Literature Study: Digital Leadership Strategies to Improve Teacher Performance in the Era of Technology Transformation

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Abstract
This research aims to examine Digital Leadership Strategies for Improving Teacher Performance in the Era of Technological Transformation. This study is literature research that adopts a descriptive qualitative approach by conducting a literature review. In this research, the authors used sources such as articles, journals, and relevant books to support the study. The main focus of this literature study is on digital leadership strategies to improve teacher performance in the context of technological transformation. The results of the analysis show that digital leadership involves adapting to digital culture and mastering digital competencies. Digital leadership reflects a leadership style that emphasizes implementing digital transformation in organizations, enabling them to face complex challenges and exploit new opportunities. Digital leadership strategies cover various aspects, such as managing increasing complexity, holistic adaptation to change, leveraging technology, recognizing leaders' limitations and leveraging team expertise, and viewing failure as part of the innovation process. Overall, this study concludes that effective digital leadership is crucial for enhancing teacher performance, as it fosters a culture of continuous learning and innovation, ultimately leading to improved educational outcomes in the era of technological transformation.

Keywords: Digital, Performance, Teacher, Technological.

Introduction
Leadership and education are closely interrelated; they are inseparable. In an educational institution, the principal usually takes on a leadership role. An important function of leadership is to improve teacher performance in this regard. Digital leadership is one of the trends being monitored. Implementing digital transformation in a business is the main goal of digital leadership (Hung et al., 2023). Digital leadership is expected to improve society by encouraging the development of talents in the social, cultural, and economic fields, among others (Jameson et al., 2022). Subject matter expertise, emotional intelligence, and critical-creative-imaginative thinking are the cornerstones of effective digital leadership for school administrators. In an era of rapid technological advancement, a strong digital leadership approach is essential to improve teacher effectiveness.
Several countries have realized that digital leadership strategies are needed to improve the performance of educators working in education. One of these strategies is the Hungarian National Education Sector Innovation System (NESIS) (Halász, 2021; Radó, 2021). Hungary focuses on the involvement of key players in developing digital leadership in education. Singapore, which implements STEM (Science, Technology, Engineering, and Mathematics), is another country that exemplifies digital leadership (Rialti & Filieri, 2024). Therefore, it can be said that the creation of a comprehensive digital leadership plan is necessary for improving teacher performance. Digital leadership strategies need to be well thought out and able to take advantage of existing opportunities, such as technological advancements (McCarthy et al., 2024; Schiuma et al., 2024). Technological advances must be balanced with quality human resources in utilizing this technology. Providing people with the necessary digital skills is critical to their ability to engage in the social, cultural, and economic life of their country, both now and in the future.

The Industrial Revolution will enter a new chapter marked by very rapid technological advancement, which will pave the way for the entry of the Industrial Revolution 4.0 (Azrai et al., 2020). The Industrial Revolution changed the way of looking and thinking about education. For example, learning takes place in an environment where the use of technology is more common (Wagire et al., 2021).

The dynamic nature of the digital economy requires people to adapt to fluctuations in competency needs and technological advancements immediately. In order for the learning process to continue to run smoothly and remain student-centered, teachers must also have a warm, cooperative, innovative, risk-taking, and comprehensive learning attitude (Slocumb et al., 2023). Significant changes have occurred in many aspects of society, including education, thanks to the rapid evolution of technology. The advent of digital technology has brought about changes in the education system. The previous approach was very repetitive and concentrated only on memory through rote learning. For students, learning seems boring. Much of the educational process depends on the role of the teacher. Currently, technology can be utilized in the classroom environment to support students in utilizing their sensory abilities comprehensively, as well as being able to adapt to different individual learning styles of students to improve learning outcomes (Benavides-Varela et al., 2020).

