significant difference between the mean of the communication and cooperation sub-dimension of the scale of technological leadership levels of the school administrators participating in the research with the independent variable of the type of duty (F=3.06; p<0.050). As a result of the analyses performed with the PostHoc Bonferroni test to determine from which group the difference originated, it was seen that this difference was significantly different between the B and C groups. According to the findings, it was seen that the communication and cooperation sub-dimension averages of assistant principals ($\bar{X}$=4.27) were higher than the communication and cooperation sub-dimension averages of teachers ($\bar{X}$=4.02).

When the findings were examined, it was found that there was a significant difference between the mean of the support sub-dimension of the scale of technological leadership levels of the school administrators participating in the study and the independent variable of the type of duty (F=4.34; p<0.050). As a result of the analyses performed with the Post Hoc Bonferroni test to determine from which group the difference originated, it was seen that this difference showed a significant difference between the B and C groups. According to the findings, it was seen that the support sub-dimension

averages of assistant principals ($\bar{X}$=4.37) were higher than the support sub-dimension averages of teachers ($\bar{X}$=4.07).

In the research, one-way analysis of variance (one-way ANOVA) was applied to determine whether there was a significant difference between the dependent variables of team learning, shared vision and personal mastery of the learning school scale and the data obtained according to the independent variable of task type. Post Hoc Bonferroni test was applied for significant findings. The results of the findings are presented in Table 5.6. Task types were defined in 3 different groups as manager A, assistant manager B and teacher C.

Since there was no homogeneous distribution between the mental models of the learning school scale and the independent variable of task type, Kruskal Wallis test, one of the nanparametric tests, was applied. The data related to the findings are shown in Table 7.

Table 7

ANOVA Test on the Independent Variable of Job Type and Learning School

Categories	***N***	***$\bar{X}$***	***Ss***	***F***	***p***	***Significant Difference***
Team Learning						
Manager (A)	19	4.26	.43			
Manager Assistant(B)	35	4.15	.77	0.22	.800	
Teacher(C)	367	4.16	.64			
Shared Vision						
Manager (A)	19	4.44	.54			Between A-C
Manager Assistant(B)	35	4.35	.74	3.67	.026	
Teacher(C)	367	4.11	.71			
Personal Dominance						
Manager (A)	19	4.63	.39			
Manager Assistant(B)	35	4.49	.61	2.36	.096	
Teacher(C)	367	4.37	.60			

N(Manager)=19, N(Manager Assistant)=35, N(Teacher)=367 p < .050* p < .010** p < .000***

When the findings in Table 7 are examined, the mean of the team learning sub-dimension of the learning school scale was compared with one-way ANOVA and it was found that there was no significant difference with the independent variable of task type (F=0.22; p>.050).

Based on the findings in Table 7, the mean of the shared vision sub-dimension of the learning school scale of the educators was compared by one-way ANOVA and it was determined that there was a significant difference with the independent variable of type of duty (F=3.67; p<.050). As a result of the analyses performed with the Post Hoc Bonferroni test to determine from which group the difference originated, it was seen that this difference showed a significant difference between the A and C groups. According to the findings, it was seen that the mean of shared vision sub-dimension of principals ($\bar{X}$=4.44) was higher than the mean of shared vision sub-dimension of teachers ($\bar{X}$=4.11).

When the findings in Table 7 were examined, it was found that there was no significant difference between the mean of the learning school personal mastery sub-dimension and the independent variable of task types (F=2.36; p>.050).

Table 8

Kruskal-Wallis Test for the Independent Variable of Type of Position and Learning School Dependent Variable

Categories	*N*	*X̄*	*Ss*	*F*	*p*	*Significant Difference*
Mental Models						
Manager (A)	19	4.60	.39			Between A-B and C
Manager Assistant(B)	265	4.39	.59	8.24	.035	
Teacher(C)	367	4.08	.70			

N(Manager)=19, N(Assistant Manager)=35, N(Teacher)=367 p < .050* p < .010**p < .000***

When the data in Table 8 are examined, according to the Kruskal-Wallis test conducted to see whether there is a significant difference between the mental models sub-dimension of the learning school dimension and the duty variable in the institution, it is seen that there is a significant difference between the groups (F =8.24, p<.050). The Mann Whitney U test showed that there was a significant relationship between groups A, B and C. The ranking of the groups' levels in the mental model sub-dimension was seen to be A, B and C from higher to lower levels.

