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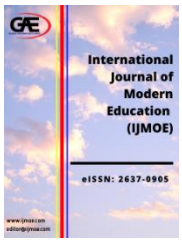

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DIGITAL LEADERSHIP COMPETENCIES THROUGH A SYSTEMATIC LITERATURE REVIEW: BRIDGING EDUCATIONAL DEVELOPMENT AND ORGANIZATIONAL SUCCESS

Nur Hafiza Hamzah[1], Norfariza Mohd Radzi[2*], Intan Marfarrina Omar[3]

[1] Department of Educational Management, Planning and Policy, Universiti Malaya, Malaysia
Email: s2108779@siswa.um.edu.my
[2] Department of Educational Management, Planning and Policy, Universiti Malaya, Malaysia
Email: norfariza@um.edu.my
[3] Department of Educational Management, Planning and Policy, Universiti Malaya, Malaysia
Email: imarfarrina@um.edu.my
[*] Corresponding Author

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Abstract:

Digital leadership competencies are critical for fostering educational development and achieving organizational success in an increasingly digital world. However, a comprehensive understanding of the competencies required for effective digital leadership remains fragmented. This systematic literature review addresses this gap by synthesizing insights from existing research to identify key digital leadership competencies and their implications for educational and organizational contexts. Following the PRISMA framework, a rigorous search was conducted in the Scopus and Web of Science databases, yielding 26 primary studies. The selection process involved screening titles, abstracts, and full texts to ensure the inclusion of high-quality, relevant studies. The review highlights essential competencies such as strategic vision, socio-technical integration, adaptability, digital literacy, and ethical governance, collectively empowering leaders to navigate the complexities of digital transformation. Numerical analysis revealed that 85% of the studies emphasized the pivotal role of adaptability and collaborative practices, while 78% underscored the significance of ethical and inclusive leadership in promoting equity and innovation. The findings demonstrate that digital leadership competencies drive organizational performance and enhance educational outcomes by fostering collaboration, resource optimization, and resilience. The review concludes that a multifaceted approach, combining structured frameworks, targeted training, and systemic support, is essential for developing these competencies. This study contributes to the existing body of knowledge by offering a consolidated perspective on digital leadership,

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providing actionable insights for educators, policymakers, and organizational leaders aiming to bridge educational development and organizational success in the digital age.

Keywords:

Digital Leadership, Competencies, Education, Organizational, SLR

Introduction

The accelerating pace of digital transformation is reshaping the landscape of organizations and educational institutions across the globe. As technology continues to evolve, the traditional models of leadership must also evolve to effectively guide teams and institutions through this digital revolution (Eden & Adeniyi, 2024; Musaigwa & Kalitanyi, 2024). This transformation is not only about adopting new tools and systems but also about fostering a culture of continuous innovation, adaptability, and strategic alignment with the digital landscape (Buonocore, Annosi, de Gennaro, & Riemma, 2024). The role of leadership, particularly digital leadership, has thus become paramount in steering organizations and educational institutions toward success in this ever-changing environment (Muktamar, Bachtiar, Guntoro, Riyantie, & Ridwan, 2023). Digital leadership is a multifaceted concept that goes beyond basic technology adoption (Magesa & Jonathan, 2020). It encompasses a set of competencies that combine technical proficiency, strategic vision, and interpersonal skills, allowing leaders to drive digital transformation effectively (Müller, Konzag, Nielsen, & Sandholt, 2024; Ongena, Morsch, & Ravesteyn, 2024). Technical competencies involve understanding and leveraging emerging technologies such as artificial intelligence, data analytics, and cloud computing (Atanasovski, Bozhinovska, & Trpeska, 2020). Strategic competencies focus on aligning digital initiatives with the long-term goals of the organization or educational institution, ensuring that digital investments contribute to overall growth and success (Osemeike, Eyieyien, Eyieyien, Paul, & Ijomah, 2024). Finally, interpersonal competencies, such as emotional intelligence, communication, and change management, are essential for fostering collaboration, trust, and resilience in the face of digital disruption (Ertiö, Eriksson, Rowan, & McCarthy, 2024). These competencies form the bedrock of effective digital leadership, equipping leaders to lead their teams and institutions through the complexities of the digital age. Digital leadership is critical for enhancing teaching, learning, and institutional development (McCarthy, Maor, McConney, & Cavanaugh, 2023; Torres, Zerna, Ramirez, & Uy, 2024). With the increasing reliance on digital platforms, online learning environments, and educational technologies, school leaders must possess the skills necessary to integrate technology into pedagogy, curriculum design, and student engagement. Digital leadership in education goes beyond merely adopting technological tools; it involves creating a digital culture that encourages collaboration, innovation, and ethical practices (Anwar & Saraih, 2024; Torres et al., 2024). Educational leaders must develop strategies to enhance digital literacy among both students and educators, fostering a climate where technology is seamlessly integrated into daily teaching and learning activities. In turn, these strategies can lead to better learning outcomes, improved operational efficiency, and greater alignment between educational goals and the demands of a digital society (Haleem, Javaid, Qadri, & Suman, 2022). Similarly, in the corporate and organizational sectors, digital leadership plays a vital role in driving innovation, improving operational efficiency, and ensuring sustainability. As organizations adopt digital tools and systems to streamline processes and engage with customers, leaders must possess the ability to manage technological change, optimize resources, and create a vision for long-term success in a digital

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world (Tagscherer & Carbon, 2023a). Moreover, digital leadership is also concerned with ethical considerations, such as data privacy, cybersecurity, and environmental sustainability (Buonocore et al., 2024). Leaders must balance technological advancements with ethical imperatives, ensuring that digital transformation efforts are responsible and aligned with societal expectations. This holistic approach to leadership is essential for navigating the complexities of the digital age and ensuring organizational success in an increasingly competitive and technology-driven global economy (Musaigwa & Kalitanyi, 2024). Despite the growing recognition of the importance of digital leadership, there remains a significant gap in research regarding the specific competencies required for effective digital leadership (Araujo, Priadana, Paramarta, & Sunarsi, 2021; Tagscherer & Carbon, 2023b). While much of the existing literature has highlighted the importance of digital leadership, studies often focus on specific aspects of digital leadership such as technology adoption or strategic alignment without fully exploring the range of competencies necessary for leaders to succeed in digital environments (Lin, 2024). This gap is particularly pronounced when it comes to understanding how digital leadership competencies contribute to bridging the divide between educational development and organizational success. To address this gap, this article presents a systematic literature review of digital leadership competencies. The review aims to provide a comprehensive synthesis of the most recent research on the competencies that define effective digital leadership. By examining studies from the past five years, this article explores how digital leadership competencies have evolved and identifies the core skills and attributes that enable leaders to drive digital transformation successfully. Furthermore, this article examines the intersection between digital leadership and its role in educational development and organizational success, highlighting how digital leadership competencies can be applied across both sectors.

