



## Teachers' Opportunities and Challenges in Facing the Digital Era (A Systematic Literature Review)

Sumiati<sup>1</sup>

Yuni Aminatus Sa'diyah<sup>2</sup>

Andy Prasetyo Wati<sup>3</sup>

Ludi Wishnu Wardana<sup>4</sup>

F. Danardana Murwani<sup>5</sup>

Faculty of Economics and Business, Universitas Negeri Malang, Indonesia

---

| ARTICLE INFO    | ABSTRACT   |
|-----------------|--|
| ISSN: 2798-2688 | <p><b>Research Aims:</b> This research aims to enhance development of information technology and these advancements impact human life, especially in the field of education and for teachers.</p> <p><b>Design/methodology/approach:</b> This research uses a systematic literature review (SLR) to understand the opportunities and challenges of teachers in facing the digital era. The research method is a scientific approach to collecting data with specific purposes.</p> <p><b>Research Findings:</b> The results of the study provide an explanation of how teachers cope with the digital era in this case the teacher provides a lot of knowledge about digital literacy and participates in training related to digital literacy.</p> <p><b>Theoretical Contribution/Originality:</b> This research equips teachers to deal with the rapid development of digital literacy.</p> <p><b>Keywords:</b> Technology, Information, Competence, Teacher</p> |

---

### Introduction

In today's era (digital era) the speed of information flow is very fast. Almost anything can be known quickly. This allows children to know something faster than what is obtained in school. In fact, there may also be many things that can be known that are not yet the time to know, they get information from Google. The speed of information because of advances in information technology will affect the pattern of human life in general. Technological advances bring changes in the lifestyle, way of thinking, and way of acting of today's children, even not only children but almost all

linearly affected by technological advances. Most companies will look for employees who can adapt to the speed of information and can make the right decisions.

The abundant and easily accessible flow of information provides enormous benefits for science and economics including in developing the world of education. More specifically, teachers who inevitably must be able to keep up with these developments. We need to realize that the advancement of information technology does not only bring positive things but also brings negative things. According to Syanurdin Ma'ruf, the ability to process knowledge (knowledge) into wisdom in the social environment will determine the level of resilience in the revolution. Unethical values that can create public uproar need to be filtered wisely, including in filtering misleading information (hoaxes). According to Andriani, argues that in the era of advances in information technology that is not limited by space and time as it is today, it can enable student-centered learning strategies, encourage students to learn creatively and independently, prepare for global competition. E-learning-based learning provides its own advantages in the culture of learning. Educators (teachers) must be able to develop knowledge and skills, facilitate learning, understand learning and the things needed in learning. Advances in information technology provide a great opportunity for teachers to continue to improve their competence (Khodijah, 2018, (Andriani, 2010).

The rapidly developing digital era has led technology to influence almost every aspect of human life, including education. The utilization of technology in learning has brought many changes and provided many benefits, but it also poses new challenges for professional teachers (Ma'arif, S., & Juharyanto. 2018). Education is the development of human thought in providing boundaries about the meaning and understanding of education, at any time always showing changes. The change is based on various findings and changes in the field related to the increasing components of the existing education system. The development of the mindset of education experts, education managers, and education observers who produce new theories (Pristiwanti, et al. 2022).

The use of technology in education has experienced exponential growth in the last decade, introducing various tools and platforms that have transformed traditional teaching methods. From distance learning to the use of big data to personalize learning, technology has opened new opportunities for more inclusive and effective education (Selwyn, 2016). Advances in information technology provide broad and rapid access to information, which often goes beyond school materials, requiring adaptation and sophisticated cognitive skills to utilize effectively. Technology brings benefits such as easier access to learning but also has negative impacts that must be carefully managed. E-learning as a learning method offers flexibility and meets diverse learning needs, underlining the importance of parents and teachers utilizing technology to improve the quality of education (Keržič et al, 2021)

The changes brought about by digital technology require teachers to master not only lesson content but also the technology that supports it. Research shows that while many teachers see technology as a learning enhancer, they also face barriers in the form of a lack of adequate training, technical support, and resources (Ertmer & Ottenbreit-Leftwich, 2010). The gap in digital readiness between teachers in urban and rural areas adds to the complexity of this issue (Wang et al., 2018). The adoption of

technologies such as distance learning, digital tools, and collaborative platforms has changed the way teachers teach and students learn. The digital age not only expands educational resources but also offers more adaptive and personalized teaching methods. On the other hand, challenges such as the lack of technology training for teachers, accessibility issues, and the digital divide between urban and rural environments, as well as data security and privacy issues are barriers that need to be addressed (Vila, et al, 2023).

By deeply understanding how teachers adapt to challenges and capitalize on opportunities, education stakeholders can design more appropriate interventions and provide appropriate resources to support teachers in the digital age. The outcome of this review is expected to influence education policy and practice in the field, improve teacher readiness, and ultimately advance student learning outcomes.

## **Literature Review**

### **Digital Leadership**

Ravesteijn & Ongena (2019) state that e-leadership is called digital leadership. Lander (2020) further argued that digital leadership and technology leadership are interrelated. In addition, Oberer & Erkollar (2018) further suggested that digital leadership is called Industrial Revolution 4.0 leadership, which is a kind of cooperation with a larger range, and a faster pace, starting from teamwork and focusing on innovation. In this research, the author mainly studies the influence of leadership on the digital competence of educators in the field of digital technology.