Recent research shows that students’ ability to use technological transformation can be improved, and their work can become simpler and faster through the use of technology (Al-Emran, 2023). However, it should be emphasized that digital technology transformation includes all forms of education, including science, mathematics, Indonesian, and other subjects, and is not only limited to ICT learning. The government, school principals, teachers, and society as a whole must support the advancement of digital technology in education. School administrators and instructors are equally required to follow the education policies that have been set. In addition to being done face-to-face, learning can also be done virtually through video conferencing or online, as
is commonly known. Therefore, teachers' teaching methods must be followed when producing digital learning materials.

The problem is the challenge of creating knowledge that can clarify practice. The secret of effective and efficient learning lies in teacher practice, willingness to learn, and adherence to existing progress (Purnasari & Sadewo, 2020: 8). Therefore, educators need to adopt a mindset that focuses on lifelong learning, especially when it comes to integrating technology into the classroom. The education system uses information and communication technology (ICT) as a source of knowledge because it provides a series of new tools and instruments that have the power to change the foundations of institutions, organizations, and technology.

This study fills a gap in the existing literature by explicitly focusing on digital leadership strategies that can be employed to enhance teacher performance amid technological transformation. Unlike previous studies that may have only touched on aspects of digital leadership in education, this research delves deeply into the specific strategies and their direct implications on teacher performance.

The objectives of this research are to identify and analyze the key digital leadership strategies that are effective in improving teacher performance, and to explore how these strategies can be implemented in various educational contexts. The benefits of this research include providing educational leaders with actionable insights and practical guidance on fostering a digitally competent and adaptive teaching workforce. The implications of this study are far-reaching, offering a framework for policymakers, school administrators, and educators to enhance the quality of education through robust digital leadership collaboratively, ultimately preparing students for success in a rapidly evolving technological landscape.

In this era of technological revolution, many studies have observed the use of digital leadership to improve teacher effectiveness. As explained in the background, technological advances are closely related to digital leadership in the field of education. This is because technology has permeated all areas of life, including education, in this era of industrial revolution. In this regard, the researcher hopes to conduct a literature review on digital leadership strategies that improve teacher performance in the era of technological transformation.

**Research Methods**

This research is a qualitative analysis that applies descriptive techniques in evaluating relevant literature. The purpose of this study is to explain phenomena that are ongoing or have occurred. This research was carried out in May 2024 and collected information from various scientific journals related to Digital Leadership Strategies. Once the data were collected, they were analyzed using a descriptive approach, which aimed to elaborate on the facts found from the theoretical studies that had been carried out by previous researchers. This article analyzes the Digital Leadership Strategy on Teacher Performance during the period of technological transformation.
Results and Discussion

Digital Leadership

Leadership refers to the ability to steer a company toward its goals and develop a sustainable competitive advantage. To maintain these advantages, organizations must have technology products and systems that support production, communication, and cost efficiency, as well as the ability to make optimal use of them. Digital leadership is a combination of digital culture and skills (Uğural et al., 2020). This concept is part of the study of leadership based on the theory of the upper echelons, developed by Chen et al. (2024), which emphasizes that the characteristics of a manager can affect results. Digital leadership emphasizes implementing digital transformation within an organization, which allows companies or organizations to adopt a digital work environment and culture (McCarthy et al., 2024).

According to Alabdali et al. (2024), a digital leader is an individual who has a vision, can motivate change, incorporates business ideas for projects, and builds relationships through the creation of new opportunities for partnerships and other forms of collaboration. Xia et al. (2023) definition of digital leadership includes five key characteristics. First, the ability to think that allows leaders to cope with market changes and competition. Second is creativity, where digital leaders have the expertise to generate new ideas and make them happen. Third is vision, which shows the ability of leaders to provide direction and lead transformation in digital ventures. Fourth is curiosity, which leads to the use of complex ecosystems and the ability to learn how to deal with volatility, uncertainty, complexity, and ambiguity (VUCA) factors. Finally, a deep leader who can lead in complex situations with a deep understanding and the ability to make decisions based on the interpretation and synthesis of knowledge he possesses.