Findings Related to the Third Sub-Problem

Regression Analysis

The results of multiple regression analysis on the prediction of Technological Leadership Levels on Learning School levels are given in Tables 9, 10, 11 and 12. A correlation coefficient between .00-.30 is low, between .30-.70 is medium and between .70-1.00 is high. (Büyüköztürk, 2017).

Table 9

Multiple Regression between Technological Leadership Subscales and Team Learning Dimension

Results of Analysis

	Variable	*B*	*SH*	*β*	*t*	*p*
Technological Leadership	Constant	1.579	.186		8.488	.000
	Human Centrality	.326	.078	.307	4.208	.000
	Vision	-.023	.083	-.024	-.275	.783
	Communication and Cooperation	.070	.083	.070	.843	.400
	Support	.259	.082	.258	3.165	.002
R=0.569	R^2=0.324			p=0.000		

p <.050* p <.010** p < .000***

According to the data reflected in Table 9, a significant relationship was found between Technological Leadership sub-dimensions and Learning School "Learning as a Team" sub-dimension prediction (p<0.01). Accordingly, R^2 (R Squared)=.324 was found. This value tells us that 32% of the variance of the dependent variable Learning School "Learning as a Team" sub-dimension can be explained by the technological leadership levels of school administrators. According to the results of the analysis, a significant relationship was found between Learning as a Team and the sub-dimensions of Human Centeredness and Support, while a significant relationship was found between the sub-dimensions of Vision and Communication and Collaboration. dimensions were not found to have a significant relationship.

According to Table 9, a one-point increase in the Technological Leadership "Human Centeredness" level of school administrators is associated with a .326 increase in the Learning School "Team Learning" sub-dimension level reported by educators (p=.001). A one-point increase in the level of Technological Leadership "Support" is associated with a .259 point increase in the level of the Learning School "Learning as a Team" sub-dimension (p=.002).

Table 10

Multiple Regression Analysis Between Technological Leadership Sub-Dimensions and Mental Models Dimension Results

	Variable	***B***	***SH***	***β***	***t***	***p***
Technological Leadership	Constant	.836	.175		4.772	.000
	Human Centrality	.285	.073	.249	3.895	.000
	Vision	.235	.078	.230	3.003	.003
	Communication and Cooperation	.064	.078	.061	0.828	.408
	Support	.224	.077	.208	2.912	.004
R=0.692	R^2=0.479		p=0.000			

p <.050* p <.010** P < .000***

According to the data reflected in Table 10, the predictive relationship between Technological Leadership sub-dimensions and Learning School "Mental Models" sub-dimension was found significant (p<0.01). Accordingly, R² (R Squared)=.479 was found. This value tells us that 48% of the dependent variable Learning School "Mental Models" sub-dimension can be explained by the technological leadership levels of school administrators. According to the results of the analysis, a significant relationship was found between the Mental Models sub-dimension and the Human Centeredness, Vision and Support sub-dimensions, while no significant relationship was found between the Communication and Collaboration sub-dimension.

According to Table 11, school administrators a one-point increase in the level of Technological Leadership "Human Centeredness" is associated with a .285 increase in the level of the Learning School "Mental Models" sub-dimension reported by educators (p=.000). A one point increase in the level of Technological Leadership "Vision" is associated with a 0.235 point increase in the level of the Learning School "Mental Models" sub-dimension (p=.003). A 1-point increase in the Technological Leadership "Support" level is associated with a 0.224-point increase in the level of the Learning School "Mental Models" sub-dimension (p=.004).

Table 11

Multiple Regression Analysis Between Technological Leadership Subscales and Shared Vision Dimension Results

	Variable	**B**	**SH**	**β**	**t**	**p**
Technological Leadership	Constant	.836	.182		4.594	.000
	Human Centrality	.211	.076	0.180	2.773	.006
	Vision	.242	.081	0.232	2.986	.003
	Communication and Cooperation	.127	.081	0.116	1.566	.118
	Support	.233	.080	0.11	2.909	.004
R=0.683	R^2=0.466		p=0.000			

p <.050* p <.010** p < .000***

According to the data reflected in Table 11, the prediction of Technological Leadership sub-dimensions and Learning School "Vision" sub-dimension was found significant (p<0.01). Accordingly, R² (R Squared) = .466. This value tells us that 47% of the dependent variable Learning School "Shared

Vision" sub-dimension is explained by the technological leadership levels of school administrators. According to the results of the analysis, a significant relationship was found between Shared Vision and Human Centeredness, Vision and Support sub-dimensions, while no significant relationship was found between Communication and Collaboration sub-dimension.