Research related to digital leadership is emerging. For example, the relationship between transformational and transactional digital leadership (Aldawood et al., 2019); prediction of job satisfaction through digital leadership (Tanucan et al., 2022); the combination of digital learning leadership and conventional learning leadership and teacher turnover intention (Berkovich, 2023); Principal's digital transformation leadership and its outcomes (Berkovich et al., 2023). However, few researchers have integrated digital leadership development in the past five years. Therefore, this study conducted an extensive review to understand the effectiveness of digital leadership and its influence on educators' digital competency development.

Digital leadership first appeared in Avolio's (2000) article. Avolio (2000) believes that digital leaders use advanced information technology to influence the process of reforming the behavior, emotions, attitudes, thoughts, and behaviors of followers and team members. However, the definition of digital leadership is still unclear (Antonopoulou et al., 2021). Yusof in 2019 proposed that leaders need to have futuristic thinking, continuously update their digital skills, and apply them in education management practices. In terms of digital technologies driving organizational reform, Antonopoulou in 2021 supports leaders in using digital technologies strategically to achieve organizational goals. Individuals and groups with digital leadership keep pace with the digital age and drive organizational digital transformation. Digital leaders do not have to understand digital, and they must be able to manage and drive the efficiency of high-quality talent in using digital technology, thereby encouraging organizations to quickly adapt to continuous digital

technology updates, and ultimately overcome the challenges of the industrial revolution 4.0 (Anak Agung Sagung et al., 2020).

The transfer of digital technologies into organizations changes not only the role of students but also the status of teachers (Frolova et al., 2019). Thus, educational institutions can develop digital leadership among students and teachers. According to Aldawood et al. (2019), digital leadership is a type of bold leadership that seeks to lead the essence of change in education. Aldawood in 2019 supports digital leadership driving organizational change and actively engaging educators, students, and other stakeholders in reform activities.

### Digital Competence

The enhancement of digital competence occupies an important place in the digital era. Esteve-Mon et al. (2020) were among the first scholars to propose the meaning of digital literacy as an ability related to the access, evaluation, and management of multimedia, information, and networks. Digital competence is a complex system that takes years to perfect. Teachers must be competent enough to overcome challenges in teaching (Karsenti et al., 2020). According to Demeshkant (2020), the emergence of many digital devices has encouraged teachers to have digital competence improve students' digital competence, and use digital technology to improve and innovate in teaching. Therefore, as technology develops and integrates into schools, educators must be equipped with appropriate digital skills (Starkey, 2020). Personal and environmental factors can influence the development of one's digital competence (Masalimova et al., 2022). Therefore, it is important to understand the relevant factors that influence educators' digital competence. There are many studies on the influence of demographics on digital competence. Some scholars support the idea that demographic factors influence teachers' digital competence. For example, Hinojo-Lucena et al. (2019) suggested that factors influencing digital competence include teaching experience, age, education, and professional category. Jiménez-Hernández et al.'s (2020) view supports that not only age is one of the factors affecting digital competence, but also gender and branch of knowledge. However, the type of school is also a driver of improving teachers' digital competence. For example, Garzón-Artacho et al. (2021) argue that school type and teacher training influence the further development of digital competence. This study will go through an extensive review to effectively understand the important factors that influence teachers' digital competence.

### Teacher Opportunities in the Digital Age

In the digital era, teachers have several significant opportunities to develop their profession and improve the quality of learning:

1. Use of Learning Technology

Teachers have the opportunity to integrate various technologies such as learning management platforms, interactive tools, and digital media into the curriculum, which can increase student engagement and facilitate adaptive and personalized learning (Marironi, et al 2020).

2. Access to Extensive Learning Resources

The Internet offers unlimited access to educational resources from all over the world, allowing teachers to enrich teaching materials with a variety of perspectives and more current and relevant materials (Butcher, et al 2020).

### 3. Continuous Professional Development

Teachers can take advantage of the many online courses, webinars, and workshops available for professional development. This helps them stay up-to-date with the latest teaching methods and educational trends (Bond, et al 2021).

### 4. Broader Collaboration

Digital technology allows teachers to collaborate not only with colleagues in their school but also with educators around the world. This could be through joint projects, knowledge exchange, or professional networks (Marironi et al., 2020).

### 5. Flexibility in Teaching

Technology gives teachers the ability to teach from anywhere, giving them the flexibility to work from home or other locations. It can also help in reaching students who are in remote areas (Zhao et al., 2020).

### 6. Personalisation of Learning

With digital tools, teachers can more easily tailor teaching materials to the individual learning needs of students, thus meeting the diverse learning needs of a single class (Shemshack & Spector., 2020).

### 7. More Effective Evaluation and Feedback

Technology provides tools for more objective and rapid assessment, allowing teachers to provide real-time feedback and improve the overall learning process (Wang et al., 2018).

