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Transformation of School Leadership in the AI Era: Requisite Leadership Roles of Teachers

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Abstract

The purpose of this phenomenological qualitative study is to investigate the transformation of leadership roles of school principals in line with teacher views. Semi-structured interviews have been carried out with teachers from different school levels, and the data have been analysed through content and descriptive methods. The findings have been collected under three main themes: (1) Changing roles and competencies of school principals in the AI era; (2) Reflection of leadership roles to school management processes in the AI era; (3) Barriers against the effective use of artificial intelligence by school principals. The participants have expressed that school principals should lead not only executive functions but also digital transformation processes, provide necessary guidance to teachers and make decisions with higher ethical sensitivity. However, the technology incompetence and resistance to change of school principals, along with problems related to infrastructure are the main obstacles within the transformation process. This study proposes that school principals should be given such trainings as systematic artificial intelligence literacy and digital leadership; the technological infrastructure of schools should be reinforced; and such emotional intelligence-based support programs aimed to transform the attitudes of school principals against the transition should be developed.

Keywords: Artificial intelligence, digital transformation, ethical leadership, school leadership.

About the Article

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Introduction

As we approach the second quarter of the 21st century, education systems are undergoing radical changes driven by both digitalisation and the growing influence of artificial intelligence (AI) technologies (Akyel & Tur, 2024). Managerial processes, like learning processes, are also being reshaped by data-driven, vision-based, and automation-focused changes (Vakıflı, 2025). Alongside large institutions, schools also lie at the heart of this technological transformation. This new era challenges the boundaries of traditional leadership. School leaders are now expected to not only manage executive operations but also develop a technological vision, make ethically sensitive decisions, and lead digital transformation (Sezer & Akan, 2018; Turan & Gökbulut, 2022; Yahşi, 2020).

In this context, the nature of leadership is undergoing a fundamental shift. Shared, flexible, and data-informed leadership models are replacing hierarchical, command-based structures (Arıkan, 1999; Kareem et al., 2024; Özdemir et al., 2013). The visionary capacity and data analytics power brought along by AI transform the intuitive decision-making role of leaders into knowledge-based strategic guidance (Akturan, 2024; Kurter, 2025; Smeets et al., 2021). Therefore, from now on, leadership is not only an executive position but it is also a dynamic learning and transformation tool driving the life in an organisation.

This transformation redefines the roles of all school stakeholders. Teachers evolve into professionals who interact through technology, continuously learn, and guide rather than merely transfer knowledge (Mumcu, 2022; Özcan, 2011; Telli & Sarsar, 2022). Students, supported by AI tools, take an active role in managing their learning instead of passively consuming information (Göksün & Kurt, 2022). Principals, in turn, are expected to act not only as supervisors but also as cultural and ethical leaders, since AI challenges core educational values such as equality, privacy, justice, and transparency (Küçükali & Coşkun, 2021; Zhong & Zhao, 2025). Therefore, beyond infrastructure, schools need human resources capable of leading this leadership transformation. From the perspective of teachers and school leaders, clarifying which roles principals must adopt, and where they lag, is critical to sustaining digitalisation (Batu & Taşdan, 2025).

Traditional schools often operate within bureaucratic, centralized, and hierarchical structures. In such systems, school leadership is typically equated with supervision, compliance, and administrative tasks (Alanoğlu & Demirtaş, 2020). This results in authoritarian and reactive leadership styles that limit innovation.

Top-down decision-making, common in centralized systems, restricts principals' proactive leadership roles and reduces them to mere implementers (Marmara & Atmaca, 2023). These roles focus more on following instructions than developing visions, limiting innovation in areas like professional development and school culture.

However, the emergence of the artificial intelligence era has brought about many challenges against this static structure. AI technologies not only make the leadership practices more effective but also redefine the role and identity of leaders (Pabuçcu & İşcan, 2025). For instance, while data-based decision-making processes relocate intuitive reflexes of principals with evidence-based leadership, such tools as learning analytics and algorithmic guidance make the principals more active in the field of educational leadership (Doğan, 2023). Moreover, novel duties as ethical responsibilities, fighting against digital inequalities, and supporting digital competencies of teachers necessitate principals to exhibit more strategic, visionary, and transformative leadership roles (Kubilay, 2022).

AI is more than a tool; it brings a paradigm shift in school management, decision-making, and power structures (Adams & Thompson, 2025). As a transformative force in culture and communication, it reshapes leadership expectations across domains like ethics, pedagogy, and data literacy (Girgiç-Altaş et al., 2025; Kesim et al., 2025). However, many questions remain unanswered from teachers' perspectives about how well school leaders are adapting.

Recent studies have focused on such areas as the integration of artificial intelligence technologies with educational processes, the development of digital pedagogy, and the attitude of school principals towards technology (Krein, 2025; Richardson et al., 2025). These studies have especially put a special interest on digital leadership skills and technology competencies of school principals, and strategic technology management (Banoğlu, 2011; Çalık et al., 2019). Nevertheless, a significant portion of these studies have investigated the matter in terms of technical competencies of school principals and fail to provide a deep analysis on pedagogical, ethical and organisational aspects of the transforming nature of leadership. Besides, while some studies in the literature feature descriptive data based on the self-reports of school principals and vice principals (Gevrek & Çebi, 2023), there is still a need for studies that examine the transformation of school leadership during the AI era from teachers' perspectives. Teachers are the ones who directly observe the technological leadership practices of school principals and are the immediate parties affected by these practices in daily school life. For these reasons, focusing on the experiences and needs of teachers concerning the transformation of school principals will provide a valuable contribution to redefining the leadership roles in the context of digitalisation of education.

