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Examining Teachers' Perspectives on School Principals' Digital Leadership Roles and Technology Capabilities during the COVID-19 Pandemic

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Abstract: The current study investigates the perspectives and experiences of teachers regarding their school principal's digital leadership roles and technology capabilities during the COVID-19 pandemic. The research was conducted using a case study-based qualitative approach, and with a study group consisting of 89 teachers holding a Master's degree. Maximum diversity sampling, one of the purposive sampling methods, was preferred in the determination of the study group, and the data obtained from the research were analyzed through content analysis. The five main themes determined based on the perceptions and experiences of the participants are listed as: "Digital technology usage, support for the digital transformation, support for technology-based professional development, support for digital learning culture, and digital leadership skills." The results of the research revealed that the level of use of digital technologies by school principals during the COVID-19 pandemic was perceived as adequate by teachers. In addition, it was determined that school principals support digital transformation and technology-based professional development in schools. Furthermore, within the scope of the research, it was determined that school principals contribute to the construction of a digital learning culture in schools. The results of the study revealed that school principals' digital leadership skills were clustered under three categories: technology use, managerial skills, and individual skills. As a result, in order to realize digital transformation within the context of K-12 education, school principals must first demonstrate their digital leadership and actively support the establishment of a digital learning culture in their schools.

Keywords: COVID-19; pandemic; digital leadership; technology capabilities; school principal; teachers; K-12 education

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1. Introduction

It is well known that education and teaching practices are affected by technological developments. The ubiquitous spread of information and communication technologies in recent years has forced educational institutions to undergo a digital transformation so as to keep up with the today's technological age. Educational activities have become sustainable in virtually all environments and under virtually all conditions, with interactive whiteboards having long since replaced the traditional blackboard in most schools. Changes emerging today include revised job definitions, changing patterns of daily life, and the desire for economic value; together they represent the primary results of this digital transformation [1–3]. The fast-paced development and changes seen in technology have profoundly affected the teaching process, changing the methods for accessing information as well as the speed at which it is accessed [4]. In this digital age, radical

transformations have been seen in educational practices, as in almost every field, and the necessity for educational institutions to keep up with this digital transformation trend is clear. The technological devices predominantly used in recent years and the sustainability of education across virtually all conditions have emerged as a result of the sector's digital transformation.

A leading factor in the digital transformation of educational institutions has undoubtedly been the vision of its leaders. To a large extent, digital transformation capability can be determined by the clarity of the digital strategy employed by leaders who support a culture capable of change and fostering new ideas and practices. Leaders should also be able to consider whether or not different digital technologies or approaches can help make these changes happen in actuality. They also need to be able to understand which aspects of the current culture will drive a more comprehensive form of digital transformation [5].

Digitalization is a global transformation that applies not only in terms of an economy, but across virtually all areas of human life. Governments worldwide, however, are at varying different stages of digital transformation according to their priorities for establishing a functioning digital economy based on their national agenda [6]. In this process of digital transformation, organizational administrators cannot distance themselves from this emerging and ongoing radical process of change [7,8]. As known, change within organizations almost always starts with the senior administration or executive management function, but for a successful transformation, leaders need to be able to motivate their employees and to successfully direct them towards the goals of the organization. True digital transformation within organizations can only happen with leaders who are capable of successfully managing the entire process [9,10].

2. Literature Review

In the age in which we live, the concepts of digital transformation or Industry 4.0 are often mentioned, and these concepts continue to affect almost all areas of modern society. Especially following Industry 4.0, digital transformation is seen as a process of change that can generally only be realized through the application of technological elements. Industry 4.0, also referred to as the digitalization of industry or the digital age, is expressed as an institution's digitalization of all its work and work-related processes and practices [11]. With the rapid developments seen in the digital world, this revolution in technology and science has minimized human and machine cooperation and made it largely autonomous [12]. In this context, in the era of Industry 4.0, organizations now have to provide information exchange between its business processes, machines, and its employees, and obtain and analyze data on all its products, as well as to support the formation of an integrated network for the purpose of evaluating and improving performance for the advancement of its business [13].

Digital leaders differ from non-leaders with different skillsets, attitudes, knowledge, and their professional and personal experiences. Digital leaders must be flexible, adaptable, and hungry for intellectual curiosity and new knowledge. They should be open to continuous learning by seeking solutions globally and should constantly encourage their collaborators and followers to learn [8,14].

Sheninger [15] defined digital leaders in education as individuals who can set direction, influence others, initiate sustainable change based on knowledge, and build relationships so as to anticipate changes that are important to the success of the school's future. Digital leadership is the application of effective strategies to use an organization's digital data to achieve its business goals. In this sense, digital leadership can be applied at both the institutional and individual level [16]. In other words, digital leadership involves the use of technology extensively to improve the lives, happiness, and conditions of others [17]. Zhong [18] defined digital leadership in education as accepting, adopting, and applying new technologies in order to transform schools into digital-age places of learning.

In the literature, many studies have attempted to explain the dimensions, pillars, standards, and competencies of digital leadership. For example, Sheninger [15] mentioned

the dimensions of digital leadership as being communication, public relations, branding, student participation/learning, professional growth/development, reimagining areas, and environments of earnings and opportunity. Sheninger [15] also stated that there are certain areas that can be improved in the culture of all schools, especially through the use of existing technology, mainly social media, and that any educator or leader can begin to harness the power of technology to change professional practices. Furthermore, Sheninger [15] listed the elements of digital leadership according to five dimensions as visionary leadership, learning culture in the digital age, excellence in professional practices, systemic improvement, and digital citizenship. In this sense, the aim of school administrators is to develop and lead a common vision for the excellence of the institution, to create a digital learning culture and to encourage innovation, the creation of professional learning environments, and the appropriate use of information technologies [10,19].