## **Metode**

### Research Design

This research uses a systematic literature review (SLR) to understand the opportunities and challenges of teachers in facing the digital era. The research method is a scientific approach to collecting data with specific purposes, which is based on scientific principles such as rationality, empiricism, and systematization (Agung Widhi Kurniawan, 2016). Research aims to discover, prove, and develop knowledge. Rukin (2019) states that research methods are instruments to understand more deeply the process of research systematization. Qualitative research, used in this study, involves the description of phenomena based on the researcher's interpretation of the observed symptoms, without testing hypotheses (Rukin, 2019). Data was obtained from secondary sources such as literature, journals, and previous studies. This approach views truth as a result of understanding the phenomenon, making it descriptive and interpretive (Agung Widhi Kurniawan, 2016)

### Database

PRISMA was used as a guide during the processing of this systematic review study. There are three benefits of using PRISMA as a mentoring program for the online environment of educational organizations: (i) The PRISMA program provides a systematic search procedure (ii) Educators can use the step-by-step procedure as a useful guide to get what they need articles more effectively. (iii) The PISMA procedure helps readers clearly understand the systematic review process (Mohamed et al.,

2020). PRISMA offers researchers the opportunity to conduct an in-depth exploration of digital leadership and digital competencies. This approach can be used to examine the influence of leaders' digital leadership on digital competence in learning institutions.

This research uses two databases. WoS and Scopus are often considered the most comprehensive databases for various purposes (Zhu et al., 2020). According to Birkle et al. (2020), WoS covers journals, conference proceedings, books, etc., and currently covers about 34,000 journals. The Scopus database was created in 2004. Scopus covers books, conference proceedings, scientific journals, and more. The latest Scopus content coverage guide (October 2019) shows that it covers about 23,452 active journals and 206,000 books, etc. (Singh et al., 2021). These two databases will be used to select articles related to digital leadership and digital competence in the context of education.

**Table 1. Search strings in WOS and Scopus**

| Databases | Keywords  |
|-----------|---|
| WOS       | (OPPORTUNITIES) AND (CHALLENGES) AND (TEACHER) / (DIGITAL ERA) AND (TEACHERS) |
| SCOPUS    | "OPPORTUNITIES" AND "CHALLENGES" AND "TEACHER" / "DIGITAL ERA" AND "TEACHER"  |

#### Literature Screening Criteria

The researcher used inclusion and exclusion criteria in selecting the literature that would be the source of the paper.

**Table 2: Literature screening criteria**

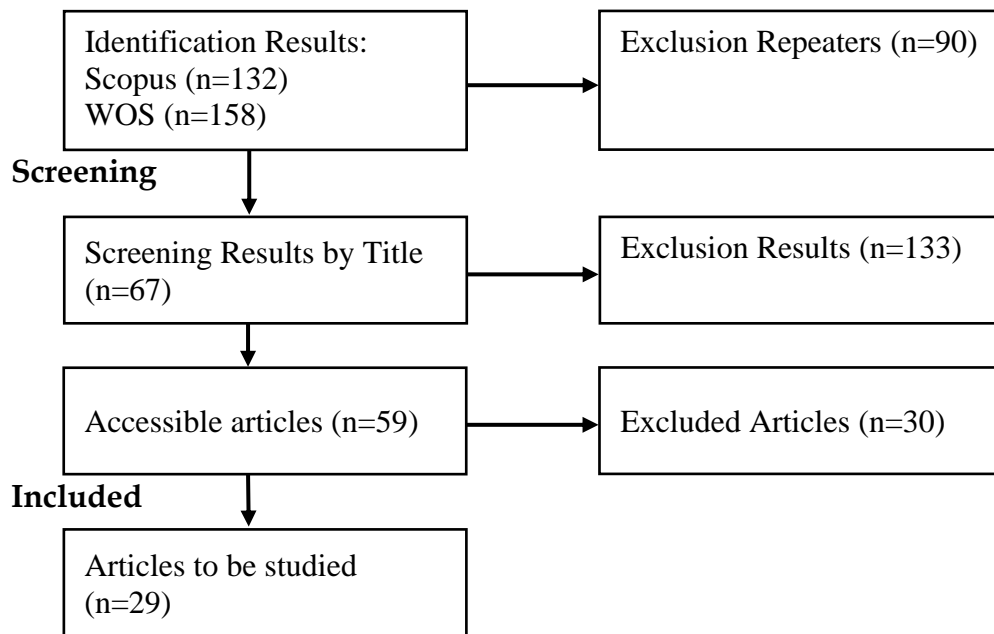
| Criteria     | Exclusions                          | Inclusion              |
|--------------|-------------------------------------|------------------------|
| Period       | <2018                               | 2018-2023              |
| Article Type | Books, Conference proceedings, etc. | Articles and Journals  |
| Language     | Other than English and Indonesian   | English and Indonesian |
| Field        | Not related to education            | Education              |

## Result and Discussion

### Literature Identification

We collected articles published from 2018 to 2024 as relevant literature for inclusion in the analysis. A search of the Scopus database resulted in 132 articles and the WOS database resulted in 158 articles. The total number of journals searched from the 2 databases was 290, but after being identified as having similar titles there were 90 articles. There are 200 articles and filtering based on the title and abstract there are 67 research articles. The 67 research articles will be selected again and only 59 articles remain. In the last stage, 29 research articles were obtained based on relevant research objectives following the title. The results of this selection are 29 research articles that are very relevant to the researcher's objectives.