This study addresses this gap by exploring teachers' perspectives on school leadership transformation in the AI era. It aims to provide a multi-dimensional field-based understanding of leadership, moving beyond conventional frameworks. The findings will offer practical insights for professional development and policy guidance. Based on this fundamental problem, the questions below have been tried to be replied to:

- How are school principals' leadership roles and competencies transformed during the AI era, according to teachers?

- How does this transformation affect school management processes?
- What are the cognitive and technical barriers principals face in effectively using AI?

Method

Research Model

This study aims to understand how school leadership is being transformed in the AI era from the perspective of teachers. Therefore, a qualitative research design was employed. Qualitative research enables an in-depth exploration of participants' experiences and perspectives within their context (Yıldırım & Şimşek, 2021). A phenomenological approach was adopted, which focuses on revealing individuals' lived experiences and the meanings they assign to these experiences (Creswell, 2013). The study investigates the leadership roles expected from school principals during the AI era and how these roles are interpreted by teachers.

Study Group

The characteristics of the study group have been provided in Table 1 below:

Table 1. Demographic Information of Study Group

Code Names	Age	Gender	School Type	Level of Education	Field	Educational Background	Years of Experience	Years of Experience at this School
T1	34	Male	Public	Secondary School	Special Education	Bachelor	12	1
T2	39	Female	Private	Secondary School	Turkish	Master's	16	4
T3	42	Male	Private	Secondary School	Social Studies	Bachelor	19	3
T4	28	Male	Public	High School	English	Bachelor	6	6
T5	54	Male	Public	High School	Maths	Master's	31	25
T6	36	Female	Private	High School	Biology	Postgraduate	13	8
T7	24	Female	Private	Preschool	Preschool	Bachelor	1	1
T8	42	Female	Public	Secondary School	IT	Master's	20	8
T9	27	Female	Public	Preschool	Preschool	Bachelor	4	1
T10	32	Male	Private	Primary School	Elementary School Teaching	Bachelor	10	8
T11	43	Male	Private	Primary School	Elementary School Teaching	Postgraduate	21	12
T12	37	Female	Public	Preschool	Preschool	Bachelor	15	15
T13	32	Female	Private	Preschool	Preschool	Bachelor	12	8
T14	38	Male	Public	High School	English	Postgraduate	15	5
T15	40	Male	Public	High School	Maths	Postgraduate	17	10
T16	30	Male	Public	Secondary School	Turkish	Bachelor	8	8
T17	40	Female	Public	Secondary School	Turkish	Master's	18	10
T18	26	Female	Public	Primary School	Elementary School Teaching	Bachelor	2	2

T19	36	Female	Public	Secondary School	Life Sciences	Postgraduate	15	7
T20	45	Male	Public	Secondary School	Special Education	Postgraduate	24	18

The study group consisted of 20 teachers from various school types (public and private) and educational levels (preschool to high school). Participants were selected via convenience sampling, allowing the inclusion of individuals who could offer rich and relevant data (Patton, 2015). Teachers had diverse backgrounds in subjects such as Turkish, English, Math, IT, and Special Education, with experience ranging from 1 to 31 years and their ages range from 24 to 54. Data saturation was reached after completing all 20 interviews, as no new themes emerged in the final responses, indicating thematic consistency.

Data Collection Tool

Data were collected through a semi-structured interview form, a common tool in qualitative research. The form included three main questions and several sub-questions designed to explore participants' perceptions, expectations, and observations regarding school leadership in the AI era. Questions were developed based on the literature and reviewed by experts to ensure content validity. This format allowed participants to express their views freely while ensuring alignment with the purpose of the study.

Such questions as *"What do you think about the extent of transformation of school principals' sense of leadership? How the anticipated leadership roles of school principals that they are expected to have during the AI era are reflected school management processes and why these roles are important?"* could be given as examples of questions within the interview form.

Data Collection and Analysis

The ethics approval required for this research was obtained from the Scientific Research and Publication Ethics Committee for Social and Human Sciences at Anadolu University (Decision No: 839356, dated 23.01.2025). Following this approval, data were collected during the 2024–2025 spring term through face-to-face and online interviews. Each interview lasted approximately 30–45 minutes. With participants' consent, interviews were audio-recorded and transcribed verbatim. Descriptive and content analysis methods were used. Data were coded based on pre-defined themes derived from the research questions. Codes were validated through intercoder agreement between the researcher and a field expert. Direct quotations were used to preserve the depth of participant perspectives.

In terms of assuring ethical considerations, participation was voluntary and all procedures were conducted in line with ethical standards. Participants were informed about the purpose of the study, the use of their data, and their right to withdraw at any time. Informed consent was obtained, and all identifying information was anonymized using code names.

Validity and Reliability

Ensuring the validity and reliability of qualitative studies is significant in terms of credibility, transferability and accuracy of any qualitative research. Regarding this, several measures have been implemented based on four basic qualitative research criteria (credibility, transferability, consistency, and confirmability) (Lincoln & Guba, 1985; Merriam, 2009). In order to increase the credibility, the data has been authentically deciphered in detail and supported via direct quotations during the analysis. Besides, the themes and codes have all been developed based on the data set and the interpretations have been directly attributed to the participant views. The coding process has been independently executed by the researcher and a field expert and then the codes have been compared. Finally, analysis reliability has been reached after getting the consensus percentage.