Literature Review

The rapid evolution of digital technologies has significantly transformed organizational dynamics and educational practices, creating a pressing need for effective digital leadership. Digital leadership is broadly defined as the capacity to guide organizations and institutions through digital transformation while leveraging technology to achieve strategic objectives (Blanka, Krumay, & Rueckel, 2022; Böck & Lange, 2018). (Sow & Aborbie, 2018) describe digital leadership as influencing the adoption of strategies that facilitate digital transformation processes, while (Mihardjo, Sasmoko, Alamsjah, & Elidjen, 2019) emphasize its foundation in the interplay between digital culture and digital competence. As such, digital leadership encompasses a blend of technical, strategic, and interpersonal competencies that enable leaders to align technology with organizational and educational goals effectively (Al-Hadrawi & Reniati, 2023; Torres et al., 2024). In educational settings, digital leadership has become essential in integrating technology into teaching and learning processes (Al-Ajmi, 2022; Anwar & Saraih, 2024). Education leaders must develop and implement strategies that enhance digital literacy among students and educators while promoting innovative pedagogies. A key aspect of this integration is the establishment of a strong digital culture that encourages collaboration, ethical use of technology, and continuous learning (Aktaş & Karaca, 2022) and highlights the importance of fostering a digital culture, noting that it enhances engagement and facilitates the successful adoption of technological innovations. Furthermore, the strategic use of digital tools in education, such as learning management systems and data analytics, has been shown to improve educational outcomes and align institutional goals with broader digital transformation efforts (Li, Kim, & Palkar, 2022; Nikolopoulou, Gialamas, & Lavidas, 2021). In the context of organizational success, digital leadership serves as a critical driver of innovation, operational

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efficiency, and sustainability (Philip, Gilli, & Knappstein, 2023; Sow & Aborbie, 2018). Digital leaders are responsible for fostering a culture of innovation by leveraging technology to encourage creativity and adaptability (Öngel, Günsel, Çelik, Altındağ, & Tatli, 2023). (Jagadisen, Salamzadeh, Farzad, Salamzadeh, & Palalić, 2022) argue that innovation driven by digital leadership allows organizations to remain competitive in an increasingly dynamic market. Additionally, the implementation of digital technologies under strong leadership can streamline processes, reduce costs, and enhance productivity (Sainger, 2018). At the same time, ethical considerations, including data privacy, cybersecurity, and environmental sustainability, are integral to the responsibilities of digital leaders. These ethical practices ensure that digital transformation efforts align with societal expectations and regulatory standards.

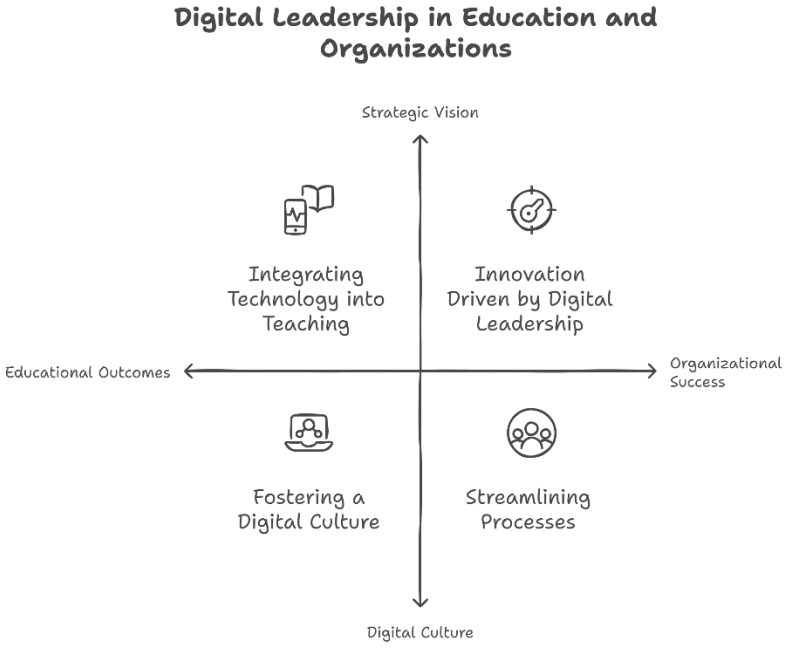

Figure 1: Digital Leadership in Education and Organizations
Source: Blanka, Krumay, & Rueckel, 2022; Böck & Lange, 2018

Despite its importance, digital leadership faces significant challenges, including resistance to change, limited resources, and the rapid pace of technological advancement. Resistance to change often stems from employees' fear of disruption or a lack of digital literacy, which can hinder the adoption of new technologies. Kotter (1996) emphasizes the role of effective communication and trust-building in overcoming such resistance (Carreno, 2024). Limited resources, including inadequate funding, infrastructure, and skilled personnel, further complicate the implementation of digital initiatives (Chen, Lin, Chen, Chao, & Pandia, 2021; Jerab, 2024). Additionally, the fast-paced nature of technological innovation necessitates continuous learning and adaptation on the part of leaders to stay relevant and effective. The intersection of digital leadership in education and organizational success lies in their shared objective of driving transformation through technology. Both contexts emphasize the alignment of digital initiatives with strategic goals, fostering a culture of innovation, and ensuring ethical practices. In education, digital leadership contributes to improved teaching and learning outcomes, increased digital literacy, and overall institutional development (Nasution, 2024). Similarly, in organizational contexts, digital leadership enables the efficient use of resources, promotes sustainability, and supports long-term success (Abdullah & Abdul Kadir,

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2023). These overlapping competencies underscore the universal applicability of digital leadership principles across different sectors (Torres et al., 2024). A key insight from the literature is the importance of strategic vision in digital leadership. Leaders must be able to anticipate technological trends, integrate emerging tools effectively, and align digital initiatives with broader objectives. (Davis, 2024) emphasizes that strategic vision enables leaders to drive innovation and maintain organizational relevance in a rapidly changing environment. This competency is particularly critical in educational settings, where the integration of digital technologies must be carefully planned to enhance educational outcomes while ensuring alignment with institutional goals (Eden & Adeniyi, 2024). In conclusion, the literature underscores the critical role of digital leadership in navigating the challenges and opportunities of the digital age (Musaigwa & Kalitanyi, 2024; Siregar & Akhter, 2024). By developing and leveraging technical, strategic, and interpersonal competencies, digital leaders can effectively bridge the gap between educational development and organizational success. Future research should explore practical applications of digital leadership competencies across diverse sectors, including education, healthcare, and business. Additionally, there is a need for studies that examine the role of digital leadership in promoting equity and inclusivity within digital transformation efforts. Such research will provide valuable insights into addressing emerging challenges and maximizing the potential of digital leadership in driving sustainable and impactful change.