Digital leadership is a form of leadership that is relevant to technological developments in the 4.0 era, which is characterized by rapid technological advancements. This definition is given by several experts in the field:

According to Araujo et al. (2021), digital leadership refers to the use of digital resources in an entity to achieve business goals, both overall and at a personal level. This opinion is in line with Schiuma et al. (2024), who revealed that digital leadership involves the effective use and combination of digital and traditional communication methods. In addition, Siagian et al. (2020) stated that digital leadership is a leader's understanding of how to direct the transformation of an organization or company in a more digital direction. At its core, digital leadership considers the use of digital assets, communication methods, and organizational transformation to achieve business goals.

After considering various definitions presented by several experts earlier, researchers concluded that digital leadership is the ability and actions possessed by a leader to manage a business effectively using digital technology to achieve company goals.

Characteristics of Digital Leadership
The characteristics of digital leadership are different from traditional or ordinary leadership. Siagian et al. (2020) identified several of these characteristics, which include:

1. Digital Leadership Communication Skills
   The first characteristic of digital leadership is communication skills. It includes skills in using various digital communication platforms to interact with team members or colleagues effectively. Digital leadership requires conveying information clearly and facilitating collaboration through various online communication channels.

2. Ability to Think and Cooperate
   The second characteristic is the ability to think and cooperate. It emphasizes the importance of being able to think critically and creatively to face various complex challenges in the digital era. In addition, the ability to work together as a team in an all-digital environment is key to achieving common goals and generating innovative solutions.

3. Ability to Supervise and Manage Digitally
   The third characteristic is the ability to monitor and manage digitally. It refers to the ability to use digital tools and technologies to oversee team performance, manage projects, and coordinate tasks efficiently. Digital leadership requires a good understanding of how to leverage technology to improve work productivity and effectiveness.

4. Flexible
   Being flexible in the use of time is the fourth characteristic. In addition to flexibility, digital leadership recognizes the importance of understanding and accommodating the different lifestyles of team members who may work remotely or have flexible schedules. This allows leaders to facilitate a healthy work-life balance and be mindful of individual needs in a rapidly changing and dynamic era of work.

Digital Leadership Strategy
Innovative ideas about the leadership model of the future, faced with technological change and ever-increasing uncertainty, have become a major discussion in human resource development. This new leadership model is designed to estimate the best response a leader can take amid ever-evolving uncertainty and complexity. New criteria are beginning to emerge in response to increasingly complex demands; The more complex a situation is, the greater the need for effective leadership.

The main strategy in educational leadership is to create an individual learning environment that has a wealth of social capital and extensive interaction opportunities. Interpersonal interaction is the main foundation of leadership, which supports students and promotes a mutually supportive interaction process. Education leadership requires an innovative curriculum, multidisciplinary content, diversity of staff, and diverse learning locations. Teaching strategies based on five common themes facilitate forming relationships with stakeholders, developing an understanding of global leadership, self-awareness of the leadership dimension, and learning through continuous monitoring and analysis of actions (Wang, 2010).
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The SP Jain School of Global Management applies a disruption approach to explore key skills in facing future change, including leadership, teamwork, communication, business intelligence, critical thinking, thinking design, innovation, lifelong learning, and technology understanding (Brown et al., 2021). Disruption results in fundamental transformations in various areas of life, with change happening rapidly and often initiated by smaller, more agile institutions. Advances in digital technology are changing the landscape of human work significantly, enabling unprecedented access to information and resulting in benefits such as easy access and increased well-being. However, digitalization also brings new complexities and challenges, including increasing complexity and confusing variety of options, as well as changing dynamics. Leadership is challenged to remain relevant and effective in managing organizations in this increasingly complex context.