With the aim of ensuring transferability, detailed descriptions of the participants have been provided by detailing such demographic information as their age, field, school type, and years of experience and therefore, the necessary groundwork has been laid for researchers studying in similar fields regarding the transferability of findings. In order to strengthen the consistency, the data collection has been carried out in a systematic way and the semi structured interview form has been used within the same themes for all the participants.

The method employed during the interviews has been standardised while the processes regarding the collecting, analysis and interpretation of the data have been reported in a detailed way thus ensuring accountability. Finally, with the aim of ensuring the confirmability, the findings have all been related to participant perspectives and the interpretations have been done in an unbiased manner.

In qualitative research, the potential influence of the researcher on data collection and interpretation is acknowledged. To minimize subjectivity, a reflexive journal was maintained, assumptions were discussed with peers, and triangulation was applied through dual coding. The researcher's professional background in education was continuously monitored for potential biases.

Findings

Theme 1: Changing Roles and Competencies of School Principals in the AI Era

The integration of artificial intelligence technologies into the field of education has made it compulsory for the roles and responsibilities of school principals to undergo an extensive transformation. According to the views of participants, this change has made school leaders drift apart from the traditional administrative mentality and transform into more visionary, strategic, instructional, and ethical leaders. In this regard, the anticipated novel leadership roles of school principals include pedagogical awareness, ethical

sensitivity, and data-based decision making besides technological competencies. The categories and codes of this theme have been provided in Table 2 below:

Table 2. Categories and Codes Related to the Changing Roles and Competencies of School Principals in the AI Era Theme

Theme	Category	Codes
Changing Roles and Competencies of School Principals In the AI Era	Transition from Traditional to Visionary and Strategic Leadership	Transition from authority to collaboration
		Strategic vision
		Need for long term planning
		Transforming technology from tool to vision
		Leadership with future projection
	Instructional Leadership and Digital Guidance	Supporting digital literacy of teachers
		Leader guidance in technology integration
		Digital support to teaching processes
		Digitalisation of learning culture
	Data Based Decision Making and Digitalisation in Management	Use of data analytics
		Analysis of student development reports
		Data based transparent management
		Objective decision-making processes
		Stakeholder communication via digital systems
	Increase in Ethical and Cultural Sensitivity	Ethical awareness in technology use
		Privacy of student data
		Inclusive school culture in digital transformation
		Pedagogical and cultural sensitivity
		Humanistic and empathetic characteristics of leaders

Transition from Traditional to Visionary and Strategic Leadership

The participants have expressed that school principals took over a limited role in previous years limited to ensuring discipline and implementing executive duties while the sense of leadership has undergone a significant transformation during the artificial intelligence era. This transformation urges principals to become visionary and strategic-thinking leaders who focus on long-term development of schools. As T6 states, "*While traditionally, becoming a principal was defined as a more authority-based, hierarchical, and control-oriented management style, today this conception has evolved into a model that is open to collaboration, sensitive to digital developments, and data-based.*" In this context, the role of school principals is no longer limited to administrative duties but also includes the responsibility of restructuring the school vision from a digital transformation perspective. Similarly, T7 underlines the paradigm shift by stating "*Democratic, distributive and sustainable leadership now better meets the needs of the age.*" Considering these views, principals are expected to abandon their identities as mere administrators and become visionary leaders who guide the development of the school.

Instructional Leadership and Digital Guidance Roles

Participants have emphasised the importance of school principals actively guiding teachers in integrating AI technologies into their educational processes while they have particularly pointed out the need for principals to take a leading role in ensuring teachers embrace technology in pedagogical terms. As T15 indicates, "*As a mathematics teacher, one of the things I need most in the field is that the school principal should act as a guide who not only follows technological developments but also integrates these into the pedagogical structure of the school*." Likewise, T1 remarks on the significant role of school principals in the technological and professional development of teachers by stating, "*Our school principal, whose door we used to knock on only for administrative matters, is now becoming an actor who steers our professional development.*" As understood from the participants' views, the fact that principals transfer digital literacy skills to teachers facilitates the effective use of artificial intelligence tools in education and training processes and directly and positively affects the quality of teaching within the school.

Data Based Decision Making and Digitalisation in Management

Another point frequently underlined by participants is that the data analytics opportunities offered by artificial intelligence technologies can make school management processes more transparent, objective, and efficient. According to T12, "*Thanks to the AI-supported systems, individual development processes of students could be easily followed and quick interventions can be made by specifying learning deficiencies.*" Within this context, it is of much significance for school principals to develop a data based decision-making culture and spread this throughout the school. As T13 has pointed out, "*Artificial intelligence has made it easier to make data-based decisions in decision-making processes. If school principals can utilise this convenience, the decisions made will be of higher quality*." Additionally, T4 points out the fact that thanks to data-based approaches, school principals could strengthen their communication with other stakeholders at school by stating "*Another important opportunity brought along by technology is that principals can communicate more effectively and transparently with non-school stakeholders.*" Therefore, school principals' adoption of a data-based management approach will support the creation of a more democratic, accountable and participatory school culture for all stakeholders of the school.