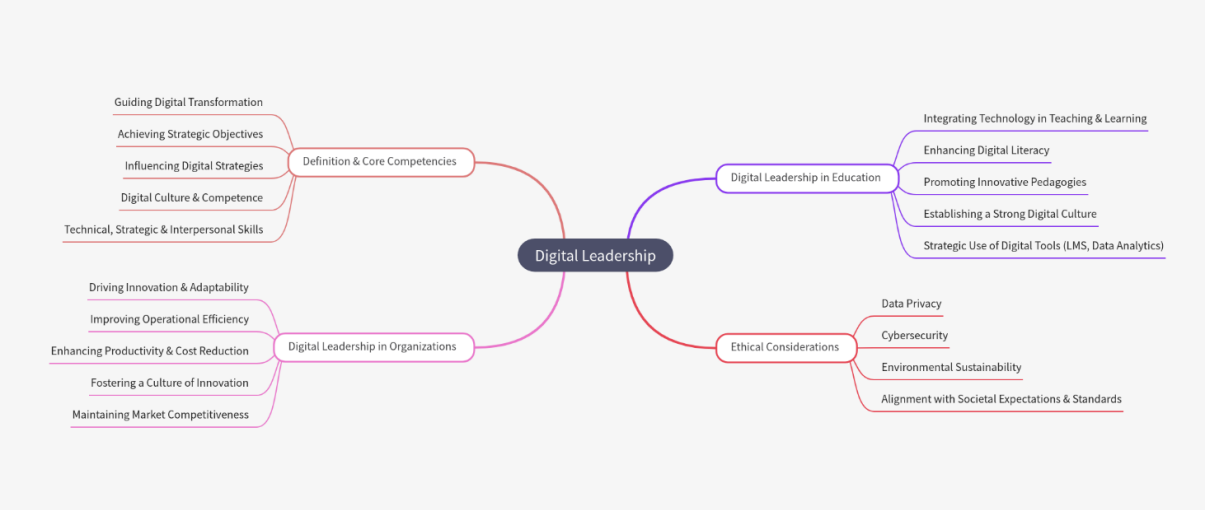

Figure 2: Mind Mapping of Digital Leadership

Source: Musaigwa & Kalitanyi, 2024; Siregar & Akhter, 2024

Research Questions

Research questions are essential in guiding a systematic literature review (SLR), providing the framework and direction for the entire process. They help define the scope and focus of the review, determining which studies should be included or excluded, thus ensuring the review remains relevant and aligned with the subject of interest. A well-defined research question ensures a thorough and systematic literature search, capturing all pertinent studies that address key aspects of the topic. This minimizes bias and guarantees a comprehensive summary of existing evidence. Furthermore, research questions assist in organizing and categorizing data from selected studies, creating a structured framework for analyzing findings and synthesizing results to draw meaningful conclusions. They enhance clarity and focus, eliminating ambiguity and ensuring the review stays concentrated on specific issues, making the findings more

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practical and applicable. Well-crafted research questions also support the transparency and reproducibility of the review, allowing other researchers to replicate the process and verify results or expand the review in related areas. Ultimately, research questions ensure the review aligns with the study's overall objectives, whether identifying gaps in the literature, evaluating the effectiveness of interventions, or exploring trends within a particular field, making them a cornerstone for a rigorous, focused, and relevant systematic literature review. Defining the Research Questions (RQs) is a crucial step in the planning phase and forms the foundation of any systematic literature review (SLR), as it influences the entire review methodology (Kitchenham, 2007). For this SLR, we applied the PICo framework, a qualitative research tool proposed by Lockwood, Munn, & Porritt (2015), to develop the research questions. PICo stands for Population, Interest, and Context, and it is a framework designed to help structure research questions in a clear and systematic way. Each component of the PICo framework serves to refine and focus the scope of the research, ensuring that the study is both relevant and well-defined. The Population (P) refers to the specific group or participants the study focuses on. This component is crucial because it defines who or what the study is concerned with, be it a particular demographic, such as age, gender, or ethnicity, a patient group, a community, or any other defined set of individuals or entities. This allows the researcher to narrow down the study's target audience and helps to ensure that the findings are applicable to the relevant population. For instance, a study could focus on adolescents with a specific medical condition or workers in a particular industry. The Interest (I) represents the central focus of the research—the phenomenon or issue the study seeks to understand or explore. This could involve various aspects, such as a specific experience, behaviour, intervention, treatment, or issue that the researcher is interested in investigating. For example, the research may aim to explore the effectiveness of a new educational intervention on improving student outcomes, or it could focus on understanding the relationship between a certain lifestyle behaviour and health outcomes. By defining the interest, the researcher ensures that the investigation is focused on a clear research problem or question. The Context (Co) defines the setting or environment in which the study takes place. This is a critical element, as it provides the backdrop that can influence how the population and the interests interact. The context might refer to the geographical location, cultural, or social environment, or any other situational factors that are relevant to the study. For example, a study examining the effects of air pollution on respiratory health might specify that it takes place in a city with high levels of industrial pollution, which will influence how the results are interpreted. Contextual factors are important because they help to contextualize the findings and determine their applicability to other settings or populations.

By breaking down research questions into these three components (Population, Interest, and Context) the PICo framework allows for a more focused and systematic approach to research. It helps researchers ensure that their questions are specific, well-defined, and aligned with the scope of their study. This clarity improves the process of literature searching by narrowing down relevant studies that match the defined parameters. Additionally, it assists in designing the study itself, ensuring that each element is considered and addressed meaningfully. Overall, using the PICo framework enhances the quality and precision of research questions, making it easier to generate meaningful insights and conclusions. This study achieved two research questions as below;

i) What digital leadership competencies and practices are essential for school principals in Malaysia to effectively lead the digital transformation of education?
ii) How do training programs and competency development in digital environments

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influence the digital leadership capabilities of school principals in Malaysia?

iii) What is the impact of digital leadership competencies among school principals on Malaysian schools' academic performance and overall organizational effectiveness?