According to a study by Jakubik et al. (2021), some aspects of leadership cannot be replaced by digital computerized systems. These aspects include understanding and managing situations, flexibility, agility, balance, creative intelligence, and social intelligence. According to Jakubik et al. (2021), in their work entitled "Rethinking Leadership," leaders in the digital era must have special skills, such as social intelligence, creative and analytical thinking, the ability to work collaboratively and collaboratively, and the ability to communicate through network platforms. In addition, leaders are also expected to delegate authority to empower members of the organization and be able to anticipate the future by formulating a clear vision and goals. Abbatialo et al. (2017) classifies digital leadership into three parts, namely:

1. Digital Investor

Digital investors are those who allocate resources to digital assets or technologies that are considered to have potential for future growth or development. They can invest in different types of digital assets, such as cryptocurrencies, shares of technology companies, or innovative projects in the digital realm. Digital investors tend to use online trading platforms or financial apps to make their investments.

2. Digital Pioneer

Digital pioneers are individuals or organizations that play a crucial role in introducing or developing new technologies in a digital context. They may create a product or service that changes the way people interact with technology, or they may be innovators in applying existing technology to solve previously unsolved problems. Digital pioneers often have a strong vision of the digital future and are willing to take risks to make it happen.

3. Digital Transformer

A digital transformer is an individual or organization that adopts digital transformation across the board to improve its performance, efficiency, and innovation. They not only integrate technology into their business processes but also change the organization's culture and way of thinking to achieve better results. Digital transformers often undertake organizational restructuring and employee training and adopt best
practices in data and technology management to achieve their digital transformation goals.

Gurr et al. (2020) explain some leadership steps that can be taken to respond to increased complexity as follows:

1. Acknowledging and accepting the increased complexity that occurs

   Effective leadership in the face of modernization must be able to understand and manage the increasing complexity. It involves recognizing and navigating the diverse factors and dynamics that affect the work environment, including technology, company culture, and market dynamics.

2. Holistic change

   Successful leadership in managing modernization does not only focus on the technology side alone but also considers change holistically throughout the organization. This includes changes in organizational structure, work processes, company culture, and employee skills.

3. Ensuring all aspirations are heard

   As a leader in the era of modernization, it is important to ensure that all aspirations and ideas from various parties within the organization are heard and considered. This creates an inclusive environment where every individual in the team feels valued and has a meaningful contribution in the change process.

4. Utilizing Technology

   The utilization of technology is key in modernization, and leaders must be able to identify and implement technology solutions that align with the organization's goals. This may involve investing in new systems, developing custom applications, or adopting technologies that enable remote work and online collaboration.

5. Knowing Bataan

   As a leader, it's important to understand the limitations of technology, resources, and expertise in managing modernization. It involves recognizing potential obstacles and the ability to overcome or overcome them with the right strategies.

6. Failure Rewards

   In the process of modernization, failure can occur. However, effective leaders do not see failure as the end of the journey, but as an opportunity to learn and grow. They encourage a culture where risks are taken, and mistakes are learned to improve strategies and approaches going forward.

   1. Be relevant: Disruptive leadership must remain relevant to changing times and market conditions. This includes understanding the latest trends and developments in the industry or business environment, as well as being able to adjust leadership strategies and decisions as needed quickly.

   2. Moving forward: Disruptive leadership must be proactive in taking new steps. They do not hesitate to explore innovative concepts. They need to have a clear picture of the goals they want to achieve and to have the courage to take the bold steps needed to realize the vision.
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3. Cultivating values: Disruptive leadership must be able to foster positive values within the organization, such as innovation, courage, collaboration, and integrity. They must also be good role models in applying these values in their daily actions.
4. Provide an environment and opportunities to grow: Disruptive leadership should create a supportive work environment and provide opportunities for team members to grow and develop their potential. This can be done through training, mentoring, and providing space for creativity and innovation (Grace:2018).

Teacher Performance

Ghavifekr et al. (2020) explained that performance refers to the achievements that can be achieved by individuals or groups in an organization in line with the duties and responsibilities that have been given to them to achieve organizational goals legitimately and following moral and ethical principles. For example, a teacher's performance can be seen from actions such as checking student attendance every day or evaluating the learning process over a certain period. Ghavifekr et al. (2020) also emphasize that performance includes the willingness of individuals or groups to carry out tasks and complete them with results that are in line with expectations. A teacher's performance is reflected in his willingness to carry out his duties with responsibility, follow the principles of professionalism, and show good morals. Teachers' performance includes their ability to develop students' potential and contribute to the progress of the school.