According to Table 11, a one point increase in the Technological Leadership "Human Centeredness" level of school administrators is associated with a 0.211 increase in the Learning School "Shared Vision" sub-dimension level reported by educators (p=.006). A one point increase in the Technological Leadership "Vision" level is associated with a 0.242 point increase in the level of the Learning School "Shared Vision" sub-dimension (p=.003). A 1-point increase in the level of Technological Leadership "Support" is associated with a 0.233 point increase in the level of the Learning School "Shared Vision" sub-dimension (p=.003). is associated with an increase of one point (p=.004).

Table 12

Results of Multiple Regression Analysis between Technological Leadership Subdimensions and Personal Dominance Subdimension

	Variable	**B**	**SH**	**β**	**t**	**p**
Technological Leadership	Constant	2.098	.172		12.230	.000
	Human Centrality	.156	.072	.160	2.183	.030
	Vision	.029	.077	.033	.375	.708
	Communication and Cooperation	.130	.076	.144	1.713	.087
	Support	.246	.075	.268	3.260	.001
R=0.516	R^2=0.31			P=0.00		

p <.050* p <.010** p < .000***

According to the data reflected in Table 12, the predictive relationship between Technological Leadership sub-dimensions and Learning School "Personal Mastery" sub-dimension was found significant (p<0.01). Accordingly, R^2 (R Squared) = .31. This value tells us that 31% of the dependent variable Learning School "Personal Mastery" sub-dimension is explained by the technological leadership levels of school administrators. According to the results of the analysis, a significant relationship was found between Personal Mastery and Human Centeredness and Support sub-dimensions, while no significant relationship was found between Vision and Communication and Collaboration sub-dimensions.

According to Table 12, a one point increase in the Technological Leadership "Human Centeredness" level of school administrators is associated with a 0.156 increase in the Learning School "Personal Mastery" sub-dimension level reported by educators (p=.030). A one point increase in the level of Technological Leadership "Support" is associated with a 0.246 point increase in the level of the Learning School "Personal Mastery" sub-dimension (p=.001).

DISCUSSION AND RECOMMENDATIONS

In this part of the study, the findings obtained regarding the technological leadership levels of the school administrators and the learning school levels of the teachers participating in the research, the examination of the measurements of the two scales according to personal variables and the discussion of the results are included.

Comments on the Sub-Problems of the Research

Discussions Related to the First Sub-Problem

When the findings related to the first sub-problem of the research, which is the technological leadership levels of school administrators, are examined, it is seen that the average levels of the sub-dimensions of school administrators are "Support", "Human Centeredness", "Communication and

Cooperation" and "Vision". According to the results, school administrators' technological leadership levels of Human Centeredness, Vision, Communication and Cooperation, and Support dimensions of technological leadership levels are at the level of "I agree". In the research, it was seen that the technological leadership competencies of school administrators were high. The high level of technological leadership behaviors of school administrators can be considered because of the increase in the prevalence and use of coding, robotic coding and distance education, especially with the recent developments (such as the pandemic). It can be thought that school administrators must realize education and training with the intensity of technological infrastructure with the distance education process. It can be said that school administrators must show technological leadership behaviors more intensively than before. As similar results in the literature, Sincar and Aslan (2011) in their study on the technological leadership roles of school administrators found that school administrators were most adequate in the Support dimension and least adequate in the Communication and Cooperation sub-dimension; Şişman Eren (2010) found that school administrators exhibited high level leadership behaviors in the processes of planning, providing and using technology in education and training; they had moderate leadership behaviors in the field of Support, Management and Operations. Akıllı (2019) stated that school administrators saw the level of technological leadership at the level of "agree". Alan Seay (2004) found that school administrators had the highest level of technological leadership in technological support and maintenance sub-dimensions and the lowest level of vision sub-dimension. Afshari, Bakar, Luan, Samah, and Fooi (2008) also stated in their study that the technological leadership behaviors of school administrators are at a medium level.