Material And Methods

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework, as described by (Page et al., 2021), is a widely acknowledged methodology for conducting systematic literature reviews. It promotes transparency, comprehensiveness, and uniformity throughout the review process. By adhering to PRISMA guidelines, researchers can ensure a more accurate and rigorous analysis, as these guidelines provide clear directions for systematically identifying, evaluating, and selecting studies. The framework also emphasizes the critical role of randomized studies in minimizing bias and delivering reliable evidence. For this review, Web of Science and Scopus were chosen as the primary databases due to their extensive scope and robustness. PRISMA organizes the review process into four fundamental stages: identification, screening, eligibility, and data extraction. In the identification stage, relevant studies are gathered through database searches. The screening phase applies predefined criteria to exclude irrelevant or substandard studies. During the eligibility phase, the remaining studies undergo a detailed assessment to verify their alignment with the inclusion criteria. Finally, the data extraction stage involves collecting and synthesizing information from the selected studies to generate reliable insights and conclusions. This systematic process ensures a high level of rigour, resulting in findings that can effectively guide both research and practice.

Identification

In this study, a systematic and structured approach was undertaken to ensure the collection of a comprehensive and relevant body of literature. The process began with identifying core keywords closely aligned with the research objectives. To broaden the scope and capture all related terms, a meticulous review was conducted using various reference tools, including dictionaries, thesauri, encyclopedias, and previous research studies. This step was crucial in ensuring that no significant terms or variations were overlooked, enhancing the inclusiveness and relevance of the search. After compiling all relevant terms, detailed, and carefully constructed search strings were developed for use in two widely recognized academic databases, Web of Science and Scopus. These databases were selected for their extensive coverage, multidisciplinary scope, and robust indexing capabilities, which are critical for a high-quality systematic review. The search strings were tailored to maximize the retrieval of studies directly addressing the research topic while minimizing irrelevant results, reflecting the precision and rigour of the review process (as illustrated in Table 1). This initial phase of the systematic review was highly productive, yielding 1,022 publications from the two databases. These publications represented a diverse and rich dataset, providing a strong foundation for further screening, analysis, and synthesis. This meticulous and methodical approach ensured that the literature review was comprehensive, unbiased, and aligned with the study’s goals.

Scopus	TITLE-ABS-KEY (digital AND leadership AND (competencies OR competency OR competence)) AND (LIMIT-TO (SUBJAREA, "SOCI")) AND (LIMIT-TO (PUBYEAR, 2023) OR LIMIT-TO (PUBYEAR, 2024)) AND (LIMIT-TO (DOCTYPE, "ar")) AND

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	(LIMIT-TO (PUBSTAGE, "final")) AND (LIMIT-TO (SRCTYPE, "j")) AND (LIMIT-TO (LANGUAGE, "English")) **Date of Access: December 2024**
WoS	(((ALL=(digital leadership competencies)) AND TS=(digital leadership competencies)) AND TS=(digital leadership competencies)) AND TS=(digital leadership competencies) and 2024 or 2023 (Publication Years) and Article (Document Types) and English (Languages) **Date of Access: December 2024**

Table 1: The Search String

Screening

In the screening stage, potentially relevant research items are carefully evaluated to ensure their alignment with the predefined research question(s). This step plays a critical role in refining the dataset by focusing on studies that directly contribute to the investigation of digital leadership competencies. At this stage, duplicate records are identified and removed to streamline the review process. Following this initial screening, 917 publications were excluded, leaving 105 papers for further evaluation based on specific inclusion and exclusion criteria (as shown in Table 2). The first criterion for inclusion was the relevance of the literature, as it serves as the primary source of valuable insights. This included a range of materials such as book series, book reviews, meta-syntheses, meta-analyses, conference proceedings, and book chapters not covered in the latest studies. To maintain consistency and relevance, only English-language publications from the years 2023 to 2024 were considered. During the process, an additional eight publications were excluded due to duplication, ensuring that the final dataset was both unique and focused. This rigorous screening process provided a refined collection of studies for detailed analysis, ensuring the integrity and relevance of the systematic review.

Table 2: Inclusion and Exclusion Criteria for Selection

Criterion	Inclusion	Exclusion
Language	English	Non-English
Timeline	2023 – 2024	< 2023
Literature type	Journal (Article)	Conference, Book, Review
Publication Stage	Final	In Press
Subject Area	Social Sciences	Besides Social Sciences

Eligibility

In the third step of the systematic review process, known as the eligibility phase, the 97 articles identified during the screening phase underwent a more detailed and rigorous evaluation. This phase was crucial to ensure the selected studies were not only relevant but also of high quality and aligned with the research's core objectives. The evaluation focused on several key aspects, including the significance of the article titles, the relevance of the abstracts, and the availability of full-text access. Additionally, the content of each study was assessed to determine its empirical foundation and its alignment with the study's inclusion criteria. This step involved a systematic review of titles and abstracts to identify

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studies that directly contributed to the investigation of digital leadership competencies. Articles that were outside the scope of the research had vague or irrelevant titles, or presented abstracts unrelated to the objectives were excluded. Similarly, studies without full-text access or lacking empirical evidence were deemed unsuitable for further analysis. Out of the 97 articles initially selected, 71 were excluded for these reasons, significantly narrowing the dataset. The remaining 26 articles were carefully retained as they met all the predefined criteria, ensuring their relevance and quality for inclusion in the final review. These articles represent a curated and focused collection of high-value resources that will form the foundation for in-depth analysis and synthesis in the subsequent phases of the study. This rigorous approach ensures that the findings derived from the review are both reliable and directly applicable to advancing knowledge in the field of digital leadership competencies.