According to some of the theories that have been discussed, the performance of a teacher is the result of the efforts that have been made by the teacher himself in a certain period, which can be seen in the form of real work. Teachers' performance reflects their ability to carry out tasks in school and shows how the teacher shows creation or achievement when carrying out learning activities.

So, Teacher performance refers to their ability to apply skills in the job with visible results. This includes their responsibility to carry out their professional duties and their moral responsibility. Obedience and loyalty in carrying out teacher duties inside and outside the classroom show teacher performance. Teacher performance assessment is carried out by assessing various indicators. In the technical guidance for teacher performance assessment, the components of teacher performance are described, including learning planning, learning implementation, learning evaluation, analysis of evaluation results, implementation of improvement and enrichment programs, implementation of guidance and counseling programs (specifically for BK teachers), and student guidance in extracurricular activities.

According to Ghavifekr et al. (2020), performance is influenced by various factors:

1. Ability Factor
The ability factor is one factor affecting a person's performance. This ability includes individuals' knowledge, skills, and competencies to carry out a specific task or job. When a person has adequate abilities according to the demands of the job, the likelihood of achieving good performance will increase.
2. Motivational Factors
Motivation includes internal or external impulses that drive a person to act or work towards a specific goal. When a person feels motivated, they tend to perform at a higher level because they feel driven to achieve the desired results.

Teacher Performance Assessment Indicators
According to Dakheel et al. (2020), performance indicators can be divided into:
1. Number of Jobs: This indicator measures the number of jobs or tasks a person has completed in a given period. A high number of jobs indicates good productivity, but it is also necessary to pay attention to the quality of the work.
2. Quality of Work: It assesses how well the work is done. Quality of work includes the level of accuracy, effectiveness, and satisfaction generated by the work. High-quality work produces results that meet or exceed the set standards.
3. Punctuality: This indicator measures a person's ability to complete a job or task according to a set schedule or deadline. The ability to complete tasks on time demonstrates orderliness, discipline, and work efficiency.
4. Employability: This reflects the extent to which a person has the skills, knowledge, and competencies needed to complete the job well. Work skills include technical and non-technical aspects, such as expertise in certain fields, communication skills, leadership, and problem-solving skills. High employability allows a person to overcome challenges and achieve the expected results.

Digital Transformation
Currently, digitalization and digital transformation are seen as global trends that fundamentally change the structure of value chains in various industrial and public sectors. According to Scupola et al. (2022), this phenomenon includes using digital artifacts, systems, and symbols in and around organizations, as proposed by Chen et al. (2024). Furthermore, Yang et al. (2024) emphasized that digital transformation is not only about the use of technology but also about the company's strategy in adapting and competing with its competitors. Digital transformation accelerates the process of technology adaptation by individuals, businesses, communities, and countries globally (McCarthy et al., 2024). In the context of education, teachers use technology to develop creative and engaging teaching methods, supporting the intellectual development of students more effectively.

Conclusion
Digital leadership is a combination of digital culture and competence, becoming an important part of the discussion on leadership discourse based on the concept of the upper echelon introduced by Hambrick and Mason. Meanwhile, digital leadership emphasizes the integration of digital transformation in the context of an organization, which facilitates the adaptation of the work environment and culture to the digital era. Fisk stated that digital leaders must have a strong vision and ability to inspire change, integrate business ideas, and build a collaborative network through the creation of new opportunities. Pearl Zhu identified five key digital leadership characteristics: creative
thinking, strong vision, interest in learning, deep leadership, and the ability to deal with complex situations. Digital leadership refers to a new era or era 4.0, which is marked by significant technological advancements. Digital transformation in this context reflects a fundamental shift in the way value chains across various industries operate. The world of education also takes advantage of technological transformation to create innovative and attractive teaching styles for students to improve the quality of education.

Bibliography


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