Increase in Ethical and Cultural Sensitivity

Participants have also indicated that the ethical and cultural sensitivity of school principals has become even more important during the artificial intelligence era. Managing the ethical issues brought about by technology use and establishing a sustainable and inclusive school culture are among the primary responsibilities of principals. T20 summarises this situation: "*In the age of artificial intelligence, it is not enough for principals to simply understand technology; they must interpret it in line with*

the needs of the school, lead teachers in developing their digital skills, and guide teaching processes by considering students' individual differences." T1, a special education teacher, emphasised this ethical and cultural sensitivity, stating that principals' humanistic characteristics, such as ethics, communication, and managerial flexibility in decision-making, have become more evident in the artificial intelligence era. The common view of participants on this matter is that technological opportunities offered by artificial intelligence will lead to meaningful and sustainable transformation only when combined with ethical and cultural sensitivity.

Theme 2: Reflection of Leadership Roles to School Management Processes in the AI Era

This theme focuses on how the leadership roles expected of school principals in the new era are reflected in management processes and the views of participants have been analysed to determine the leadership skills principals should be equipped with and the impact of these skills on school management. The categories and codes for this theme have been presented in Table 3 below:

Table 3. Categories and Codes of Reflection of Leadership Roles to School Management Processes in the AI Era Theme

Theme	Categories	Codes
Reflection of Leadership Roles to School Management Processes in the AI Era	Digital Transformation and Technology Leadership	Management and improvement of digital infrastructure
		Pedagogical integration of artificial intelligence tools
		Establishing a culture to support technological adaptation
	Data Based Objective Management	Data based strategical decision making
		Analysis and follow-up of student data
		Evaluation of teacher performance via data
	Ethical and Humanitarian Leadership	Data security and student privacy
		Integration of ethical sensitivity to administrative procedures
		Featuring soft skills in administrative procedures
	Transformative and Learning Leadership	Continuously learning and evolving leadership
		Management culture encouraging innovative applications
		Future oriented visionary management

Digital Transformation and Technology Leadership

A key-shared expectation among participants is that school principals will lead the digital transformation and align technological advancements with pedagogical processes. In this context, establishing, maintaining, and developing digital infrastructure stands out as their primary responsibility. T9 refers to this need as: "*If a school lacks technological equipment, the principal must determine the budget and priorities. Otherwise, what can a teacher do?*" The integration of artificial intelligence tools into teaching processes reveals the pedagogical dimension of digital leadership. T8 mentions this deficiency by stating, "*We talk about how teachers can use tools like ChatGPT in the classroom, but*

principals do not provide any guidance in this process." The issue of creating a culture supporting technological adaptation is also noteworthy. T2, "*Our school principal is biased against every new application. This makes teachers even more conservative,*" points out leadership profiles that fail to cope with the resistance in the school culture. Sustainability of digital transformation will only be possible with this leadership being undertaken in a decisive and guiding manner.

Data Based Objective Management

One of the roles expected of school principals in the artificial intelligence era is to make decision-making processes more strategic and accountable by basing them on data. According to the participants, this skill is not only a technical requirement but also a management approach that contributes to the democratic functioning of the school. T12's statement is striking on this point: "*With AI-supported systems, students' individual development processes can be analysed, learning deficiencies can be identified in a timely manner, and rapid interventions can be made*." T4 emphasised the transparency and efficiency aspects of this process, by stating: "*When the school principal's decisions are based on more concrete data, then teachers have more confidence in the decisions made.*" Evaluating teacher performance with data; however, is regarded by some participants as an area that requires careful handling. T18 reminds the ethical limitations of these practices, by mentioning, "*Data can sometimes be misleading; numbers do not tell the whole story*." Nevertheless, the general trend is that data has become an indispensable tool for both guidance and accountability in management processes.

Ethical and Humanitarian Leadership

With the advent of artificial intelligence applications, data security, student privacy, and ethical decision-making processes have become core responsibilities of school leaders. Participants agree that despite rapid technological advancements, ethical and humanitarian values should not be left behind. T6 makes a striking statement on this matter: "*It is now very easy for a principal to access a student's entire behavioural history, including attendance, grades, and minutes. But how and for what purpose this access is used is crucial*." Integrating ethical sensitivity into management processes ensures a safe school learning environment. T3 emphasizes this point by saying, "*Without ethical values, technological development creates distrust and tension.*" T1, who advocates for the emphasis on soft skills, states that "*Leadership no longer requires charisma or authority, but empathy and flexibility*." These exemplary perspectives demonstrate the importance of ethical leadership not only in preventing the potential harms of the digital world but also in strengthening human relationships.

Transformative and Learning Leadership

Participants occasionally emphasise that during the artificial intelligence era, school principals should not only be managers, but also learners, researchers, and systematically transfer innovations into the institution. Continuous learning leadership

goes beyond simply keeping up with technological changes and means integrating these changes into the school culture. T15 describes this role as follows: "*If the principal doesn't make any kind of innovation on their own, they can not expect innovation from teachers. They must lead by example.*" A management culture encouraging innovative practices directly impacts teacher motivation. T8 shares the positive impact of this, indicating, "*We had a principal who supported all our ideas; projects were approved quickly, and thanks to this, we were motivated.*" Visionary management, which foresees the future, stands out as a less frequently mentioned but still important role. T18 criticises principals without vision, expressing, "*Some principals still defend the old systems, but the world has long since moved on.*" This category demonstrates that principals should be the actors who lead the change and carry their schools into the future.