Data Abstraction and Analysis

An integrative analysis was employed in this study as a key assessment strategy to systematically examine and synthesize diverse research designs, particularly those utilizing quantitative methods. This approach aimed to identify and organize relevant topics and subtopics that contribute to the understanding of digital leadership competencies. The process began with data collection, marking the initial step in developing thematic categories that would guide the analysis. As depicted in Figure 2, the authors conducted a meticulous review of 26 selected publications, thoroughly analyzing their content to extract assertions and material directly relevant to the study's focus. This phase involved identifying significant statements, insights, and patterns that aligned with the overarching objectives. Following this, the authors delved deeper into the prominent studies related to digital leadership competencies, scrutinizing their methodologies, and synthesizing their research findings. This comprehensive examination provided a robust foundation for understanding the core themes emerging from the data (as shown in Table 7). Collaboration played a pivotal role in the theme development process. The authors worked closely with co-authors to refine and define themes based on the evidence gathered within the context of the study. To ensure transparency and consistency, a detailed log was maintained throughout the data analysis process. This log served as a repository for recording observations, analytical insights, unresolved questions, and interpretative thoughts, enabling a reflective and iterative approach to theme development. In the final stages, the authors compared the results to identify and address any inconsistencies in the theme design process. Any conceptual disagreements were resolved through collaborative discussions among the authors, ensuring a consensus-driven outcome.

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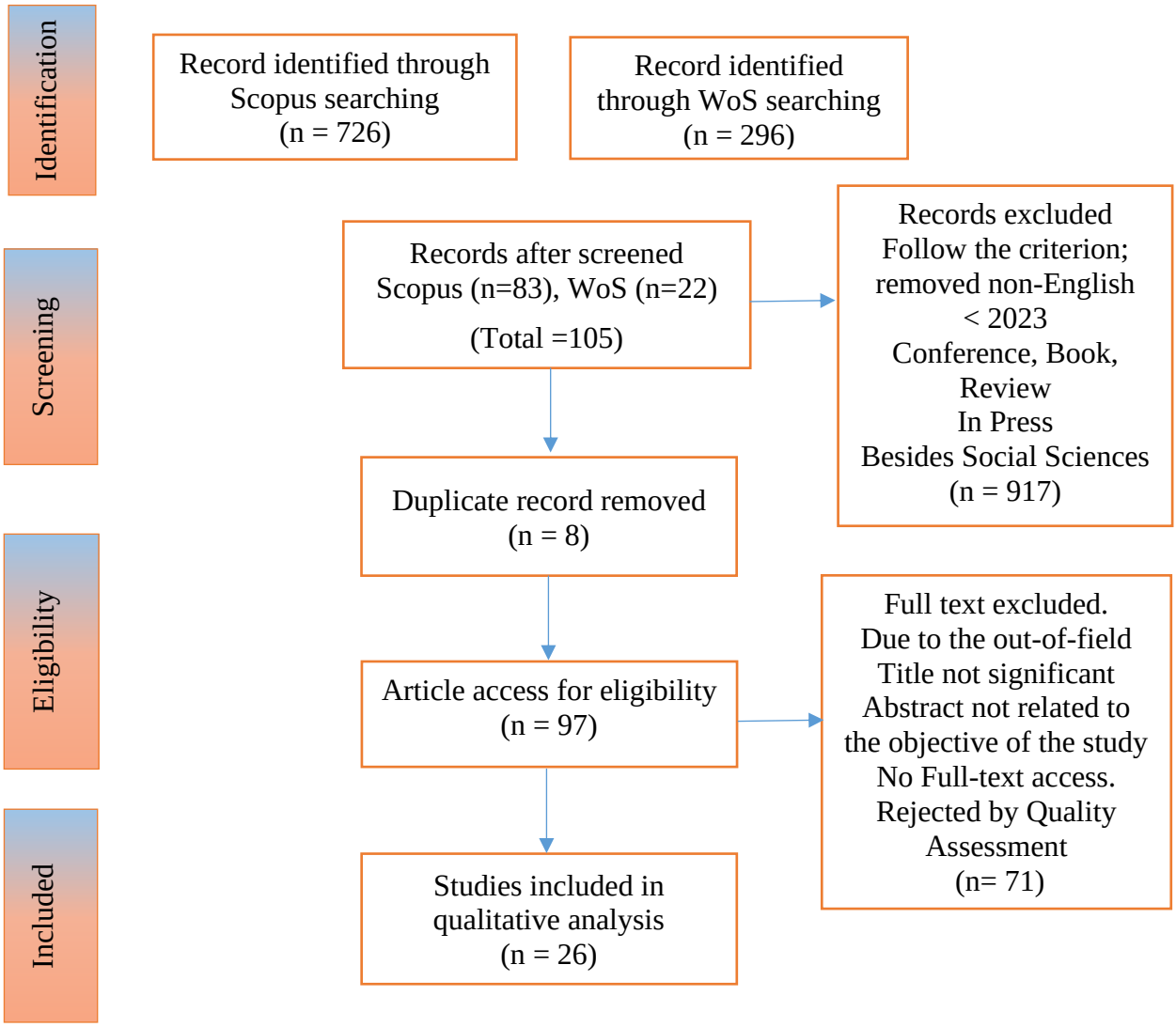

Figure 3: Flow Diagram of The Proposed Searching Study

Source: Page et al., 2021

Quality Of Appraisal

In this study, the quality appraisal followed the guidelines from (Kitchenham, 2007). After selecting the primary studies original research articles and documents that provide the main evidence for the review a thorough evaluation was conducted to assess their quality and allow for quantitative comparisons. These studies are essential as they help answer the research questions. To ensure an objective assessment, the study used a quality evaluation framework from (Abouzahra, Sabraoui, & Afdel, 2020) which includes six Quality Assessment (QA) criteria. Each study was scored based on three possible outcomes: a score of 1 for fully meeting the criterion, 0.5 for partially meeting it, and 0 for not meeting it at all. The following questions can help assess the clarity and rigour of a study: First, QA1 asks whether the purpose of the study is clearly stated, ensuring that the research objectives are explicitly outlined. QA2 evaluates whether the interest and relevance of the work are presented, highlighting the significance of the study. QA3 checks if the study methodology is established, ensuring that

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the approach used to conduct the research is well-defined and appropriate. QA4 looks at whether the key concepts of the approach are clearly defined, making sure that the foundational terms and ideas are explicitly explained. QA5 investigates whether the work is compared and measured against other similar studies, which allows for contextualizing the findings within the existing body of research. Finally, QA6 examines whether the limitations of the study are mentioned, ensuring transparency about potential weaknesses or areas where the study may have constraints. These questions collectively serve to evaluate the overall clarity, thoroughness, and transparency of the study.