Dependence on technology and the age we live in requires the evolution of leadership practices to create schools that are able to adapt to the latest technological developments [20]. In terms of increasing the effectiveness of educational organizations, it is of significant importance for administrators to possess the appropriate leadership characteristics, and to be able to guide the institution's employees throughout the change process [21]. The most important task facing today's school leaders is to raise individuals who are compatible with the current digital age. The digital leadership roles of school administrators are, therefore, now accepted as an important parameter. The overriding mission of leaders is to overcome difficulties and obstacles by guiding individuals in the right direction. During the COVID-19 pandemic, it became urgent for both educational leaders and teachers at all levels to acquire substantial digital skills. From this perspective, administrators should first aim to address inadequacies related to their own technological knowledge and skills in order to guide the digital development within their schools, to provide appropriate guidance, and facilitate the appropriate usage of technology within the school learning environment [16,22].

Industry 4.0 has not only affected businesses, management processes, and policies, but also the education sector [23]. The digital transformation of schools in the digital age has become an educational priority, and from this perspective, digital content plays a fundamental role in attempting to improve the quality of education [24]. In recent years, new technologies have begun to be used in an ongoing digital transformation across the board in education, and to increase the quality of the education on offer. In Turkey, the Education Information Network (EBA) was developed and put into practice as a socially qualified national educational network for digital content. EBA offers all the course materials that teachers and students need within an accessible online environment. In the digital age, it can be said that digital transformation has taken place in the field of education, not only in learning environments but also in terms of information systems. This transformation has also been reflected across educational institutions with the fourth industrial revolution (Industry 4.0). In this context, it is emphasized that there are information systems used in educational activities, school management processes, documentation, as well as for finance and expenditure transactions.

On a global scale, educational practices inevitably face the occasional interruption for various reasons or are conducted according to varying different methods, and with equally varying rates of success. From this perspective, it may be said that there are a number of different reasons that drive digitalization in education apart from simply the era of technological development. For example, climate conditions worldwide, natural disasters, civil unrest, or conflict, as well as health-related events such as the COVID-19 pandemic can all significantly disrupt the delivery of education [25].

The global adoption of social distancing, a mitigation policy introduced by the World Health Organization in order to prevent the spread of COVID-19, forced educational institutions at all levels to immediately close their doors to face-to-face classroom-based education. This move caused an immediate and widespread suspension of traditional teaching and learning methods that affected millions of learners worldwide [26–28]. COVID-

19 effectively halted face-to-face education on almost a global scale, including throughout many developed and developing countries. During the initial months of the pandemic, many countries attempted to overcome this problem through the offering of various forms of emergency online distance education. With one of the most effective ways to combat the spread of such a virus, social distancing was applied to teaching and learning activities with educational institutions moving tuition to various online environments such as Zoom, Moodle, Skype, and Panopto [29]. During the COVID-19 pandemic process, the obligation of both teachers and administrators to utilize digital technologies in education emerged. However, during the troubling and difficult period of the pandemic, school administrators needed to exhibit clear leadership regarding the effective management of digital technology usage within their institution.

Making effective use of the available technology to support learning, as well as to advance pedagogical practices in the (virtual) classroom, formed one of the most critical issues faced by educational administrators. Even prior to the pandemic, technological changes in the digital age had pushed many schooling systems to integrate innovative technologies into the classroom, as well as the associated changes to pedagogical practices and the school curricula [30]. Supporting school administrators as digital leaders and developing professional digital learning opportunities can facilitate the self-development of both teachers and students. In addition to their many other responsibilities, it is very important for school leaders to acquire the necessary knowledge and skills in order to be effective technology leaders [31]. Training of various types may be needed in order for school administrators to embrace digital leadership and to fully understand the digital learning competencies that need to be integrated into working processes employed by their teaching staff [32]. In fact, school administrators often take the initiative to learn technology usage voluntarily, by planning for the professional development of their teachers in terms of technology usage and fulfilling their school management and digital leadership roles through the application of digital technology [33,34].

Professional learning opportunities in line with the digital leadership vision are very important for teachers in the implementation process. Teachers and administrators can gain the technical skills and confidence necessary to implement new digital literacy through opportunities for continuous, consistent, and refined professional development. Transformations that occur with digital density and management density also change the vision of leadership and this has influenced the education sector to rethink digital leadership [35–37]. Administrators in educational organizations need certain leadership characteristics in order to increase the effectiveness of the organization by guiding its employees during times of transformation and change [21]. This was especially clear during the crisis conditions brought on by COVID-19, with school administrators expected to adopt and exhibit digital leadership through largely self-improvement.

School leaders faced an extraordinary educational crisis following the national and local governments worldwide taking urgent decisions to close all schools to in-person education due to the COVID-19 outbreak. Although there have been a significant number of studies published in the literature regarding leadership in times of crisis e.g., [16,22,38–45], there exists a gap in the literature with regards to school principals' digital leadership practices during the COVID-19 pandemic. It is thought that examining the perceptions and experiences of teachers on the digital leadership roles of their school principals will contribute to the relevant literature during the ongoing pandemic, where information and communication technologies are still extensively used within educational practices.

Accordingly, the current study was conceived in order to investigate teachers' perspectives on and experiences of school principals' digital leadership roles and technology capabilities during the COVID-19 pandemic. In line with this main purpose, answers to the following research questions were sought:

- RQ1. How does your school principal use digital technologies in management processes?

- RQ2. What support does your school principal provide for the realization of digital transformation within your institution?
- RQ3. What support does your school principal provide for technology-based professional development within your institution?
- RQ4. What support does your school principal provide for the creation of a digital learning culture within your institution?
- RQ5. What do you think a school principal's digital leadership skills should be?

3. Materials and Methods

3.1. Study Design

A case-study research method, which is one of the qualitative research approaches, was utilized in this study [46]. Case studies allow the researcher to analyze and understand real-life events in depth with a holistic approach. In addition, while the case study research approach is used to understand current and real-life events, it does not allow the researcher to make generalizations about similar cases [47,48]. Qualitative research is a preferred research method in terms of benefiting from the experiences of those researched and in understanding their feelings and thoughts. In addition, qualitative research is considered important in terms of determining how people interpret their own lives and experiences, and how they attribute meaning to those experiences [49,50]. In qualitative research, the phenomenon or event that constitutes the subject of the research should be examined within its natural environment [51]. In the current research, the participant teachers were able to reveal their perceptions of their school principals' digital leadership roles and technical abilities within a natural working environment for them (schools) and with a realistic and holistic perspective during the period of the COVID-19 pandemic.