Theme 3: Barriers against the Effective Use of Artificial Intelligence by School Principals

This theme highlights the key obstacles school principals face when integrating AI technologies into their educational and administrative processes. Based on participant feedback, these obstacles were generally attributed to principals' lack of cognitive and technological competence, inadequate infrastructure and resources, and negative attitudes and perceptions toward AI. Table 4 below presents the categories and codes for this theme:

Table 4. Categories and Codes of the Barriers against the Effective Use of Artificial Intelligence by School Principals Theme

Theme	Category	Codes
Barriers against the Effective Use of Artificial Intelligence by School Principals	Cognitive and Technological Competencies	Lack of AI knowledge
		Digital literacy inability
	Infrastructure and Resource Problems	Lack of internet and hardware
		Inadequate budget and financial support
		Shortages in technical support and maintenance
	Attitudinal and Perceptual Barriers	Leadership culture resistant to innovation
		Fear of change

Cognitive and Technological Competencies

The most common challenges school principals face when integrating AI technologies into educational environments are the lack of digital literacy and technological knowledge. Many participants have stated that while principals possess basic IT skills, they are unable to understand and implement the educational and administrative potential of AI. T12 has stated, "*They don't have any knowledge of what AI is, how it works, or how it can be integrated into educational processes,*" indicating that this deficiency directly impacts their leadership role. Similarly, T15 indicates, "*Principals don't feel adequately equipped to pedagogically integrate these technologies into the school environment,*" pointing out that this inadequacy hinders the teacher guidance process.

T18, on the other hand, has stated that principals "*have difficulty in using technology effectively in decision-making processes*" and emphasised the necessity of improving digital literacy levels. These inadequacies are not merely technical issues; they also stand out as structural deficiencies that weaken the leadership influence on teachers.

Infrastructure and Resource Problems

Many participants have highlighted technical infrastructure deficiencies as one of the reasons why AI applications cannot be effectively used in education. Teachers in some public schools, in particular, have stated that inadequate internet connection, a limited number of computers, outdated software, and the lack of physical hardware make it difficult for school principals to lead the digital transformation process. T1 has exemplified this by saying, "*There are limited computers and a weak internet connection.*" Similarly, T5 has stated, "*Sustainable digital transformation cannot be achieved due to weak internet infrastructure and software deficiencies.*" T9's view, "*Simply having technological tools is not enough; the infrastructure system that will enable these tools to operate sustainably must also be strong,*" reveals that this problem is not solely tool-based but also systemic. This situation causes school principals, despite their willingness, to fail to implement the practices and remain mere observers of the process.

Attitudinal and Perceptual Barriers

The adoption of AI technologies in educational settings depends not only on technical knowledge but also on a positive attitude and an open mind-set. However, participants have noted that many school principals either resist innovation or trivialize AI by belittling it. T12 has stated that his principal is "mentally resistant" and views technology as "an unnecessary or temporary fad." He argues that this situation also reduces teacher motivation. T13 has indicated that his principal looked down on [a completed task] when he said, "I did it with artificial intelligence," by saying, "I thought you did it." This perception needed to be broken. T14's observation that "Artificial intelligence can be perceived as a factor that will undermine trust in teachers" also indicates that principals can view technological developments as a threat. T8 has remarked that his principal "experiences a high level of anxiety and stress" when using these tools, demonstrating that this attitude has not only a cognitive but also a psychological dimension. All these views demonstrate that attitudes and perceptions significantly affect principals' leadership roles and constitute a significant resistance point against the digital transformation process.

Results and Discussion

The findings of this study demonstrate that school principals must transform not only their managerial positions but also their understanding of leadership in the age of artificial intelligence. Participants have specifically stated that the transition from traditional to visionary and strategic leadership is now inevitable, emphasising that this shift plays a significant role in determining the school's development trajectory. This finding aligns with the view of Fullan (2016) and Constantinou (2025) that "leadership should no longer be pure management but a transformational form of guidance." Participants have indicated that while authoritarian and control-oriented leadership was dominant in the past, today a governance-focused approach that includes stakeholders in the process is necessary. The fact that this approach is evolving into a collaborative, digitally responsive, and data-driven leadership model, as some teachers suggest, clearly demonstrates how changing leadership paradigms are finding a local response.

Another striking finding of the study is the prominence of the roles of instructional leadership and digital guidance. It has been specifically found out that principals should lead teachers in adapting to technological advancements from a pedagogical perspective. This finding is directly related to the "impact of instructional leadership on student achievement" revealed by Pietsch et al. (2023) through meta-analysis and big data. As some teachers have emphasised that school principals should not only monitor technological developments but also be guides who integrate them into the school's pedagogical structure. This demonstrates that the role of principals is no longer simply to guide, but also to learn together and lead transformation. The concept of "digital leadership," frequently discussed in the literature recently (Polat, 2021; Saray et al., 2025), has gained new meaning in this study within the context of teachers' daily needs and expectations.

The findings also indicate a growing expectation from school administrators regarding data-driven decision-making and administrative digitalisation. With the advent of artificial intelligence technologies, school principals are expected to establish a managerial system that monitors and evaluates student data rather than relying on intuitive approaches in decision-making. This directly aligns with the "data-driven decision-making culture" defined by Doğan (2023) and Schildkamp & Ehren (2013). As some teachers emphasise, a system that can monitor individual development of students and plan timely interventions positively affects not only academic achievement but also the school climate. This finding is significant since it demonstrates that artificial intelligence is becoming a part of strategic leadership, not a mere tool.