The table presents a quality assessment (QA) process designed to evaluate a study based on a set of predefined criteria. In this process, three experts are tasked with assessing each study using the listed criteria. Each criterion is evaluated and scored according to three possible outcomes: "Yes" (Y), "Partly" (P), or "No" (N). A score of "Yes" (Y) indicates that the criterion is fully met, suggesting the study adheres completely to the required standard. A score of "Partly" (P) is given when the criterion is somewhat met but contains certain gaps or weaknesses. Finally, a score of "No" (N) is assigned if the study fails to meet the criterion altogether. This scoring system allows for a nuanced evaluation of the quality of each study, providing a comprehensive and consistent method for assessing its relevance and rigour. The following provides a detailed explanation of the criteria used to assess a study. The first criterion, Is the purpose of the study clearly stated? Evaluates whether the study's objectives are clearly defined and communicated. A well-articulated purpose is essential for setting the direction and scope of the research. The second criterion, Is the interest and usefulness of the work presented? Assesses how well the study's significance and potential contributions are explained. This helps to gauge the relevance and impact of the research. The third criterion, Is the study methodology established? Focuses on whether the research methodology is clearly defined and appropriate for achieving the study's objectives. Methodological clarity is critical for ensuring the study's validity and reproducibility. The fourth criterion, Are the concepts of the approach clearly defined? Examines whether the theoretical framework and key concepts are thoroughly articulated. Clear definitions are crucial for understanding the study's approach. The fifth criterion, Is the work compared and measured with other similar work? Checks if the study has been compared with existing research. Benchmarking against other studies helps place the work within the broader academic context and highlights its contributions. Lastly, Are the limitations of the work clearly mentioned? Assesses whether the study's limitations are transparently acknowledged, allowing for a more complete understanding of the research. To determine the study's progress, experts independently evaluate it based on these criteria, and their scores are aggregated to calculate a final score. For a study to advance to the next phase, the total score, which is the sum of individual assessments from the three experts, must exceed 3.0. This threshold ensures that only studies meeting a certain quality standard move forward.

Result And Finding

The quality assessment process for the 27 selected primary studies (PS1 to PS27) was a crucial step in ensuring the reliability and validity of the systematic review (refer to Table 3). Each study was evaluated against six quality assessment criteria (QA1 to QA6), designed to measure various aspects of research quality. The evaluation was conducted independently by three experts, each of whom assigned scores to the criteria based on the level of compliance. Studies had to achieve a minimum quality threshold of 3.0 to progress to the next phase of the review. This stringent threshold ensured that only studies meeting the required quality standards were retained for further analysis, thereby enhancing the robustness of the evidence base. From the

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assessment, several key observations emerged. A select number of studies, such as PS5, PS8, PS11, PS14, and PS19, achieved a perfect score of 6.0, translating to a 100% quality rating. These studies demonstrated full compliance with all six quality assessment criteria and were considered exemplary in terms of research quality. Conversely, studies like PS4, which scored 2.5 (41.67%), fell below the quality threshold and were excluded from further analysis due to their failure to meet the minimum standards. Most of the studies scored between 4.0 (66.67%) and 5.5 (91.67%), signifying strong adherence to the quality standards. This range highlighted the overall high quality of the selected studies, with only a few falling short of the minimum threshold. Importantly, all studies scoring above 3.0 were retained for the next stage of the systematic review, reflecting their adequate compliance with the predefined criteria. This rigorous and transparent quality assessment process not only ensured the inclusion of reliable and credible studies but also provided a structured approach to evaluating the evidence. By retaining only studies that met the quality standards, the review guaranteed a robust and meaningful synthesis of findings, laying a solid foundation for the subsequent stages of analysis and interpretation.

Table 3: The Quality Assessment Table For The Selected Papers

Primary Studies	QA1	QA2	QA3	QA4	QA5	QA6	Total Mark	%
PS1	1	1	1	1	0.5	0.5	5.0	83.33
PS2	1	0.5	1	0.5	0	0.5	3.5	58.33
PS3	1	1	0.5	0.5	0.5	1	4.5	75.00
PS4	0.5	0.5	0.5	0	1	0	2.5	41.67
PS5	1	1	1	1	1	1	6.0	100
PS6	0.5	1	0.5	1	0.5	0.5	4.0	66.67
PS7	1	0.5	1	0.5	1	1	5.0	83.33
PS8	1	1	1	1	1	1	6.0	100
PS9	0.5	0.5	0.5	1	0.5	1	4.0	66.67
PS10	1	0.5	1	0.5	0.5	1	4.5	75.00
PS11	1	1	1	1	1	1	6.0	100
PS12	1	1	1	1	0.5	1	5.5	91.67
PS13	1	1	1	1	0.5	0.5	5.0	83.33
PS14	1	1	1	1	1	1	6.0	100
PS15	1	1	1	1	0.5	0.5	5.5	91.67
PS16	1	1	1	1	0.5	1	5.5	91.67
PS17	1	1	1	1	0.5	0.5	5.5	91.67
PS18	1	1	1	1	1	0.5	5.5	91.67
PS19	1	1	1	1	1	1	6.0	100
PS20	1	1	1	1	1	0.5	5.5	91.67
PS21	1	1	1	1	0.5	0.5	5.0	83.33
PS22	1	1	0.5	1	0	0.5	4.0	66.67
PS23	1	1	1	1	0.5	1	5.5	91.67
PS24	1	1	1	1	1	0	5.0	83.33
PS25	1	1	1	1	1	0.5	5.5	91.67
PS26	1	1	1	0.5	0	1	4.5	75.00
PS27	1	1	1	1	0.5	1	5.5	91.67

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The study found that the highest-scoring papers were authored by Awodiji & Naicker (2024), Durrani et al. (2024), Helmi et al. (2024), Holm et al. (2024), and Mollah et al. (2023), all of which achieved a perfect score of 100%. These papers stood out due to their clear articulation of purpose, usefulness, well-structured methodology, well-defined concepts, comparative analysis with other research, and acknowledgement of limitations. In contrast, the lowest-scoring paper, authored by Müller et al. (2024), received a score of 58.33%, as it only partially met the criteria related to conceptual approach and comparison with other works, while failing to mention study limitations. These findings emphasize the importance of a comprehensive research framework, clarity in defining key concepts, and critical evaluation of constraints in ensuring academic rigour and credibility.