3.2. Data Collection

This research was conducted with inservice teachers who were undertaking graduate studies at the Institute of Educational Sciences at Fırat University (Turkey) during the 2021–2022 academic year. In line with the purpose of the research, a semi-structured question form comprised of open-ended questions was used as the study's data collection tool in order to determine the participants' opinions. The data collection tool contains factual questions in order to determine the "demographic characteristics" of the participants, plus questions regarding the "digital leadership roles of school principals" during the COVID-19 pandemic period.

Related literature, similar studies, and other research were examined during the preparation of the open-ended questions used in the data collection tool. Field experts' opinion were sought so as to determine whether or not the questions were suitable to accurately measure the intended situation, and whether or not each question statement was considered understandable for the target participants of the study. In addition, whilst creating the data collection tool (semi-structured question form), attention was paid to principles such as the questions being easy to understand, not deemed to be multidimensional, and non-directive in their questioning [50,52,53].

The prepared open-ended questions were then sent to 17 inservice teachers working in public state schools via e-mail in order that a "preliminary application" (i.e., pilot) could be made. The answers received from this application were evaluated and, following the recommendations made, certain updates applied. Next, the revised questions were presented to field experts as well as experts from the fields of measurement and evaluation. The recommendations of the experts were assessed, and corrections applied where needed to the questions in order to arrive at the semi-structured question form's final form as the study's data collection tool.

Since the research was conducted during the COVID-19 pandemic, the semi-structured question form (data collection tool) was sent to the participant teachers electronically (via e-mail) in order not to place the health of the researchers or the participants at

any unnecessarily risk. Prior to the start of the research, an e-mail was sent to the study group explaining the subject of the research, and to seek their consent to participate (in accordance with the research ethics).

Then, the semi-structured question form (data collection tool), which consisted of five open-ended questions, was sent via e-mail to 96 graduate students (teachers) who had responded positively to the call for participation in the research. The participants were each given seven days to provide their written response to the semi-structured question form (using Microsoft Word). Semi-structured question form responses returned from seven of the participants were excluded from the subsequent analysis due to their containing insufficient or incomplete data. Therefore, the opinions of 89 participants in total were included in the analysis phase of the study.

3.3. Data Analysis

The data obtained from the participants were analyzed according to the content analysis technique [46,51,53]. In addition, five main themes were determined based on the research questions answered by the participants. According to Attride-Stirling [54], identified themes help to explain important points about a study's research questions, and aid in representing the answers or meanings given to each research question. The five main themes determined were (i) digital technology usage, (ii) support for digital transformation, (iii) support for technology-based professional development, (iv) support for digital learning culture, and (v) digital leadership skills. The themes and subthemes of the study are presented as shown in Figure 1.

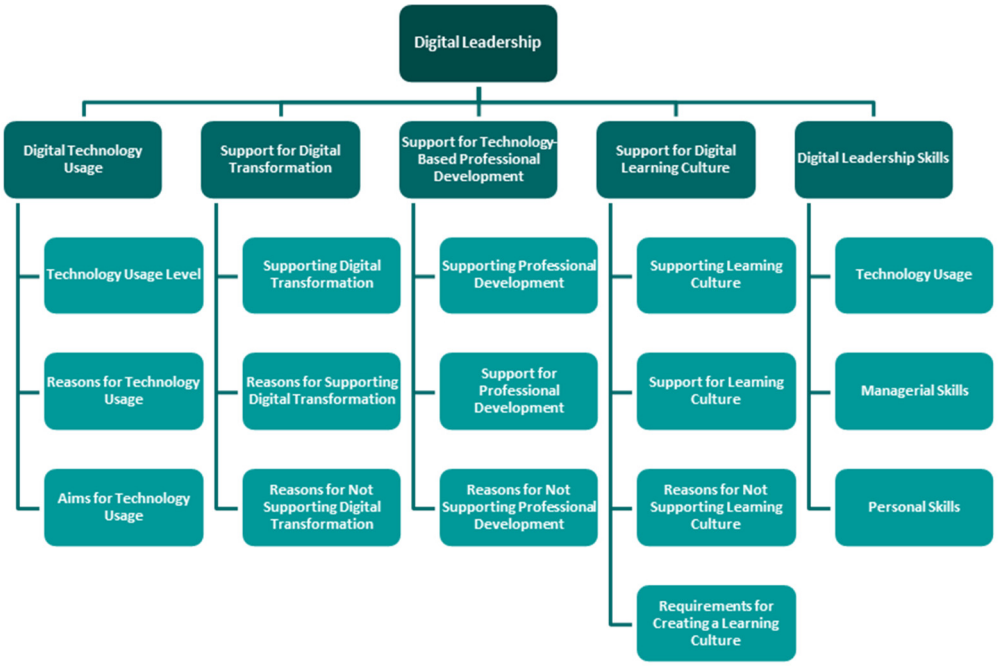

Figure 1. Thematic map showing relationships between themes and subthemes.

The researchers independently read each completed semi-structured question form, and then coded the answers given by the participants according to the five themes. Afterward, the answers were analyzed, and subthemes formed under each of the five themes. Furthermore, the frequency of the subthemes determined in the analysis were recorded, as can be seen in the relevant results tables. This process was carried out by determining similarities and differences between the participants' answers to the questions under each theme and was conducted separately by three different researchers. According to Buyukozturk, Cakmak, Akgun, Karadeniz, and Demirel [55], the use of different people examining research data in qualitative studies can help to increase the validity of the study.

Next, the codes and categories that emerged as a result of the analysis made by each separate researcher were compared, and consensus reached after evaluating each of the differences. The current study used the agreement percentage formula so as to determine the reliability of the content analysis. This was calculated using Miles and Huberman's [56] formula, "Reliability = Consensus/(Agreement + Disagreement) × 100." The general agreement level for all five themes in the current study was calculated as .93. According to Yildirim and Simsek [53], when the percentage of agreement in the reliability calculation is 70% or above, the percentage of reliability is considered to have been reached.