When the sub-items are examined according to the "Human Centeredness" sub-dimension of Technological Leadership, it is seen that the highest level belongs to the item "They use the internet service to ensure in-school communication with all members of the school." It is seen that it belongs to the item and has a value. This situation can be stated that it is an expected result that school administrators benefit from internet services in the communication process within the school, especially in centralized, large schools with a high number of personnel. Especially with the pandemic, it can be thought that school administrators tend to use active internet environments to notify the teachers at school about official documents and to make directions. When the sub-items were examined according to the Technological Leadership "Human Centeredness" sub-dimension, the item with the lowest level was "They consult the opinions of students for the effective use of educational technologies at school." It was seen that it was the item. The fact that students' opinions about educational technologies are not taken reveals the necessity to ask the question of how much educational technologies can be utilized. Because it can be stated that the level of utilization of educational technologies by students, who are the target group in educational planning, and their wishes and opportunities are not revealed. School management, planning independent of the target audience in educational technology planning may hinder educational efficiency. Especially in the pandemic process, students, who are the target audience, play an active stakeholder role in the planning of educational technologies. to undertake the task.

When the items belonging to the vision sub-dimension are examined, it is seen that the item "They support the views on the implementation of educational technology plans at school." has the highest average. With the pandemic process, school administrators are in a period when educational technologies are more active. It can be said that MoNE and school administrators are trying to direct teachers and students to learn eba and other educational software to realize distance education processes effectively. When the items belonging to the vision sub-dimension are analyzed, it is seen that the item "They have long-term technological development plans" has the lowest average. Based on these findings, it can be said that school administrators do not use technology in long-term planning in their technological leadership behaviors. The inadequacies experienced in long-term technological planning can be thought to be the determination of the term of office as a 4-year period in schools, the expectation of MoNE support in technological planning, or that school administrators put technological planning in the second plan. School administrators may be inadequate in following the innovations of technology by focusing on the technological usage skills of their own period. In the

qualitative study conducted by Güllüoğlu (2021), it was stated that school administrators' technological planning is very difficult due to the tenure of school administrators. Öztapan (2020) stated that "They have long-term technological development plans." It was seen that the item had the lowest score. Sincar (2011) and Yumlu (2020) stated that school administrators' competence to make long-term technological use and planning is at a medium level.

The Communication and Collaboration sub-dimension has the highest mean with the item "They use technology to ensure the development and innovation of the school." It can be said that during the pandemic, communication and cooperation in educational institutions have been provided more than the technological environment. School administrators may prioritize integrating technology into educational environments at a time when technological development and innovation are imperative in our age. Communication and Collaboration sub-dimension has the lowest average with the statement of the item "They form a technology board that will represent all members of the school in order to apply the plans for educational technologies to the learning-teaching processes." Based on the findings obtained in the research, it can be said that technological planning within the school is planned only by school administrators. Considering the infrastructure problems of educational technologies, especially during the pandemic process, it can be said that the importance of having a board where stakeholders can express their needs and opinions has increased. It can be said that it is not possible for school administrators to achieve the desired level of efficiency by carrying out educational planning, implementation, and evaluation processes independently from stakeholders. School administrators acting by considering the support and opinions of all stakeholders in the planning and implementation of educational technologies will contribute to cooperation and communication processes in the organization.

It was seen that the item "They enable teachers to benefit from the opportunities brought by technology in order to enrich learning-teaching environments" of the support sub-dimension had the highest mean value. The fact that the support sub-dimension has the highest scores in this study may be due to the fact that the study was conducted in district centers where technological support can be accessed more easily or due to the increase in technological support in education due to the pandemic. The item of the support sub-dimension "They organize technological environments that will respond to the needs of students." It was seen that the item had the lowest average. It can be said that students do not effectively access technological support in distance education processes. Considering the financial difficulties experienced in schools, it can be stated that MoNE technological investments are not sufficient for the number of students in schools and the provision of technological infrastructure. It was observed that students had difficulty especially in participating in live lessons in the distance and diluted education models carried out by MoNE during the pandemic process. In particular, the planning of live lessons in a synchronous manner made it even more difficult for students to access the lessons. On the other hand, it also encountered situations where our distance education infrastructure could not handle synchronous education. This problem can be solved with flipped classroom models. It is a model that supports students to realize their education from synchronous and asynchronous virtual environments regardless of time and place constraints (Talbert, 2012; Toytok, 2021).

In the research, when the mean levels of the sub-dimensions of the learning school levels are ranked from higher to lower, it is seen as Personal Dominance Sub-dimension, Team Learning Sub-dimension, Shared Vision Sub-dimension, and Mental Models Sub-dimension. According to the results, it can be stated that the Learning in Teams, Mental models, Shared Vision, and Personal Dominance sub-dimensions of the Learning School Scale are high. When the findings related to the learning school levels are analyzed, it is seen that the scores of the findings are very close to each other.