Participants have also noted that ethics and cultural sensitivity have become even more important during the AI era. They have underlined that, in addition to the opportunities brought by technology, issues such as ethical dilemmas, digital inequalities, and student privacy should also be on leaders' agendas. This result aligns with Shapiro & Stefkovich's (2016) multi-paradigm approach to ethical leadership in education. In particular, some

teachers argue that principals should not only be familiar with technology but also interpret it in line with the needs of the school, demonstrating that technological leadership must also be integrated with a pedagogical and humanistic stance.

The findings of the study reveal that the leadership roles of school principals in the age of artificial intelligence are not limited to technological skills; they also require multidimensional leadership models that spearhead digital transformation processes, embrace data-based management, and establish ethical human relationship. This becomes particularly evident in the context of digital transformation and technology leadership.

Participants have stated that school principals should actively guide the integration of technology not only in administrative tasks but also in teaching processes. This finding supports Anderson & Dexter's (2005) approach, which defines technology leadership as not only providing digital tools but also developing strategies to guide pedagogical processes.

On the other hand, the resistance of some principals to technological innovations hinders the transformation of leadership. Some teachers' views indicate that a leader's approach to technology within the school culture directly affects teacher behaviour. This supports the claim by Fullan & Langworthy (2014) that "school transformation is possible through pedagogical leadership." Therefore, the principal's embrace of technology determines not only digital transformation but also the evolution of teaching processes.

The age of artificial intelligence demands that educational leaders not only understand technology but also make sense of and use it effectively. However, research findings point to multifaceted challenges that prevent school administrators from adapting to this transformation. These challenges revolve around cognitive and technological competence deficiencies, inadequate infrastructure and resources, and attitudinal and perceptual resistance. The findings demonstrate that there are both individual and institutional barriers preventing school administrators from fulfilling their digital leadership roles.

The majority of participating teachers have indicated that school principals lack sufficient knowledge about the functioning of AI and its integration into educational processes. This suggests that principals fail to fully grasp not only the technological tools themselves but also their pedagogical potential. This finding, as highlighted in Almohamad's (2024) study, highlights one of the most fundamental obstacles to digital transformation: a widespread lack of digital skills among administrators and employees, coupled with resistance to technological innovation. Almohamad (2024) notes that the inadequacy of digital competencies, particularly among administrators, leads to the disruption of transformation processes despite investments in technological infrastructure. This, combined with other obstacles such as cultural resistance, cost pressures, and cybersecurity concerns within organisations, significantly reduces the effectiveness of digital transformation. Some school principals' lack of artificial intelligence literacy

prevents teachers from using technology confidently and acts as an invisible yet effective barrier to institutional transformation. In this context, the creation of systematic and practical digital leadership training programs for school principals holds the potential to transform not only individual development but also the entire school ecosystem.

The findings indicate that one of the main obstacles to implementing AI-supported systems, particularly in public schools, is inadequate infrastructure and hardware. As participant teachers have stated, a limited number of computers, poor internet connections, and outdated software systems make it impossible for principals to actively assume their digital leadership roles. These results align with the Digital Education Infrastructure Report published by the OECD (2021). The report emphasises that for digital technologies to be effectively used in school settings, not only the tools but also the technical support systems to ensure their sustainability are necessary. In the Turkish context, these deficiencies are often addressed through centralised policies rather than the initiatives of school administrators.

Perhaps one of the most striking findings of the study is that administrators' attitudes and perceptions are a factor that affects the transformation process more than technological inadequacies. The perception of some principals about AI as a passing fad, their disdain for teachers' innovative initiatives, and their anxiety about technological advancements lead to a weakening of leadership roles. This situation negatively affects not only digital leadership capacity but also the motivation and change climate within the school. Some participating teachers have experienced an example of the principal's disdain for digital outputs, thereby devaluing the teachers' professional labour. This attitude, when evaluated within the framework of Bandura's (1997) self-efficacy theory, can be interpreted as a factor that undermines teachers' self-confidence and reduces their willingness to participate in innovation. On the other hand, the anxiety and fear emphasised by some teachers demonstrate that leaders require not only cognitive but also emotional support. In this context, emotional intelligence-based leadership skills and change management training stand out as important development areas for leaders who resist transformation.

In conclusion, this research reveals that in the age of artificial intelligence, the leadership roles of school principals have transcended traditional patterns and acquired visionary, strategic, digital, ethical, and transformational qualities. Analysis based on the views of participating teachers demonstrates that artificial intelligence is not merely a tool but also a paradigm that is redefining educational leadership. The research findings demonstrate that the transformation in school principals' understanding of leadership is taking shape on four fundamental levels:

- The transition from traditional to visionary leadership necessitates a leadership approach that plans the long-term digital development of the school and guides pedagogical processes.

- Instructional leadership and digital guidance highlight the principal's profile, supporting teachers' professional development and technological integration.
- Data-based administrative decision-making demonstrates the effectiveness of AI-supported systems in strengthening a culture of transparency and accountability.
- Ethical sensitivity and humanitarian leadership necessitate interpreting the opportunities offered by AI within a pedagogical ethical framework.
- School principals' cognitive and technological shortcomings, lack of digital infrastructure, and attitudinal resistance to innovation slow down this transformation process. Therefore, leadership in the age of AI has become not only a matter of vision but also of technical capacity, cultural sensitivity, and emotional intelligence.