In addition, in qualitative research, consistency analysis should also be conducted in order to ensure the reliability of the study. Therefore, researchers are expected to explain how consistency was achieved during the data collection and data analysis phases of a study [53,57]. The data obtained in the current study were analyzed separately by each researcher and then consistency analysis was conducted. Additionally, direct quotations from research findings and data sources are presented clearly in the tabular findings. Whilst quoting directly from the participants during the presentation of the findings, striking (different opinion), explanatory (conformity to the theme), diversity, and extreme examples criteria were taken into account [58]. During the content analysis conducted by the researchers and when quoting directly, the participants were coded as T1, T2, T3, etc.

During the final stage of the analysis, the findings were explained, correlated, and interpreted. In order to increase reliability in qualitative research, each step followed in the research should be clearly explained in detail [55,59]. Procedures used to increase the validity and reliability of the research in the current study, therefore, included participant selection, development of the data collection tool, collecting the data, independent data analysis by different researchers, reaching consensus on the determined themes through a comparison of the findings, and supporting the findings with direct quotations from the participants.

3.4. Ethical Considerations

Ethics approval for the study was obtained from the Social and Human Sciences Research Ethics Committee of Fırat University, Turkey (Meeting and Decision Protocol Number: 12.02.2021-04/06). All methods and procedures involved in the study were conducted in accordance with the Declaration of Helsinki for the ethical principles on conducting human-based research.

4. Results

4.1. Participants' Characteristics

The working group of the research consisted of 89 teachers (57 male, 32 female) teachers studying as graduate students at Fırat University's Institute of Educational Sciences in Turkey. Maximum variation sampling, one of the purposive sampling methods, was preferred in the determination of the study group. In purposive sampling, researchers use their judgment about who will be selected and selects those who are most suitable for the research [57]. The maximum variation technique, on the other hand, involves identifying and defining the main themes that contain the most significant differences [51]. Within the scope of maximum diversity sampling, attention was paid to the participant teachers working at varying levels of education and from different schools wherever possible. This approach aimed at ensuring maximum diversification in the potential data collection within the possibilities available. Accordingly, the selected teachers worked in preschools, primary schools, middle schools, or high schools, which provided different and rich data in the research. Per the ethics of scientific research, the names of the teachers and the schools at which they work remained confidential, with teachers identified only by coded abbreviations of "T" followed by a number (i.e., T1, T2,...T89).

Sociodemographic information regarding the teachers participating in the research is presented in Figure 2.

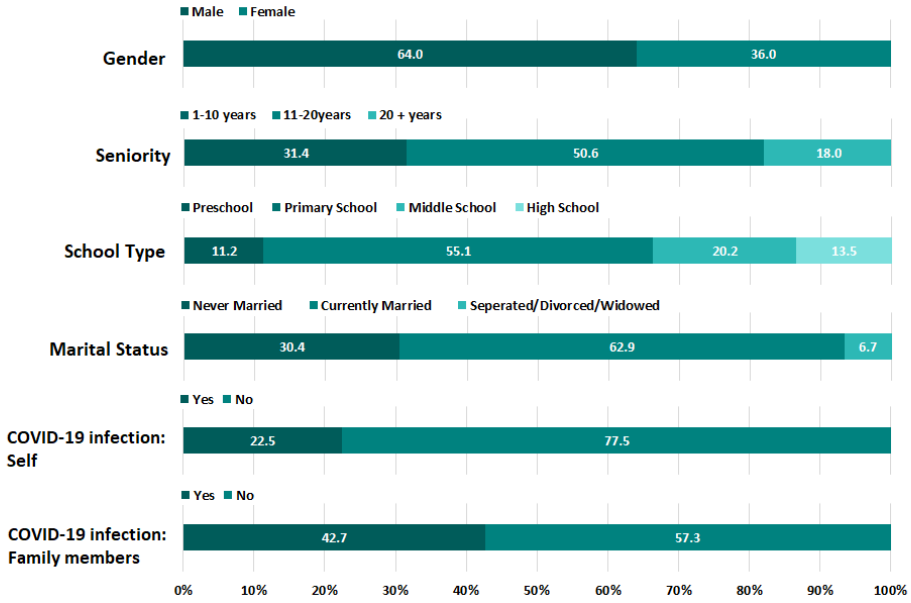

Figure 2. Participants' sociodemographic characteristics.

Of the teachers participating in the study, 57 were male and 32 were female. A total of 28 of the participants had been teaching for 1–10 years, 45 for 11–20 years, and 16 for 20+ years. In terms of school type, 10 worked in preschools, 49 in primary schools, 18 in middle schools, and 12 in high schools. Of the teachers, 27 had never been married, 56 were currently married, and six were separated, divorced, or widowed. While 20 of the participants had been infected with COVID-19 at some point, 69 had never been infected. The number of teachers with COVID-19 infections in their family was 38, whilst the number without an infection in their family was 51.

4.2. Themes

In this section, the findings obtained from the content analysis of the participants' responses to the semi-structured question form are presented according to the study's research questions, which formed the five main themes. In addition, direct quotations from the answers given by the participants in each subtheme are presented in the relevant tables.

4.2.1. Theme 1: Digital Technology Usage

The findings obtained by examining the participant teachers' opinions on the use of digital technologies by their school principals are presented in Table 1.

Table 1. Main Theme 1, subthemes, codes, and most relevant quotes.