## Identification



**Figure 1. Results of article selection relevant to the researcher's objectives**

**Table 3. Resume of Research Articles Appropriate to the Study**

| Years | Authors   | Objective  |
|-------|---|--|
| 2018  | Mortiboys, A.,<br>Stevenson, M., & Ross,<br>K.                                | To examine how collaborative continuing professional development, particularly through industry partnerships, impacts teachers' professional identity. |
| 2018  | Oberer, B., & Erkollar, A   | To explore the characteristics and challenges of digital leadership in the era of the Industrial Revolution 4.0, and its impact on organizations.      |
| 2018  | Wang, Y., Han, X., &<br>Yang, J.  | To explore the layers of the digital divide that impact access to and use of digital technologies in developing countries.                             |
| 2019  | Aldawood, H.,<br>Alhejaili, A., Alabadi,<br>M., Alharbi, O., &<br>Skinner, G. | Untuk mengevaluasi integrasi kepemimpinan digital dalam konteks supervisi pendidikan dan memberikan tinjauan kritis terhadap pendekatan tersebut.      |
| 2019  | Cheng, E. C., Widodo,<br>H., and Ruzita, A. B.                                | To explore and evaluate the level of teachers' competence in teaching trade and business subjects.   |
| 2019  | Frolova, E. V., Ryabova,<br>T. M., & Rogach, O. V                             | To explore the challenges and prospects of implementing the "Moscow Electronic School" project in the use of digital technologies in education.        |
| 2019  | Hinojo-Lucena, F. J.,<br>Aznar-Diaz, I., Cáceres-<br>Reche, M. P., Trujillo-  | To analyze the factors influencing the development of digital competencies in teachers at permanent education centers.                                 |

|      |   |  |
|------|---|--|
|      | Torres, J. M., & RomeroRodriguez, J. M.   |  |
| 2019 | Ravesteijn, P., & Ongena, G   | To understand how e-leadership plays a role in optimizing IT capabilities and driving digital transformation in organizations.   |
| 2019 | Ritchie, A., & Genoni, P.   | To explore the transformative potential of industry partnerships in teacher professional development.  |
| 2020 | Anak Agung Sagung, M. A., & Sri Darma, G.   | To reveal the drivers of digital leadership in the Industrial Revolution 4.0.  |
| 2020 | Bhatia, P., & Varma, A.   | To assess the impact of industry training on professional development of educators in business schools across India  |
| 2020 | Jiménez-Hernández, D., González-Calatayud, V., Torres-Soto, A., Martínez Mayoral, A., & Morales, J. | To examine the differences in digital competencies between prospective secondary school teachers by gender, age, and discipline.   |
| 2020 | Lander, J   | To examine the relationship between digital leadership values and actions held by school principals and teachers' use of technology, and how these values influence teachers' use of technology. |
| 2020 | Saher, S.   | To assess the impact of industry basic training on the professional development of educators in business schools in Pakistan   |
| 2020 | Butcher, N., Wiley, D., Jarvis, P., Karunanayake, D., & Bang, J.                                    | To examine the efficacy of integrating open educational resources (OER) into blended learning environments.  |
| 2020 | Demeshkant, N.  | To investigate the digital skills of prospective academic teachers in Poland and identify areas where they need improvement.   |
| 2020 | Esteve-Mon, F. M., Llopis-Nebot, M. Á., & Adell-Segura, J.  | To conduct a systematic review of the literature to understand the digital teaching competencies of university teachers.   |
| 2020 | Karsenti, T., Poellhuber, B., Parent, S., & Michelot, F   | To explain the digital competence framework and how it can be applied in the context of higher education.  |
| 2020 | Marinoni, G., Van't Land, H., & Jensen, T.  | To assess and document the broad impact of the COVID-19 pandemic on higher education globally.   |
| 2020 | Starkey, L.   | To summarise the research that has been done in preparing teachers for the digital age, as well as identify knowledge gaps that still need to be filled.   |

|      |  |   |
|------|--|---|
| 2020 | Zhao, Y., & Frank, K. A.   | To investigate why technology is not being utilized more widely in educational settings despite its potential.  |
| 2021 | Antonopoulou, H.,<br>Halkiopoulos, C.,<br>Barlou, O., &<br>Beligiannis, G. N.  | To examine the relationship between traditional and digital leadership in academic settings during the COVID-19 pandemic.   |
| 2021 | Bond, M., Marín, V. I.,<br>Dolch, C., Bedenlier, S.,<br>& Zawacki-Richter, O.  | To analyze the overall challenges and solutions of the digital age in education.  |
| 2021 | Dobrowolska, B., et al.  | To explore the factors that influence how students perceive their academic performance during the transition to e-learning due to COVID-19.                                       |
| 2021 | Garzón-Artacho, E.,<br>Sola-Martínez, T.,<br>Romero-Rodríguez, J.<br>M., & Gómez-García, G.                              | To investigate teachers' perceptions of digital competence at the stage of lifelong learning, and the barriers they may face in acquiring it.                                     |
| 2022 | Masalimova, A. R.,<br>Erdyneeva, K. G.,<br>Kislyakov, A. S., Sizova,<br>Z. M., Kalashnikova, E.,<br>& Khairullina, E. R. | To test the validity of a scale used to measure prospective teachers' digital competence in assisting students with functional diversity.   |
| 2022 | Tanucan, J. C. M.,<br>Negrido, C. V., &<br>Malaga, G. N.   | To examine the relationship between principals' digital leadership and teachers' job satisfaction in the Philippines during the COVID-19 pandemic.                                |
| 2023 | Berkovich, I., & Hassan,<br>T. (   | To identify the relationship between principals' digital transformational leadership, teacher commitment, and school effectiveness.   |
| 2023 | Vila-Couñago, E., &<br>Rodríguez-Groba, A.   | To explore the complex challenges and contradictions teachers face in integrating digital technologies into their professional development in a compulsory education environment. |

### Digital Leadership

There has been an evolution of digital leadership in education over the past five years. The word "digital" has emerged only recently, and it is on the list of most popular keywords but does not appear in the themes of most cited papers (Tigre et al., 2023). While the study of digital leadership is still in its early research stage and requires further research (Eberl et al., 2021), digital leadership will attract more scholars to conduct research (Tigre et al., 2023). Therefore, it is necessary to conduct an in-depth review of the research trends and effectiveness of digital leadership in the last five years.