The themes generated were refined to maintain consistency. The analysis and selection process were collaboratively conducted by the author and co-authors to ensure the validity of the identified issues. During the expert review phase, domain validity was established to confirm the clarity, significance, and appropriateness of each sub-theme. The authors compared findings to address any discrepancies in the theme development process. In cases where inconsistencies arose, the authors collaboratively resolved them. Additionally, two experts, including one specializing in digital leadership, reviewed the themes to validate the issues. Expert feedback and comments guided further adjustments, which were made at the discretion of the author to enhance the overall validity and coherence of the themes. The themes are;

Digital Leadership Competencies and Practices

Digital leadership competencies, an essential aspect of modern educational and organizational transformation, have been extensively examined through diverse contexts. The findings and discussions from the abstracts of studies focusing on this theme provide critical insights into leadership strategies, their impacts, and the evolving requirements for fostering digital transformation in various environments. Leadership frameworks play a pivotal role in shaping the competencies needed for effective digital transformation. For instance, (Müller et al., 2024) developed a contingency-based framework that identifies four competency archetypes challenger, bricoleur, organizer, and competitor. These archetypes enable leaders to adapt to transformation drivers and goals effectively. Similarly, (Bastidas et al., 2024) introduced the DC2-CF framework, emphasizing the integration of socio-technical and multidisciplinary approaches to address leadership gaps in urban digital innovation. Both studies highlight the necessity of tailored frameworks to guide leaders in diverse contexts, whether in education or urban planning, for achieving optimal transformation outcomes. The relationship between digital leadership and teacher competencies has been a focus of various studies. (Zhu, Alias, Hamzah, & Hamid, 2024) demonstrated that digital leadership significantly impacts teachers' digital competency and moderately influences their technology behaviour, with competency acting as a mediating factor. Similarly, (Reis-Andersson, 2024) emphasized the importance of school leaders in facilitating teacher access to technology and developing digital competencies, which are crucial for equitable digitalization. These findings underscore the need for robust leadership practices to enhance teacher capabilities, fostering a culture of innovation and collaboration. The agility of leaders during crises is another critical theme. (Juliana, Suwarto, Pramono, & Prasetya, 2024) explored how Indonesian school leaders exhibited agility by leveraging adaptive, flexible, and future-oriented practices during the COVID-19 pandemic. These agile capabilities were instrumental in addressing resource constraints and fostering collaboration. Similarly, (Durrani et al., 2024) found that Kazakhstani school

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leaders enhanced teacher digital competencies and supported digital pedagogy through professional development initiatives, demonstrating resilience and strategic communication during school closures. Both studies highlight the importance of adaptive leadership in navigating challenges and sustaining transformation. Challenges such as resistance to digitalization and resource limitations are common barriers to digital transformation. (Ghamrawi & M. Tamim, 2023) identified the development of a "5D typology" encompassing digital competence, culture, differentiation, governance, and advocacy as essential for overcoming resistance and fostering a digital culture in higher education. Similarly, (Reis-Andersson, 2024) pointed out that inadequate support and unclear guidelines hinder digitalization efforts in schools. Effective leadership requires addressing these barriers through strategic planning and fostering a shared digital vision. The reviewed studies collectively emphasize the significance of leadership in shaping professional development initiatives. For instance, (Connolly et al., 2024) highlighted the success of a transdisciplinary curriculum in enhancing digital competencies among medical students, suggesting the value of integrated learning approaches. Furthermore, (Connolly et al., 2024) revealed that self-efficacy, coupled with digital and intercultural competencies, significantly improves employability among students, showcasing the broader societal impact of effective leadership in education.

Table 4: Findings of Digital Leadership Competencies and Practices

Key Themes	Findings
Leadership Frameworks	Tailored frameworks like the contingency-based model (Müller et al., 2024) and the DC2-CF framework (Bastidas et al., 2024) help leaders adapt to digital transformation.
Teacher Competencies	Digital leadership enhances teachers' digital skills and promotes innovation and collaboration (Zhu et al., 2024; Reis-Andersson, 2024).
Leadership Agility	Leaders must be adaptive and resilient to navigate crises like COVID-19, ensuring continuity in digital transformation (Juliana et al., 2024; Durrani et al., 2024).
Challenges in Digitalization	Barriers such as resistance to digitalization, lack of resources, and unclear guidelines hinder transformation (Ghamrawi & Tamim, 2023; Reis-Andersson, 2024).
Professional Development	Leadership supports interdisciplinary learning, boosting employability through digital and intercultural competencies (Connolly et al., 2024).
Strategic Leadership Vision	Digital transformation requires strategic planning, advocacy, and a shared digital vision to sustain long-term success (Reis-Andersson, 2024)

Competency Development and Training in Digital Environments

The competency development and training of leaders in digital environments is a central focus in the context of modern organizational and educational settings, as reflected in a diverse array of studies. A recurrent theme across various papers is the emphasis on the role of digital leadership in enhancing both individual and organizational capabilities. In the educational sphere, (Hidayat, Patras, & Muliyawati, 2024) highlight the significance of digital leadership

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in fostering teacher innovativeness, outlining strategies that prioritize digital communication skills, digital resilience, and monitoring school performance. These strategies align with the broader notion that digital leadership is crucial for fostering adaptability and technological competence in an increasingly digitalized environment. Similarly, (Connolly et al., 2024) argue that educational leaders in the Fourth Industrial Revolution must possess a blend of digital and leadership skills, with an emphasis on developing technological capabilities to manage administrative tasks efficiently. They observe that educational leaders in South Africa are comparatively more adept at utilizing technology than their counterparts in Nigeria, underscoring the need for targeted development programs in technological applications. Further elaboration on the importance of leadership competencies for digital environments is seen in studies from other sectors, such as healthcare and city planning. (Connolly et al., 2024) discuss the redesign of a postgraduate digital health program that integrates competencies essential for managing digital health transformation, including business model understanding, organizational processes, and stakeholder management. The development of these competencies is seen as a vital step in preparing leaders who can navigate the disruptions posed by digital health technology. (Helmi et al., 2024) focusing on city managers involved in smart city projects, highlighting a similar emphasis on leadership competencies, stressing the need for skills in both technical and governance areas to successfully implement sustainable urban innovations. These findings suggest that leadership competency frameworks must not only address the digital and technical aspects but also encompass broader management and ethical dimensions to ensure responsible digital leadership. Digital communication skills and the ability to foster collaboration in a digitally mediated environment are also frequently highlighted as critical competencies. (Saeed, Razak, & Aladdin, 2023) explore the communication challenges faced by Iraqi academic leaders, identifying cultural factors, critical thinking, and collaboration as key elements impacting their communicative competence. This research emphasizes the importance of developing communicative competencies using digital tools, supporting the broader argument that effective communication is a cornerstone of leadership in the digital age. In a similar vein, (Holm et al., 2024) investigate the impact of digital didactics in police leadership education, revealing that digital learning enhances competence in bridging theory with practice and boosts confidence in leadership roles. This aligns with the notion that the ability to apply digital tools in leadership development is essential for fostering effective leadership across various sectors. Moreover, the competencies required for HR leaders in organizations undergoing digital transformation, as discussed by (Zhan, Cheng, Wijaya, & Zhang, 2024), highlight the evolving role of HR directors in exponential organizations. They identify competencies in strategic partnership, change management, and employee development as crucial for HR leaders to support organizations in their digital transformation. This framework emphasizes the adaptability required in leadership roles as organizations become more digitally integrated, underscoring the need for continuous development and upskilling in response to technological advancements. Similarly, (Helmi et al., 2024) propose a socio-technical framework for responsible digital innovation in the built environment, underscoring the importance of multidisciplinary competencies that span across digital, technical, and ethical dimensions to guide city planners and managers in sustainable innovation. The common thread among these studies is the recognition that leadership in the digital age demands a complex set of competencies that extend beyond traditional leadership skills to include digital literacy, communication, collaboration, and ethical awareness. The development of these competencies is critical not only for individual leadership effectiveness but also for ensuring organizational success in an increasingly digital and interconnected world.