Theme	Subthemes	Sample Codes	Supporting Quotations
Digital Technology Usage	Technology usage level	Sufficient	*"My administrator uses digital technologies extremely competently."* [T21]
		Insufficient	*"I do not think that the technological skills of the school principal are sufficient."* [T9]
	Reasons for technology usage	COVID-19 pandemic period	*"Meetings are held online during the pandemic period."* [T16]
			"My administrator shares the necessary documents online." [T54]
		Due to technology age	*"…it motivates us, especially in the current crisis environment (caused by the pandemic)…"* [T22]
			"…in our school, digital technologies are used in the management process." [T41]
		Sustainability in education	*"The school principal especially uses communication applications effectively."* [T21]
			"… digital technologies are used in communication with school personnel, especially during the pandemic process." [T36]
		Organizational productivity	*"The school website is constantly updated; status of the students and the activities carried out were shared."* [T29]
			"… my administrator has consistently contributed to creating a corporate identity." [T67]
			"My school principal keeps up with the information age by using technology effectively." [T59]
		Raise awareness	*"…we owe most of the technological activities in our school to our school administrator."* [T82]
			"…our administration is using WhatsApp, the school's web page, the school's social network, Zoom, EBA, etc. *applications both in interpersonal communication and in school management processes."* [T40]
	Aims for technology usage	Communication with employees	*"…the school administration uses a separate internal communication system and a different system for communicating with its teachers."* [T39]
		News/announcement	*"…we conduct school meetings using Zoom."* [T24]
		Meetings (i.e., Zoom)	*"School management prefers WhatsApp's group application for information and communication."* [T63]
		Educational activities	*"…the use of digital technology is common in my school. In this context, the Educational Information Network (EBA) is used."* [T55]
		Education Information Network (EBA)	*"...in some cases, student follow-up at school and parent-student-teacher meetings can be done* via *social media (Zoom and WhatsApp)."* [T3]
		Management processes	

Theme	Subthemes	Sample Codes	Supporting Quotations
		Communication with students/parents	*"…in the institution, my administrator uses digital technologies in the management process, mutual information flow is provided quickly."* [T17]
		Official document sharing	*"…in the school, information and document sharing is done intensively through instant messaging programs, and it is ensured that the work is carried out faster and more effectively."* [T26]
		Ensuring participation of stakeholders in management process	
		Promotion of school on social media	

When Table 1 is examined, it can be seen that the views of the participant teachers on the use of digital technologies by their school administrators are grouped under three categories; technology usage level, reasons for technology usage, and aims for technology usage. The opinion of school administrators that the level of use of digital technologies was sufficient was frequently repeated by the teachers, whilst only a small number of teachers stated that it was insufficient. Teachers who expressed their opinions on their school administrators' reasons for digital technology usage frequently mentioned it being due to the COVID-19 pandemic, as well as the age of technology, sustainability in education, organizational productivity, and raising awareness.

Teachers who commented on the purpose of digital technology usage by their school principals most frequently mentioned communication with employees, news and announcements, meetings, educational activities, EBA, management processes, communication with students and parents, official document sharing, ensuring the participation of stakeholders in the management process, promotion of the school via social media, information about the management processes, and quick access to information.

4.2.2. Theme 2: Support for Digital Transformation

The opinions of the participant teachers regarding their school principals' support for digital transformation in the schools were analyzed and presented in Table 2.

Table 2. Main Theme 2, subthemes, codes, and most relevant quotes.

Theme	Subthemes	Sample Codes	Supporting Quotations
Support for Digital Transformation	Supporting digital transformation	Supportive	*"The administrator attaches great importance to digital transformation. They are doing their share of the digital transformation."* [T44]
		Non-supportive	*"For digital transformation in education, targets must first be determined and then the adequacy of the infrastructure checked. Today, school administrators do not care enough about this."* [T8]
	Reasons for supporting digital transformation	Effective learning environment	*"…our administrator individually supports digital transformation; and smartboards encourage the use of EBA."* [T34]
		Importance of digital transformation	*"...in this way, it facilitates the student's access to information; It facilitates students' access to information in many fields."* [T12]
		Professional development	

Theme	Subthemes	Sample Codes	Supporting Quotations
		Sustainable communication	*"…provides visual learning support especially for primary school students (with simulation shows), and contributes to the realization of a more effective learning environment."* [T71]
		Effective/efficient service	*"...yes, digital transformation is given due importance in our school"* [T83]
		Effective management process	*"Our school administrator is trying to take the necessary steps for the digital transformation of the school."* [T19]
		Quick access to information	*"…recommends and supports distance learning for the personal and professional development of teachers."* [T30]
		Student success	*"…enables the effective use of smartboards to provide a more productive learning environment."* [T85]
		Enjoyment of digital content	
		Time management	
	Reasons for not supporting digital transformation	Traditional understanding	*"It is very normal for our school principal, who adopts a traditional management style, to be unaware of new technologies; in this case, digital transformation will cause emotional states such as unease, loss of time, anxiety, etc."* [T10]
			"...tries to minimize the anxiety of the employees by using models previously applied in the successful transformation to digital learning (benchmarking)." [T47]
		Limited opportunity	*"…I am not sure if the necessary steps are being taken for digital transformation, as far as I follow, there have been no significant efforts."* [T63]
			"…unfortunately, our school and classrooms are far behind in terms of technology. The inadequacy of our smartboards is a problem in itself." [T59]
			"…some of our projectors are not working, and most of the computers in the classrooms do not work…" [T21]

When Table 2 is examined, it can be seen that the participant teachers' views on the digital transformation of their schools were grouped under three categories: supporting digital transformation, reasons for supporting digital transformation, and reasons for not supporting digital transformation. When the category of school administrators' support for digital transformation was examined, the majority of the teachers stated that their administrators supported it, whilst a much small number stated that their administrators did not support it.

Teachers who commented on the school principals' reasons for supporting digital transformation in schools mentioned effective learning environment the most, as well as the importance of digital transformation, facilitating professional development, sustainable communication, effective and efficient service, effective management process, quick access to information, student success, the enjoyment of digital content, and time management.

Opinions expressed by the teachers regarding why school principals did not support digital transformation in schools were their having a more traditional understanding and limited opportunities.

4.2.3. Theme 3: Support for Technology-Based Professional Development

The opinions of the participant teachers regarding the support for technology-based professional development of school principals are analyzed and presented in Table 3.

Table 3. Main Theme 3, subthemes, codes, and most relevant quotes.