In the selected database, the study focused mainly on the individual level of digital leaders. For example, leader responsibilities (Raman et al., 2019; AlAjmi et al., 2022), leader roles (Omar et al., 2020; Agustina et al., 2020; Marmoah et al., 2023; Karunanayaka et al., 2021; Tołwińska, 2021; Reis-Andersson, 2023; Nurabadi et al., 2022; Ghavifekr et al., 2022), leader digital competencies (Karakose et al., 2021); leader tasks (Hamzah et al., 2021). The personal characteristics of digital leadership have received extensive attention from scholars.

The volume and variety of research on digital leadership have increased significantly. Among them, the number of interactive capabilities and effectiveness of digital leadership has gradually increased, but the main purpose and needs of digital leadership have not changed significantly. More scholars are studying the relationship between digital leadership and other factors, introducing mediating variables (Agustina et al., 2020), digital teaching leadership and students (Berkovich et al., 2022), leaders and teachers (AlAjmi, 2022; A 'mar, 2022), leaders and school digitalization processes (Reis-Andersson, 2023; Ghavifekr, 2022).

Digital leadership emphasizes leadership effectiveness in the digital age. Digital leaders promote digital competence among teachers in education. For example, the relationship between digital leadership and teachers at different stages of learning, including primary school (Tolwinska, 2021; AlAjmi, 2022; Marmoah et al., 2023), secondary school (Omar et al., 2020; Karunanayaka, 2021; Ghavifekr., 2022), higher education (Karakose, 2021; Yuting et al., 2022; Ghamrawi, 2023), vocational school (Delcker et al., 2021). The process of digitizing the whole organization in different stages of learning should drive the times forward.

Leaders need to ensure educators have the data they need to achieve high-level skills. The need for distance learning, shifting traditional education methods, and developing digital activities are becoming increasingly important (Fernández-Prados et al., 2021). However, a common problem is that poor integration of digital technologies in schools is related to low levels of leadership (Ugur et al., 2019). Therefore, there is a need to improve the digital leadership of leaders.

As the digital age increasingly demands leaders, the study of digital leadership has become a core category in the field of education. In addition, various factors that can influence digital leadership are discussed, including thinking and communication skills (Benson, 2018), encouraging distance learning, reducing home learning problems, and managing virtual education organizations (Nurabadi et al., 2022). Digital leadership and leadership effectiveness in the post-epidemic era have also received attention from scholars (Sujaya, 2022; Jomezai et al., 2023). The digital leadership style emphasizes that the digital literacy of leaders has become an important concern for educational institutions. Thus, school innovation, teaching methods, the role of school leaders, school performance, education quality, etc. are closely related to the digital leadership level of the organization (A'mar & Eleyan, 2022; Marmoah et al., 2023). Digital leadership is related to the digital development of educational institutions.

### Digital Competence

Leaders and stakeholders must encourage the development of teachers' digital competencies. Educational institutions with better technological resources and

training focused on teaching procedures have higher rates of digitally skilled teachers (Jorge-Vázquez et al., 2021). Factors internal and external to educational organizations influence teachers' digital competencies. Thus, the findings suggest that many factors influence educators' digital competence. Among them, Jorge-Vazquez et al. (2021) found that university leaders' strategic leadership in technology adoption had a positive impact on lecturers' digital skills development, indicating the need for leaders to create comfortable digital conditions for educators.

This research focuses on the impact of factors other than demographics on teachers' digital competencies. Perspectives support the influence of the work environment on digital competence. For example, Masoumi et al. (2023) found that institutional culture, access to resources, leadership and management, large workload, and lack of technology-based teaching influenced the improvement of educators' digital competence. In addition, skill level, and access to technology (Jorge-Vázquez et al., 2021; Raman et al., 2019) influence teachers' digital competence.

Hakim (2020) further suggested that a lack of digital technology, poor network conditions, low learning motivation, attention deficit, etc. will affect teachers' technology integration. There is a need to strengthen principals' digital leadership practices, and when leaders' digital leadership practices are strengthened, it can improve educators' digital technology self-efficacy and school digital practices. In addition, personal, occupational, and educational stage variables are related to the use of digital technology. Thus, the influence of sociodemographic factors cannot be ignored (Hurtado-Mazeyra et al., 2022).

Through the review, researchers found that various elements related to digital competence received attention from scholars, such as professional digital competence (Skantz-Åberg et al., 2022), digital competence standards (Basantes-Andrade et al., 2022), Students developing digital competence in educator education (Røkenes et al., 2014), Teacher development training for digital competence teaching (Pinto-Santos et al., 2022), Digital competence evaluation methods (Sillat et al., 2021), University students digital competence (Sánchez-Caballé et al., 2020). However, according to Zhao et al. (2021), research on digital competence is still in its infancy, with 15% of publications studying this topic. Teachers' digital competence will effectively influence students' academic performance and attitudes towards digital technology adoption. Therefore, researchers believe it is necessary to understand the elements that influence digital capabilities at different stages of learning.