Recommendations

Some recommendations based on the findings of the research have been presented below:

- AI-based digital leadership training should be integrated into national in-service training programs for school principals, and these trainings should be sustained at the policy level.
- Digital infrastructure investments in public schools should not be limited to the provision of tools; long-term technical support and maintenance mechanisms should also be established.
- Performance evaluation systems that encourage school administrators to adapt to digital transformation should be developed, and the integration of digital tools into pedagogical processes should be included among the evaluation criteria.
- Education policies should explicitly address data security, ethical use of technology, and the reduction of digital inequalities; accordingly, national frameworks on ethics and data protection must be formulated and rigorously implemented.
- In the era of artificial intelligence, it is essential to explore the influence of school leadership on student achievement, teacher motivation, and the overall school climate through quantitative approaches; in addition, leadership practices should be analyzed in the context of digital transformation by means of cross-cultural comparative research.

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Genişletilmiş Türkçe Özet

21. yüzyılın ikinci çeyreğine girerken, eğitim sistemleri yalnızca dijitalleşmeyle değil, aynı zamanda yapay zekâ (YZ) teknolojilerinin hızla artan etkisiyle de köklü bir dönüşüm yaşamaktadır (Akyel & Tur, 2024). Bu teknolojik dönüşümün merkezinde ise büyük yapıların yanı sıra okullar da yer almaktadır. Geleneksel liderlik anlayışlarının sınırlarını zorlayan bu yeni çağda, okul müdürlerinin yalnızca yönetsel işleyişi sürdürmeleri değil, aynı zamanda teknolojik vizyon geliştirmeleri, etik duyarlılığı yüksek kararlar almaları ve dijital dönüşüme rehberlik etmeleri beklenmektedir (Sezer ve Akan, 2018; Turan & Gökbulut, 2022; Yahşi, 2020).

Son yıllarda yapılan çalışmalar, yapay zekâ teknolojilerinin eğitim süreçlerine entegrasyonu, dijital pedagojinin gelişimi ve yöneticilerin teknolojiye yönelik tutumları gibi alanlara odaklanmaktadır (Krein, 2025; Richardson vd., 2025). Özellikle okul müdürlerinin dijital liderlik becerileri, teknolojik yeterlikleri ve stratejik teknoloji yönetimi konularında çeşitli araştırmalar yürütülmüştür (Banoğlu, 2011; Çalık vd., 2019). Bununla birlikte, bu çalışmaların önemli bir kısmı, okul yöneticilerini daha çok teknik yeterlilik düzeyinde ele almakta, liderliğin dönüşen doğasına ilişkin pedagojik, etik ve örgütsel boyutları yeterince derinlemesine incelememektedir. Ayrıca literatürde yer alan bazı çalışmalarda okul müdürlerinin ve yardımcılarının kendi beyanlarına dayanan betimsel veriler kullanılırken (Gevrek ve Çebi, 2023), öğretmenlerin bakış açısıyla okul liderliğinin yapay zekâ çağındaki dönüşümünü anlamaya yönelik çalışmalara da ihtiyaç vardır. Çünkü öğretmenler, okul müdürlerinin teknolojik liderlik pratiklerini günlük okul yaşamı içinde doğrudan gözlemleyen ve bu liderlikten birebir etkilenen en kritik paydaşlardır. Bu nedenle öğretmenlerin, okul müdürlerinin dönüşümüne dair deneyimlerine ve ihtiyaçlarına odaklanmak; dijitalleşen eğitim bağlamında liderlik rollerinin yeniden tanımlanmasına katkı sunacaktır. Ancak mevcut literatürde, öğretmenlerin okul müdürlerinden yapay zekâ çağında bekledikleri liderlik rolleri, yeterince sistematik ve tematik olarak ortaya konmamış; liderlik dönüşümüne ilişkin saha verileri çoğunlukla yönetsel bakışla sınırlı kalmıştır.

Bu araştırma, tam da bu noktada devreye girerek, yapay zekâ çağında okul liderliğinin dönüşümünü öğretmenlerin algı, gözlem ve beklentileri üzerinden analiz etmeyi amaçlamaktadır. Bu yönüyle çalışma, literatürdeki önemli bir boşluğu doldurma iddiası taşımakta; okul liderliğine ilişkin geleneksel yaklaşımların ötesine geçerek saha deneyimlerinden beslenen özgün ve çok boyutlu bir bakış açısı sunmaktadır. Aynı zamanda bu çalışma, okul müdürlerinin hangi alanlarda gelişim göstermesi gerektiğine dair pratik ve politika düzeyinde yol gösterici çıktılar üretme potansiyeli taşımaktadır.

Bu araştırma, yapay zekâ çağında okul liderliğinin dönüşümünü öğretmenlerin algı ve deneyimleri üzerinden anlamayı amaçladığından dolayı nitel araştırma yaklaşımı kapsamında yürütülmüştür. Bu çerçevede, çalışmada fenomenoloji (olgubilim) deseni

tercih edilmiştir. Araştırmada odaklanılan temel olgu, yapay zekâ çağında okul liderlerinden beklenen liderlik rolleri olup, bu olgunun öğretmenler tarafından nasıl deneyimlendiği ve anlamlandırıldığı anlaşılmak istenmiştir.