Theme	Subthemes	Sample Codes	Supporting Quotations
Support for Technology-Based Professional Development	Supporting professional development	Supportive	*"…our administrator supports technology-based professional development; doing online meetings…"* [T35]
		Non-supportive	*"…uses technological messaging opportunities that spread information exchange over a long period."* [T9]
	Support provided for professional development	Inservice courses/seminars	*"They are in constant cooperation with teachers, constantly exchanging views to achieve better in technology-based professional development."* [T56]
		Encourage use of technology	*"They encourage teachers to receive inservice training, and seminars are organized in line with the school's facilities."* [T73]
		Information sharing	*"...directs and encourages teachers to central inservice courses."* [T96]
		Collaboration with other teachers	*"…our administrator constantly encourages teachers to take inservice training or face-to-face training for technology-based professional development."* [T23]
		Presentation of technological tools	
	Reasons for not supporting professional development	Seen as additional workload	*"…our administrator sees this as an excessive workload, and we have to take care of ourselves."* [T5]
		Lack of resources/opportunities	*"Obviously, during the pandemic period, training that requires professional development and adaptation of candidate teachers began being conducted* via *online distance education."* [T38]
		Inadequate training	*"…as a result, the pandemic period negatively affects technology-based vocational education, albeit partially."* [T24]
			"Unfortunately, there has been no progress as we would have liked due to a lack of financial resources. Some preschool institutions cannot benefit from smartboard facilities." [T57]

When Table 3 is examined, it can be seen that the teachers' views on technology-based professional development were grouped under three categories: supporting professional development, support provided for professional development, and reasons for not supporting professional development. When the school principals' support for technology-based professional development was examined, the majority of the teachers stated that their administrators supported it, whilst a small number stated that their administrators did not support it. When the support provided for the teachers' professional development was examined, inservice courses and seminars was mentioned the most, followed by encouragement to use technology, information sharing, collaboration with other teachers, and the presentation of technological tools.

When the school principals' reasons for not supporting technology-based professional development were examined, it was mentioned that it was seen as an additional workload, lack of resources and opportunities, and inadequate training.

4.2.4. Theme 4: Support for Digital Learning Culture

The participant teachers' views on the support provided to them by their school principals with regards to the formation of a digital learning culture in their school were analyzed and presented in Table 4.

Table 4. Main Theme 4, subthemes, codes, and most relevant quotes.

Theme	Subthemes	Sample Codes	Supporting Quotations
Support for Digital Learning Culture	Supports a learning culture	Supportive	*"…yes, they provide support. During the pandemic period, EBA had a support room created for students with no access to a computer, tablet, or the Internet at home, and students were allowed to follow their lessons in the EBA support room."* [T80]
		Non-supportive	
	Support provided for a learning culture	Digital learning environments	*"…the teachers are provided with the opportunity to conduct live lessons in fully-equipped classrooms at the school."* [T31]
		Digital media	*"Our administrator provides the necessary support for the formation of a digital learning culture in our school. In this context, teachers and students are encouraged to benefit from digital learning platforms such as EBA."* [T52]
		Technological classrooms	*"...directs teachers to inservice training within the scope of educational technologies."* [T44]
		e-Books	*"…our administrator especially supports the EBA platform due to the COVID-19 pandemic."* [T12]
		e-Exams	*"...we are constantly supported by our administrator regarding digital transformation (e.g., homework, exams, measurement and evaluation, video content, etc.). Through EBA, we see that digital transformation is taking place in our school, albeit partially."* [T63]
	Reasons for not supporting a learning culture	Necessary steps not taken	*"…our administrator cares about digital learning, but is not too concerned with how we do it."* [T81]
			"…some administrators act as if they are interested in digital learning in order not to fall behind their colleagues, but they are not very interested in the functional aspect of digital learning." [T39]
		Workload	*"…for the formation of a digital learning culture in schools, first, our basic perspectives need to change, we should not have to care about this issue."* [T20]
			"Our school administrator makes no effort to create a digital learning culture." [T49]
			"...because our administrator finds it difficult to keep up with the times, perhaps due to their age. It cannot be said that our principal, who shies away from technology, also contributes to the formation of a digital learning culture." [T14]
	Requirements for creating a	Encouragement	*"Our school administrator demonstrates an innovative approach to the use of technology in education, and provides the necessary support to teachers."* [T26]
		Cooperation	
		Innovative approach	

Theme	Subthemes	Sample Codes	Supporting Quotations
	learning culture	Instruction	*"Our administrator supports and encourages cooperation in digital learning, tries to provide professional development opportunities, and appreciates successful teachers."* [T35]
		Tracking	*"…our administrator constantly monitors the implementation of digital learning in classrooms."* [T78]
		Financial support	
		Requirement of information age	*"…our administrator has knowledge in the fields of digitalization and cybernetics. In this context, they support the formation of a digital learning culture in the institution, raise our awareness and encourage us."* [T53]

When Table 4 is examined, it can be seen that the views of the participant teachers regarding their school principals' support of a digital learning culture in their schools were grouped under four categories: supports a learning culture, support provided for a learning culture, reasons for not supporting a learning culture, and requirements for creating a learning culture.

When the opinions of the teachers regarding their school administrators support of a digital learning culture were examined, the majority stated that there was support, whilst a small number stated there being no support. Regarding the support provided by school administrators for the formation of a digital learning culture, the views most frequently mentioned were digital learning environments, digital media, technological classrooms, e-books, and e-exams.

On the category of reasons why school principals did not support the creation of a digital learning culture, the teachers mentioned the necessary steps having not been taken and the workload. With regards to requirements for creating a digital culture in schools, it can be seen that the teachers mentioned encouragement, cooperation, innovative approach, instruction, tracking, financial support, and as a requirement of the information age.

4.2.5. Theme 5: Digital Leadership Skills

The participant teachers' views on the digital leadership skills of their school principals were analyzed and presented in Table 5.

Table 5. Main Theme 5, subthemes, codes, and most relevant quotes.