The fact that Personal Mastery has a higher score than the other sub-dimensions can be considered as the educators prioritizing their professional development. The lowest item mean in the study was "6. Every teacher in our school supports each other in learning as a team." It can be said that the fact that this item is the lowest in the study supports this view. Similarly in the literature, Esen (2021),

when the sub-dimensions of the learning school scale are examined, it is seen that the highest score of educators' perceptions is the sub-dimension "personal dominance" and the lowest score is the sub-dimension "mental models". In his study, Uysal (2021) stated that the scores of the sub-dimensions of the learning school levels are Personal Dominance, Team Learning, Shared Vision, and Mental models. In the study conducted by Durdağı and Sezer (2014), the average scores related to the learning school level were found in the order of mental models, team learning, system thinking, personal mastery and shared vision. Safia (2020) found that the learning school had the highest arithmetic mean in the personal mastery sub-dimension and the lowest arithmetic mean in the mental models dimension. Kara (2019) found that the learning school scores were generally high and that the "Personal Dominance" and "Mental Models" sub-dimensions had the highest mean with a small mean difference. As seen in the literature, it is seen that educators focus on personal development rather than team learning and development processes within the school. This orientation of educators can be thought to be the orientation that occurs due to the differentiation of their own professional development goals or the difficulties of team learning processes.

Discussions Related to the Second Sub-Problem

Do the Technological Leadership Levels of the Educators Participating in the Study Show a Significant Difference Between the Independent Variables of School Type and Position Type? Regarding the Sub-Objective Findings

It was determined that there was a significant relationship in all sub-dimensions of the technological leadership scale according to the type of school in which the educators work. It was seen that the Human Centeredness sub-dimension scores of the technological leadership scale of the educators working in high school were higher than the scores of the educators working in primary school. It can be thought that school administrators working in high school type are oriented towards communication, decision-making and management style in a human-centered way depending on the characteristics of the age group receiving education. Especially as they enter adolescence, the individual differences seen in students become more important in communication processes. It can be concluded that school administrators focus on human-centeredness in technological leadership roles according to the characteristics of this period.

According to the school type of the educators who participated in the research, it was seen that the averages of the educators working in the "Vision" sub-dimension of the educators who participated in the research were ranked as high school, elementary school and middle school from higher to lower. It can be considered that the school administrators working in high schools have higher values due to their professional competencies and their goals to provide their students with higher level informatics competencies. Irmak (2015) stated that there is a significant relationship between the technological leadership behaviors of school administrators according to the type of school. Demirsoy (2016) used the scale of "The Level of Technological Leadership Competencies in School Administrators" and found that the scores of primary school teachers in the sub-dimensions of "Visionary Leadership", "Digital Age Learning Culture" and "Excellence in Professional Practice" were higher than the scores of secondary and high school teachers. As an example of different results in the literature, Gary Gene Ury (2003), in his study, did not find a significant relationship between the technological leadership levels of school administrators working in schools at the k12 level (all schools at the primary, secondary and high school level in the USA).

It was seen that the Communication and Collaboration sub-dimension scores of the technological leadership scale of the educators working in high school were higher than those of the educators working in primary school. Considering that students studying in high school have more competencies over technological devices than students studying in primary school, it is expected that educators working in high school would have a higher average. In addition, it can be said that educators working in high school provide social communication with their students with information devices more than educators working in primary schools.

According to the school type of the educators who participated in the study, it was seen that the averages of the educators working in the "Support" sub-dimension of the educators who participated in the study were ranked as high school, elementary school, and secondary school type from higher to lower. It can be said that educators working in the high school school type receive more support than educators working in the other two school types in the use and teaching of technological planning. Considering that high school students are more advanced than lower age levels in technological competence and use, it may be possible for educators to receive more support. In Engür's (2014) study, the type of school they worked in created significant differences in teachers' technological leadership views. According to Hayytov's (2013) study, administrators' views on technology leadership roles differ significantly according to school type. It does not exist.