## **Opportunities in the Digital Age**

In the digital era, teachers have several significant opportunities to develop their profession and improve the quality of learning:

1. Use of Learning Technology

Teachers have the opportunity to integrate various technologies such as learning management platforms, interactive tools, and digital media into the curriculum, which can increase student engagement and facilitate adaptive and personalized learning (Marironi, et al 2020).

2. Access to Extensive Learning Resources

The Internet offers unlimited access to educational resources from all over the world, allowing teachers to enrich teaching materials with a variety of perspectives and more current and relevant materials (Butcher, et al 2020).

### 3. Continuous Professional Development

Teachers can take advantage of the many online courses, webinars, and workshops available for professional development. This helps them stay up-to-date with the latest teaching methods and educational trends (Bond, et al 2021).

### 4. Broader Collaboration

Digital technology allows teachers to collaborate not only with colleagues in their school but also with educators around the world. This could be through joint projects, knowledge exchange, or professional networks (Marironi et al., 2020).

### 5. Flexibility in Teaching

Technology gives teachers the ability to teach from anywhere, giving them the flexibility to work from home or other locations. It can also help in reaching students who are in remote areas (Zhao et al., 2020).

### 6. Personalisation of Learning

With digital tools, teachers can more easily tailor teaching materials to the individual learning needs of students, thus meeting the diverse learning needs of a single class (Shemshack & Spector., 2020).

### 7. More Effective Evaluation and Feedback

Technology provides tools for more objective and rapid assessment, allowing teachers to provide real-time feedback and improve the overall learning process (Wang et al., 2018.).

## Discussion

In the digital age, teachers are faced with complex opportunities and challenges. A systematic discussion on this topic reveals several important findings.

### 1. Opportunities

Teachers have greater access to digital learning resources, from learning videos to online learning platforms. This opens up opportunities to improve the effectiveness of learning by integrating different media and engaging learning methods. Collaboration and professional networks are also increasingly accessible through digital technology. Teachers can share experiences, ideas, and best practices with peers from around the world, broadening their horizons and skills. Personalization of learning is becoming more possible with digital technology. Teachers can customize their learning approaches according to student's individual needs, interests, and learning styles, increasing their engagement and understanding. In addition, the use of technology in learning opens up opportunities for teachers to continuously develop their digital skills. This is important in maintaining their relevance and effectiveness in teaching in an increasingly digitally connected era.

### 2. Challenges

There are several challenges faced by teachers in adopting digital technology. One of these is the gap in digital access and skills. In some areas, technology infrastructure and internet access are still limited, and some teachers may not have sufficient skills in using technology. Lack of training and support is also a significant challenge. Many teachers feel that they lack adequate training in the use of digital

technology in learning. Support from educational institutions and the government is also needed to facilitate the integration of technology into the curriculum and learning environment. Ethical and privacy challenges also need to be addressed. The use of digital technologies in learning raises issues related to the use of student data and the protection of online privacy that require clear policies and ethical guidelines.

## **Conclusion**

The results of the study provide an explanation of how teachers cope with the digital era in this case the teacher provides a lot of knowledge about digital literacy and also participates in training related to digital literacy. Teachers have the opportunity to overhaul the traditional learning paradigm by creating digital teaching materials that accommodate cultural diversity and incorporate ecological intelligence concepts into the materials. However, they also face challenges in creating an engaging learning environment, developing a curriculum based on a scientific approach, and supporting students in continuous learning. Teachers are faced with complex opportunities and challenges in integrating digital technology into the learning process. Opportunities include easy access to digital resources, greater collaboration and networking, easier personalization of learning, and improved digital skills. Meanwhile, the challenges faced by teachers are limited access and supporting infrastructure, lack of training and support, digital divide, and ethical and privacy challenges. Based on the research results, several implications and recommendations can be considered to improve the integration of digital technology in education, namely, Professional development, Institutional support, Equalisation of Access, and Policy Development. Educating is a noble responsibility that is full of obstacles and challenges. An educator must face students who have differences in their respective eras. The rapid development of information technology provides new opportunities and challenges for teachers. Millennials, who are often more interested in mobile phones and social media, show different characteristics from previous generations. Teachers have the opportunity to change the traditional paradigm in the learning environment, develop multicultural digital teaching materials, and enrich teaching materials with the concept of ecological intelligence. However, they are also faced with challenges such as creating an engaging learning environment, designing a curriculum with a scientific approach, and assisting students in lifelong learning. In addition, to be a qualified teacher, teachers need to have competencies in internet-based learning, technology marketing, globalization, and future strategies, in addition to those that have been regulated by government regulations.

## **References**

Agung Widhi Kurniawan, Z. P. (2016). *Metode Penelitian Kuantitatif (Pertama)*. Pandiva Buku.