Theme	Subthemes	Sample Codes	Supporting Quotations
Digital Leadership Skills	Technology usage	Technology capabilities	*"…an effective administrator must be open to innovation, should follow digital trends, and be active in the use of technology."* [T66]
		Encouraging digital technology	*"…the administrator must have effective communication skills that conveys their digital skills."* [T2]
		Keeping up with technology	*"…a school administrator with effective digital leadership skills should motivate all employees in this regard, and increase the quality of education by creating a digital learning culture at school."* [T19]
		Building a digital school culture	*"…the architects of transformation in schools will be digital leaders. For this reason, leaders should constantly follow new trends by using technology effectively."* [T4]
		Digital literacy	

Theme	Subthemes	Sample Codes	Supporting Quotations
	Managerial skills	Change management	*"…digital leaders have high entrepreneurial and technical skills; innovation, and developed critical thinking and conceptual skills."* [T86]
		Innovation management	*"…school leaders need to be 'agents of change.' They should focus on cooperation and teamwork with an 'embracing' attitude towards everyone."* [T64]
		Cooperation	*"...a structure should be created in which responsibilities at school are shared equally by everyone, with employees directed towards common goals."* [T13]
		Visionary	*"…digital leadership requires vision first and foremost; it requires being open to change and innovation."* [T51]
		Entrepreneurship	*"…also, digital leadership requires respect for different cultures, values, and beliefs."* [T70]
		Treating everyone equally	*"…digital leadership requires adopting democratic principles and joint decision making and participation in decisions."* [T30]
		Risk management	
		Sharing responsibility	
		Trust	
		Participation in decisions	
		Motivation	
		Accountability	
		Managing individual differences	
	Personal skills	Being open to learning	*"…digital leadership requires good human relations and communication skills."* [T26]
		Communication skills	*"The digital leader is open to continuous learning; approaches the goals and business results of the organization in a positive way so that their digital identity is developed."* [T18]
		Creativity	*"For digital leadership, reasoning, problem-solving and self-discipline skills are required."* [T47]
		Critical thinking	*"Digital leaders must constantly learn, abandon stereotyping, and be able to empathize."* [T35]
		Problem-solving ability	
		Practical intelligence	
		Global thinking	

When Table 5 is examined, it can be seen that the participant teachers' views on digital leadership skills were grouped under three categories: technology usage, managerial skills, and personal skills. When the indicators related to technology usage by digital leaders are examined, it can be seen that the teachers mentioned technology capabilities, encouraging digital technology, keeping up with technology, building a digital school culture, and digital literacy.

On the category of indicators related to the managerial skills of digital leaders, the views mentioned were change management, innovation management, cooperation, visionary, entrepreneurship, treating everyone equally, risk management, sharing responsibility, trust, participation in decisions, motivation, accountability, and managing individual differences.

When the category of indicators related to the individual skills of a digital leader are examined, it can be seen that the participant teachers mentioned being open to learning, communication skills, creativity, critical thinking, problem-solving ability, practical intelligence, and global thinking.

5. Discussion

The study's results revealed that the level of school principals' digital technology usage was perceived as adequate by the teachers. The teachers emphasized that it was both necessary and important for school principals to make use of the available digital technologies, and that this was especially true during the COVID-19 pandemic period. In addition, the participants emphasized that as a requirement of today's technological age and in terms of the sustainability of current day education, school administrators should possess the ability and know-how to make best use of digital technology. Lubis [60] stated that digital leaders who are able to manage change are better able to maintain the motivation of their employees. Cochrane [61], on the other hand, emphasized the importance of digital skills to strengthen teacher-student communication and cooperation, and for the creation of effective collaborative learning environments.

The results of the current research further revealed that school principals made use of digital technologies for different purposes such as communication with employees, news and announcements about the school, student–parent communication, document sharing, promotion of the school via social media, providing information regarding the management process, and for holding online meetings with the school's stakeholders in the absence of face-to-face meetings due to restrictions in place due to the pandemic. Cuevas López and del Arco Bravo [62] emphasized that the use of technology in leadership practices should be taken into account so as to ensure the efficiency and development of modern educational organizations. In this context, the necessity for school administrators to include new technological developments in their institutions [63] clearly emerged during the COVID-19 pandemic. However, in a study conducted by Aksal [22], it was stated that school principals were aware of digital leadership, but that they needed specific educational and technological infrastructure for the usage and dissemination of emerging technologies in education and for the future development of their schools. Antonopoulou et al. [16] stated that in terms of digital leadership, educators should possess adequate knowledge about the available digital tools, new technologies, and digital capabilities, and that they should participate in quality-focused and new training programs in order to integrate the appropriate technologies into their educational leadership.

The majority of the participant teachers in the current research agreed that their school principals supported digital transformation within their respective institutions. From this perspective, the participants stated that the principals support digital transformation as a means to creating an effective learning environment. Quddus et al. [64] stated that digital leadership and ecological leadership significantly affected the performance of institutions. However, especially during the pandemic period, the school principals who supported digital transformation did so for reasons such as the renewed importance of digital transformation, the provision of professional development opportunities for teaching staff, continuous communication, providing an effective and efficient service, effective management process, faster access to information, as an aid to their students' academic success, to benefit from digital content, and for the purposes of promoting time management. Trenerry et al. [65] emphasized that new digital capabilities can be a means of improving the performance of an organization, as well as for expanding on both products and services. Oz [66] stated that digital school leaders should possess the ability to develop and utilize digital means of communication and digital content. Some of the teachers who participated in the current research stated that their school principals had not supported digital transformation within their institutions. They cited some school principals still having a very traditional understanding of their profession and that their school's physical facilities were significantly limited. In a study by Hamzah, Nasir, and Wahab [67], it was concluded that the ability to plan and organize digital leadership programs is important, as it can help improve students' academic performance despite the circumstances of the COVID-19 crisis.