In this study, when educators were evaluated in terms of their duties within the school, they were analyzed in three categories as manager, assistant manager, and teacher. It was seen that there was a significant correlation between all sub-dimensions of school administrators' technological leadership levels of the teachers who were assistant managers and educators who were only teachers. It was determined that the technological leadership levels of the teachers who were working as assistant managers in the school were higher in all sub-dimensions. It can be thought that assistant principals in school management exhibit technological leadership more actively on all stakeholders such as teachers, parents and students. Especially with the pandemic processes, it can be said that vice principals focus more intensely than teachers in technological planning, management, and decision-making processes. In the study conducted by Yumlu (2020), it was concluded that there was no significant relationship between the technological leadership levels of school administrators and teachers. In the studies conducted by Gerçek (2016) and Cantürk (2016), it was concluded that there was a significant relationship between teachers and assistant managers.

Discussion on the Third Sub-Problem

When the results of the analyzes are analyzed, it is seen that the Technological Leadership levels of school administrators and the Learning School "Learning as a Team" sub-dimension have a significant predictive value. According to the results of the analysis, a positive and high level relationship was found between the sub-dimension of the Learning School scale, Learning as a Team, and the sub-dimensions of Human Centeredness and Support, while no significant relationship was found between the sub-dimensions of Vision and Communication and Collaboration. Accordingly, as the level of human-centeredness and support sub-dimensions of school administrators' technological leadership roles increases, the level of team learning also increases. Based on the findings, it can be said that school administrators' acting by centering stakeholders in stages such as technological planning, implementation and evaluation and providing technological support play a role in increasing the level of team learning.

According to the results of the analysis, a significant relationship was found between the Mental Models sub-dimension and the Human Centeredness, Vision and Support sub-dimensions, while no significant relationship was found between the Communication and Collaboration sub-dimension. Based on the findings, as the level of human-centeredness, vision and support sub-dimensions of school administrators' technological leadership roles increases, the level of mental models also increases. Based on this finding, it can be stated that when school administrators create visions that center and support stakeholders in technological planning at school, they positively affect the learning-based mental patterns of stakeholders. It can be stated that stakeholders move away from their prejudices in order to provide the necessary support for the vision in the organization and are more prone to learning in line with common goals. School administrators are expected to support stakeholders' personal and professional development by moving away from prejudices with their technological leader role.

In the research, a positive and significant relationship was found between Shared Vision and Human Centeredness, Vision and Support sub-dimensions, while no significant relationship was found with Communication and Collaboration sub-dimension. It can be concluded that school administrators as technological leaders in schools motivate stakeholders to act in line with common goals as they exhibit human-centered approaches. It can be thought that school administrators, as technological leaders in schools, creating a common vision with stakeholders for the effective use and integration of technology in the institution and providing the necessary support increases the stakeholders' desire for further development and commitment for the common goals of the school.

In the study, a positive and significant relationship was found between Personal Mastery and Human Centeredness and Support sub-dimensions, while no significant relationship was found between Vision and Communication and Collaboration sub-dimensions. It can be said that when stakeholders are involved in technological decisions and plans by school administrators, their level of displaying their skills and abilities increases. It can be said that as the technological support of school administrators increases, the behaviors and skills of stakeholders to perform their duties increase. School administrators are expected to provide the necessary technological support for stakeholders to exhibit their skills in the organization. It can be said that when stakeholders receive the necessary motivation and support, it is expected that the skills they show in the organization will increase.

It can be stated that school administrators' displaying a dominant management and communication in the areas of human center, vision, communication and cooperation and support will positively affect teachers' perceptions of learning schools. It can be said that school administrators' effective realization of the roles of technological leadership sub-dimensions within the school is effective in the formation of the learning school structure. The realization of technological leadership roles by school administrators will direct the stakeholders in the school to a collective action and purpose, create positive judgments on personal and institutional development, and have positive effects on the development of personal talents. In the literature, Collins (2016), in his study to determine the function of leadership teams in schools in motivating practices consistent with organizational learning, shows that leadership teams support the promotion of a collaborative environment, knowledge building, and the development of shared ideas about teaching and learning.

Recommendations

Suggestions for Researchers

Comparisons can be made by examining the variables addressed in the study in different sample and population groups.

This study can be conducted with a sample consisting only of school administrators and the results can be compared.

Qualitative research can be conducted to collect more detailed information on the same research topic.

Suggestions for Practitioners

Based on the lowest items in the technological leadership sub-dimensions in the research, technology boards can be established in schools to represent all stakeholders for the planning, implementation, and evaluation of educational technologies. With the boards formed in schools, it can be suggested to make educational technology action plans at the beginning of each semester in accordance with the educational policies of the Ministry of National Education and the province.

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