- Andriani, D. E. (2010). Mengembangkan profesionalitas guru abad 21 melalui program pembimbingan yang efektif. *Jurnal Manajemen Pendidikan UNY*, 111985.
- Diplan, D. (2019). Tantangan Pendidik di Era Digital. *Lentera: Jurnal Pendidikan*, 14(2), 41-47.
- Duryat, P. S., & Duryat, M. (2019). Paradigma baru manajemen sekolah di era industri 4.0. CV. Alfabeta.
- Hamid, A. (2017). Upaya Peningkatan Kompetensi Guru dalam Menyusun Perangkat Pembelajaran melalui Supervisi Akademik yang Berkelanjutan SDN 007 Panipahan Darat. *Jurnal PAJAR (Pendidikan Dan Pengajaran)*, 1(2), 277-289.
- Indonesia, R. (2007). Permendiknas No. 16 Tahun 2007 tentang Standar Kualifikasi Akademik dan Kompetensi Guru. Jakarta: Sekretariat Negara.
- Karmizan, K. (2018). Meningkatkan Kompetensi Pedagogik Guru dalam Pembelajaran dengan Lesson Study di Kelas SD Negeri 001 Koto Peraku Kecamatan Cerenti. *Jurnal PAJAR (Pendidikan Dan Pengajaran)*, 2(4), 608-618.
- Khodijah, S. (2018). Telaah Kompetensi Guru di Era Digital dalam Memenuhi Tuntutan Pendidikan Abad Ke-21. *Journal of Islamic Education Policy*, 3(1).
- Ma'ruf, S. (2013). Pengembangan Model Materi Ajar Bahasa Rejang sebagai Muatan Lokal di Kelas III Sekolah Dasar. *Sekolah Dasar: Kajian Teori Dan Praktik 9 | Peluang dan Tantangan Guru Dalam Menghadapi Era Digital Pendidikan*, 19(2).
- Meria, A. (2017). Kompetensi Guru Kelas Madrasah Ibtidaiyah. *Tarbiyah Al-Awlad*, 7(2). RI, K. P. N. (2019).
- Undang-Undang RI No. 14 Tahun 2005 Tentang Guru dan Dosen.
- Rukin, S. P. (2019). Metodologi Penelitian Kualitatif. Yayasan Ahmar Cendekia Indonesia.
- Wartomo, W. (2016). Peran guru dalam pembelajaran era digital. *Prosiding Temu Ilmiah Nasional Guru (Ting) Vii*, (November), 265-275.
- Cheng, E. C., Widodo, H., and Ruzita, A. B. (2019). Teachers' Competency Level in Teaching Commerce and Business Subjects: A Qualitative Study. *Journal of Talent Development and Excellence*, 11(1), 2285-2301.
- Bhatia, P., & Varma, A. (2020). Enhancing Competence through Industrial Training: An Empirical Study of Indian Business Schools. *Journal of Education for Business*, 95(4), 227-236.
- Buchori, A. (2017). Kompetensi Guru dan Kebutuhan Pendidikan Vokasi Menyongsong Revolusi Industri 4.0. *Jurnal Penelitian Pendidikan Vokasi*, 4(2), 247-260.
- Ritchie, A., & Genoni, P. (2019). Reimagining teacher professional learning through industry partnerships. *Asia-Pacific Journal of Teacher Education*, 47(3), 293-305.
- Saher, S. (2020). The impact of industry based training on the professional development of business education teachers in Pakistan. *Journal of Education and Vocational Research*, 11(2), 51-58.

- Mortiboys, A., Stevenson, M., & Ross, K. (2018). Collaborative CPD and professional identity: An exploration of teachers' learning through industry partnerships. *Professional Development in Education*, 44(4), 594-609.
- Buchori, A. (2017). Kompetensi Guru dan Kebutuhan Pendidikan Vokasi Menyongsong Revolusi Industri 4.0. *Jurnal Penelitian Pendidikan Vokasi*, 4(2), 247-260.
- Nadziroh, F. (2017). The Analisa efektifitas sistem pembelajaran berbasis e-learning. *Journal of Computer Science and Visual Communication Design*, 2(1), 1-14.
- Maryani, Y. (2013). Aplikasi E-Learning Sebagai Model Pembelajaran Berbasis Teknologi informasidi Jurusan Kesehatan Gigi Poltekkes Kemenkes Pontianak. Vo. 9 No. 1 hal. 27-39.
- Pristiwanti, D., Badariah, B. ., Hidayat, . S. ., & Dewi, R. S. . (2022). Pengertian Pendidikan. *Jurnal Pendidikan Dan Konseling (JPDK)*, 4(6), 7911-7915. <https://doi.org/10.31004/jpdk.v4i6.9498>
- Ma'arif, S., & Juharyanto. (2018). Model Pembelajaran Dalam Perspektif Era Revolusi Industri 4.0. *Journal of Innovation in Education and Learning*, 2(1), 9-17.
- Keržič, D., Alex, J. K., Balbontín Alvarado, R. P., Bezerra, D. da S., Cheraghi, M., Dobrowolska, B., et al. (2021). Academic student satisfaction and perceived performance in the e-learning environment during the COVID-19 pandemic: Evidence across ten countries. *PLOS ONE*, 16(10): e0258807. <https://doi.org/10.1371/journal.pone.0258807>
- Vila-Couñago, E., & Rodríguez-Groba, A. (2023). Digital Technology and Teacher Professional Development: Challenges and Contradictions in Compulsory Education. *Education Sciences*, 13(10), 1029. doi:10.3390/educsci13101029. Available at: <https://www.mdpi.com/2227-7102/13/10/1029>
- Marinoni, G., Van't Land, H., & Jensen, T. (2020). The impact of Covid-19 on higher education around the world. IAU Global Survey Report. *International Association of Universities*. <https://educationaltechnologyjournal.springeropen.com/articles/10.1186/s41239-021-00258-x>
- Bond, M., Marín, V. I., Dolch, C., Bedenlier, S., & Zawacki-Richter, O. (2021). Emergency remote teaching in higher education: Mapping the first global online semester. *International Journal of Educational Technology in Higher Education*, 18, Article number: 50. <https://doi.org/10.1186/s41239-021-00258-x>
- Butcher, N., Wiley, D., Jarvis, P., Karunanayake, D., & Bang, J. (2020). Promoting open educational resources-based blended learning. *International Journal of Educational Technology in Higher Education*. <https://educationaltechnologyjournal.springeropen.com/articles/10.1186/s41239-020-00210-7>
- Zhao, Y., & Frank, K. A. (2020). Factors affecting technology uses in schools: An ecological perspective. *American Educational Research Journal*, 47(2), 804-840