The results of the current study revealed that school principals support technology-based professional development. According to the participant teachers, the support

provided in this context were based upon inservice courses and seminars being held, encouraging the use of technology, information sharing, cooperation between teachers, and the promotion of technological tools. A small number of the teachers stated that their school administrators did not support technology-based professional development, with the reasons given as there being an assumed additional workload, lack of resources, and insufficient training. According to Aksal [22], effective leaders in the digital age need to support personal and professional development within their organizations at all levels. Similarly, in a study conducted by Molino, Cortese, and Ghislieri [68], it was emphasized that encouraging employees to utilize new technologies in the process of digital transformation can provide both significant motivation and job engagement. In the same study, it was also stated that specialized training on digital skills should be provided to employees as well as all administrators in leadership positions.

Additionally, the opinions of the participant teachers in the current study revealed that school principals are generally supportive of a digital learning culture. On this, it was stated that school principals who supported the creation of a digital learning environments did so through fostering the use of digital media tools, as well as encouraging technology-based classes, and the use of technological tools such as e-books and e-exams. In the digital transformation of schools, not only can the leadership of the administrators help to facilitate this transformation, but also the establishment of a digital culture and environment [24] in which their digital leadership can be developed. Ensuring consistent and reliable discipline, the provision of informative feedback, motivating others, considering both ethical and scientific rules and guidelines when making decisions, planning the mission and vision of an organization, providing consultation, encouraging the wider involvement of employees, developing trust within the organization, and promoting digital literacy are all necessary elements in the establishment of a digital culture [22].

A small number of the participating teachers in the current study mentioned their school principals not being supportive of a digital learning culture. They put forward reasons for this as the school administrators not having taken the necessary steps, and also that it was considered an area of additional workload. However, regarding the formation of a digital learning culture in schools, views such as encouraging employees, cooperation, innovative approach, information, follow-up, and economic support were mentioned by the participants. Similarly, Beytekin and Cigdem [69] concluded in their study that the majority of administrators are innovative pioneers, that they are more dominant in their innovation, and that they are in harmony with the digital leadership characteristics that emerged with Industry 4.0. Canturk and Aksu [70] stated that school administrators design and support the frequent and effective use of technology for learning-teaching activities, and that they try to provide technology-equipped learning environments and learning resources that meet the various individual needs of students.

Digital leadership represents a strategic shift in the mindset and actions of employees to initiate necessary changes that improve teaching, learning, and leadership whilst working to establish and nurture strong relationships with all the relevant stakeholders [71]. In the current study, the participant teachers' opinions regarding the digital leadership skills of the school principals were grouped within three categories: technology usage, managerial skills, and personal skills. In this context, the use of technology was expressed as technology capabilities, encouraging digital technology, keeping up with technology, building a digital school culture, and digital literacy. Philip and Gavrilova Aguilar [72] stated that for corporate leaders, digital literacy was considered an important skill alongside their traditional leadership skills. Indicators related to the managerial skills of digital leadership were listed as change management, innovation management, cooperation, having vision, entrepreneurship, treating everyone equally (as in being impartial and embracing), risk management, responsibility-sharing, trusting, encouraging participation in decision-making, being motivating, accountable, and managing individual differences. Agustina, Kamdi, Hadi, and Nurhadi [73] stated that digital leadership in school principals can positively affect teachers' motivation and encourage them to utilize technology.

In the current study, the participant teachers expressed that the personal skills of digital leadership should include being open to learning, possess communication skills, creativity, be a critical thinker, have problem-solving ability, practical intelligence, and be a global thinker. Benson [74] stated that thinking and communication skills are among the core skills that leaders in the digital age should possess. In this context, the different features required by digital leadership are frequently emphasized in the relevant literature. For example, Aksal [22] stated that digital leaders should be open to change, use technology for cooperation, and have a clear vision. Similarly, in a study conducted by Sahin, Avci, and Anik [75], it was emphasized that change and transformation in digital leadership are both continuous and inevitable. In a study by Klein [76], it was stated that among the characteristics that a digital leader should possess, there should be features such as being a motivating coach, an innovative visionary, being creative, and also a lifelong learner. In addition, skills such as trust and respect come to the fore when analyzing the makeup of a digital leader [77], and as such digital leaders should prefer to establish trust rather than impose control [78]. However, in the research published by Avidov-Ungar, Shamir-Inbal, and Blau [79] on the characteristics of digital leaders, it was stated that the dimensions of change and innovation are actually the more prominent. In many studies it was stated that digital leaders require a forward-looking entrepreneurial mindset [80,81], is cooperative and visionary [82], and can lead the change process [83] with innovativeness and openness to change [84,85].

Limitations and Future Research

Although the current study provides important findings on the digital leadership roles of school principals, it undoubtedly presents certain limitations too. The research was conducted according to the qualitative method of research in order to determine the digital leadership roles of school principals, and, therefore, the sample size of the study was limited. However, due to the COVID-19 pandemic, online tools were deemed necessary for the study's data collection. Therefore, in order to conduct a more comprehensive evaluation of the digital leadership roles and technology capabilities of school principals, it may be recommended to conduct more in-depth research using a larger sample and with the inclusion of different stakeholders, as well as to conduct research based on a mixed method of study in the future.

6. Conclusions

The current study provided an in-depth and detailed examination of the perceptions and experiences of teachers regarding digital leadership during the COVID-19 pandemic period. The research results revealed that the level of school principals' use of digital technologies was adequate, as perceived by teachers employed in their schools. In this context, the school principals preferred to use digital technologies for purposes such as communication, news and announcements, document sharing, information, and to hold online meetings.

The majority of the participant teachers stated that their school principals supported digital transformation and technology-based professional development in their schools as a means to creating an effective learning environment. Support provided by school principals included inservice training for teaching staff, information sharing, cooperation, supply, and the promotion of technological tools.

According to the results of this research, it may be stated that school principals contribute to the establishment of a digital learning culture in schools by supporting teachers in subjects such as the creation of a digital learning environment, the use of appropriate technological tools, technological classes, and the use of e-books and e-exams. The findings also revealed that school principals' digital leadership skills were seen as being in three categories, with technology usage, managerial skills, and personal skills. As a result, school principals supporting the corporate digital learning culture by displaying their

digital leadership roles can significantly contribute to the realization of digital transformation in education.

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