Araştırmanın çalışma grubunu, Eskişehir il merkezinde farklı okul türleri (devlet ve özel) ile çeşitli eğitim kademelerinde (okul öncesi, ilkokul, ortaokul ve ortaöğretim) görev yapan toplam 20 öğretmen oluşturmaktadır. Katılımcılar, amaçlı örnekleme yöntemlerinden biri olan ulaşılabilir durum örneklemesi yoluyla belirlenmiştir. Bu örnekleme türü, araştırmacının erişebileceği, veri sağlayabilecek ve araştırma sorularına anlamlı katkılar sunabilecek katılımcıların seçilmesine olanak tanımaktadır (Patton, 2015). Katılımcılar, okul yöneticilerinin yapay zekâ çağında göstermeleri gereken liderlik rolleri hakkındaki görüş ve deneyimlerini ifade edebilecek ölçüde deneyime ve mesleki çeşitliliğe sahiptir. Araştırmanın verileri, nitel araştırmalarda yaygın olarak kullanılan yarı yapılandırılmış görüşme formu aracılığıyla toplanmıştır. Araştırmanın verileri, gerekli etik kurul onayı alındıktan sonra 2024-2025 bahar döneminde toplanmış, veriler hem yüz yüze hem de çevrim içi (Zoom gibi araçlar üzerinden) görüşmeler yoluyla elde edilmiştir. Veri toplama süreci boyunca etik ilkelere titizlikle uyulmuştur. Katılımcılara araştırmanın amacı, süreci, gönüllülük esasına dayandığı ve verilerin yalnızca bilimsel amaçlarla kullanılacağı açık biçimde açıklanmıştır. Görüşmeler öncesinde aydınlatılmış onam alınmış, katılımcıların kimlik bilgileri gizli tutulmuş ve tüm veriler kod isimlerle anonimleştirilmiştir.

Araştırma bulguları üç ana temada toplanmıştır: Birinci tema, yapay zekâ çağında okul müdürlerinin değişen rolleri ve yeterlikleri, ikinci tema, yapay zekâ çağında liderlik rollerinin okul yönetim süreçlerine yansıması ve son tema okul yöneticilerinin yapay zekâ kullanımı konusundaki engelleridir. Bu araştırmanın bulguları, okul müdürlerinin yapay zekâ çağında yalnızca yönetsel pozisyonlarını değil, liderlik anlayışlarını da dönüştürmeleri gerektiğini göstermektedir. Katılımcılar, özellikle geleneksel liderlikten vizyoner ve stratejik liderliğe geçişin artık kaçınılmaz olduğunu belirtmiş, bu değişimin ise okulun gelişim rotasını belirlemede önemli rol oynadığını vurgulamıştır. Bu bulgu, Fullan (2016) ve Constantinou'nun (2025) vurguladığı "*liderliğin artık salt yönetim değil, dönüşümsel bir rehberlik biçimi olması gerektiği*" görüşüyle örtüşmektedir. Katılımcılar, geçmişte otoriter ve denetim odaklı liderliğin baskın olduğunu ancak bugün artık paydaşları sürece dahil eden, yönetişim odaklı bir yaklaşımın gerekli hale geldiğini ifade etmektedir. Bu noktada, bazı öğretmenlerin dile getirdiği şekliyle günümüzde bu anlayışın iş birliğine açık, dijital gelişmelere duyarlı ve veri temelli bir liderlik modeline dönüşüyor olması, değişen liderlik paradigmalarının yerelde nasıl karşılık bulduğunu açıkça göstermektedir. Araştırmanın bir diğer dikkat çekici bulgusu, öğretimsel liderlik ve dijital rehberlik rollerinin ön plana çıkmasıdır. Özellikle müdürlerin, öğretmenlerin teknolojik gelişmelere pedagojik açıdan uyum sağlamasına öncülük etmeleri gerektiği dile getirilmiştir. Bu bulgu, Pietsch vd. (2023) tarafından meta analizle ve büyük veriyle

ortaya konulan "*öğretimsel liderliğin öğrenci başarısına etkisi*" ile doğrudan ilişkilidir. Araştırmanın belki de en dikkat çekici bulgularından birisi de, teknolojik yetersizliklerden daha fazla dönüşüm sürecini etkileyen faktörün, yöneticilerin tutum ve algıları olduğudur. Bazı müdürlerin yapay zekâyı geçici bir moda olarak görmesi, öğretmenlerin yenilikçi girişimlerinin küçümsenmesi ve teknolojik gelişmelere karşı duyulan kaygı, liderlik rollerinin zayıflamasına yol açmaktadır. Bu durum sadece dijital liderlik kapasitesini değil, aynı zamanda okul içindeki motivasyon ve değişim iklimini de olumsuz etkilemektedir. Katılımcı bazı öğretmenlerin yaşadığı örnek, yöneticinin dijital çıktıları küçümsemesi üzerinden öğretmenin profesyonel emeğini değersizleştirmesiyle ilgilidir. Bu tutum, Bandura'nın (1997) öz yeterlik kuramı çerçevesinde değerlendirildiğinde, öğretmenlerin kendine olan güvenini zedeleyen ve yeniliklere katılım isteğini düşüren bir etken olarak yorumlanabilir. Sonuç olarak bu araştırma, yapay zekâ çağında okul müdürlerinin liderlik rollerinin geleneksel kalıpların ötesine geçerek vizyoner, stratejik, dijital, etik ve dönüşümcü nitelikler kazandığını ortaya koymaktadır. Katılımcı öğretmenlerin görüşleri doğrultusunda yapılan analizler, yapay zekânın yalnızca bir araç değil, aynı zamanda eğitim liderliğini yeniden tanımlayan bir paradigma olduğunu göstermektedir.

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Informed Consent: All 20 teachers were fully informed about the nature and aims of the research, and informed consent was subsequently obtained.

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