- Shemshack, A., & Spector, J.M. (2020). A systematic literature review of personalized learning terms. *Smart Learning Environments*, 7.
- Wang, Y., Han, X., & Yang, J. (2018). Revisiting the digital divide in the context of a developing country. *Sociological Studies of Children and Youth*, 23, 173-195
- Ravesteijn, P., & Ongena, G. (2019, April). The role of e-leadership in relation to it capabilities and digital transformation. In International Conference Information Systems 2019(pp. 171179).
- Lander, J. (2020). The relationship between principals' pillars of digital leadership aligned values and actions and teacher technology use. St. John's University (New York).
- Oberer, B., & Erkollar, A. (2018). Leadership 4.0: Digital Leaders in the Age of Industry 4.0. *International Journal of Organizational Leadership*. Available at SSRN: <https://ssrn.com/abstract=3337644>.
- Aldawood, H., Alhejaili, A., Alabadi, M., Alharbi, O., & Skinner, G. (2019, July). Integrating digital leadership in an educational supervision context: Acritical appraisal. In 2019 International Conference in Engineering Applications (ICEA)(pp. 1-7). IEEE. doi: 10.1109/CEAP.2019.8883484.
- Tanucan, J. C. M., Negrido, C. V., & Malaga, G. N. (2022). Digital leadership of school heads and job satisfaction of teachers in the Philippines during the pandemic. *International journal of learning, teaching and educational research*, 21(10), 1-18. <https://doi.org/10.26803/ijlter.21.10.1>
- Berkovich, I., & Hassan, T. (2023). Principals' digital transformational leadership, teachers' commitment, and school effectiveness. *Education Inquiry*, 1-18. <https://doi.org/10.1080/20004508.2023.2173705>.
- Antonopoulou, H., Halkiopoulos, C., Barlou, O., & Beligiannis, G. N. (2021). Associations between traditional and digital leadership in academic environment: During the COVID-19 pandemic. *Emerging Science Journal*, 5(4), 405-428. <http://dx.doi.org/10.28991/esj-2021-01286>
- Anak Agung Sagung, M. A., & Sri Darma, G. (2020). Revealing the digital leadership spurs in 4.0 industrial revolution. *Asri, AASMAN, & Darma, GS, Revealing the digital leadership spurs in*, 4, 93-100. <https://doi.org/10.31295/ijbem.v3n1.135>.
- Frolova, E. V., Ryabova, T. M., & Rogach, O. V. (2019). Digital Technologies in Education: Problems and Prospects for "Moscow Electronic School" Project Implementation. *European Journal of Contemporary Education*, 8(4), 779-789. doi: 10.13187/ejced.2019.4.779
- Esteve-Mon, F. M., Llopis-Nebot, M. Á., & Adell-Segura, J. (2020). Digital teaching competence of university teachers: A systematic review of the literature. *IEEE Revista Iberoamericana de Tecnologías del Aprendizaje*, 15(4), 399-406. doi: 10.1109/RITA.2020.3033225
- Karsenti, T., Poellhuber, B., Parent, S., & Michelot, F. (2020). What is the Digital Competency Framework? *Revue internationale des technologies en pédagogie universitaire*, 17(1), 11-14. <https://doi.org/10.18162/ritpu-2020-v17n1-04>.

- Demeshkant, N. (2020). Future academic teachers' digital skills: Polish case-study. *Universal Journal of Educational Research*, 8(7), 3173-3178. DOI: 10.13189/ujer.2020.080746
- Starkey, L. (2020). A review of research exploring teacher preparation for the digital age. *Cambridge Journal of Education*, 50(1), 37-56. <https://doi.org/10.1080/0305764X.2019.1625867>
- Masalimova, A. R., Erdyneeva, K. G., Kislyakov, A. S., Sizova, Z. M., Kalashnikova, E., & Khairullina, E. R. (2022). Validation of the Scale on Pre-Service Teachers' Digital Competence to Assist Students with Functional Diversity. *Contemporary Educational Technology*, 14(4). <https://doi.org/10.30935/cedtech/12301>.
- Hinojo-Lucena, F. J., Aznar-Diaz, I., Cáceres-Reche, M. P., Trujillo-Torres, J. M., & RomeroRodríguez, J. M. (2019). Factors influencing the development of digital competence in teachers: Analysis of the teaching staff of permanent education centres. *IEEE Access*, 7, 178744-178752. doi: 10.1109/ACCESS.2019.2957438.
- Jiménez-Hernández, D., González-Calatayud, V., Torres-Soto, A., Martínez Mayoral, A., & Morales, J. (2020). Digital competence of future secondary school teachers: Differences according to gender, age, and branch of knowledge. *Sustainability*, 12(22), 9473. <https://doi.org/10.3390/su12229473>
- Garzón-Artacho, E., Sola-Martínez, T., Romero-Rodríguez, J. M., & Gómez-García, G. (2021). Teachers' perceptions of digital competence at the lifelong learning stage. *Heliyon*, 7(7). <https://doi.org/10.1016/j.heliyon.2021.e07513>.