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Table 5: Findings of Competency Development and Training in Digital Environments

Key Themes	Findings
Teacher Innovativeness	Digital leadership enhances teacher adaptability, digital resilience, and school performance monitoring (Hidayat et al., 2024).
Educational Leadership	Leaders must develop digital and administrative skills to manage institutions efficiently; disparities exist across regions (Connolly et al., 2024).
Sector-Specific Leadership Training	Digital leadership is vital in healthcare (digital health transformation) and smart city management (Connolly et al., 2024; Helmi et al., 2024).
Digital Communication & Collaboration	Effective leadership requires digital communicative competence, critical thinking, and collaboration (Saeed et al., 2023; Holm et al., 2024).
HR Leadership in Digital Transformation	HR leaders need strategic partnerships, change management, and employee development competencies (Zhan et al., 2024).
Socio-Technical Competencies	Leadership must integrate digital, technical, and ethical competencies for sustainable digital innovation (Helmi et al., 2024).
Future Leadership Development	Leaders must continuously upskill in digital literacy, ethics, and technology for organizational success in a digital era. (Helmi et al., 2024).

Impact of Digital Leadership on Organizational and Educational Outcomes

The influence of digital leadership on organizational outcomes is evident through its role in fostering adaptability and sustainability. (Mollah et al., 2023) identified that digital leadership, coupled with IT capabilities and organizational learning, directly enhances sustainable organizational performance (SOP). Key competencies, such as IT-proactive stances and organizational learning, mediate this relationship, demonstrating the necessity of innovative leadership strategies in dynamic digital environments. Similarly, (Faliza, Yahya, Malinda, & Santika, 2024) found that strategic leadership and digital competencies significantly influence marketing performance through technological innovation, underscoring the importance of leadership in leveraging technological advancements for organizational success. (Connolly, O'Brien, & O'Ceallaigh, 2023) highlighted the role of digital educational leadership in supporting resilience during crises by fostering flexible and inclusive approaches, which align with broader organizational transformation goals. In educational contexts, digital leadership contributes to improving teaching quality and fostering equality. (Reis-Andersson, 2024a) revealed that leaders' perceptions of digitalization influence the adoption of digital technologies, enhancing educational quality and equity across schools. The study emphasized collaborative practices, such as idea-sharing among leaders, as pivotal in shaping effective digital leadership. Similarly, (Madrid et al., 2024) highlighted that digital competencies and transformational leadership are predictive of improved job performance in university teachers, suggesting a direct impact on educational delivery. (Rauseo et al., 2023) corroborated these findings by showing that school management's strategic alignment and teachers' digital competencies are vital for achieving successful digital transformation. The synergistic relationship between digital leadership and organizational learning is crucial for addressing systemic challenges in educational and organizational settings. (Connolly et al., 2023)

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proposed a theoretical framework for digital educational leadership, focusing on structural realism and multi-level integration to drive transformation. This approach aligns with (Mollah et al., 2023), who emphasized the role of digital leadership in embedding IT capabilities and fostering sustainable practices. By incorporating strategic planning and resource optimization, leaders can address barriers to digital transformation, as shown in (Rauseo et al., 2023), where effective communication between stakeholders facilitated organizational change. Challenges in achieving digital transformation often stem from differing perceptions among stakeholders. (Rauseo et al., 2023) identified discrepancies in how school management and teachers perceive digital competencies and strategies, emphasizing the need for cohesive communication to bridge these gaps. Additionally, (Madrid et al., 2024) recommended fostering motivation and job satisfaction to align teachers' efforts with organizational goals. These findings suggest that addressing stakeholder concerns and promoting an inclusive culture are critical for the successful implementation of digital initiatives. Digital leadership profoundly influences both organizational and educational outcomes by fostering innovation, sustainability, and equity. Its impact is amplified through the strategic integration of competencies, collaborative practices, and systemic approaches to overcoming challenges. By aligning digital leadership with organizational learning and stakeholder inclusion, institutions can enhance their adaptability and resilience in an increasingly digital landscape.

Table 6: Findings of Impact of Digital Leadership on Organizational and Education

Key Themes	Findings
Sustainable Organizational Performance (SOP)	Digital leadership, IT capabilities, and organizational learning enhance SOP; innovative strategies are necessary for dynamic environments (Mollah et al., 2023).
Strategic Leadership & Marketing Performance	Leadership and digital competencies significantly impact marketing success via technological innovation (Faliza et al., 2024).
Resilience in Crises	Digital leadership fosters flexible, inclusive crisis responses, supporting broader organizational transformation (Connolly et al., 2023).
Teaching Quality & Equity	Leaders' perceptions of digitalization enhance education quality and equality, promoting collaborative idea-sharing (Reis-Andersson, 2024a).
Digital Competencies & Job Performance	Transformational leadership and digital skills improve university teachers' job performance (Madrid et al., 2024).
Strategic Alignment for Digital Transformation	School management and teacher digital competencies must align for successful transformation (Rauseo et al., 2023).
Systemic Integration & Organizational Learning	Structural realism and multi-level integration frameworks help embed IT capabilities and drive transformation (Connolly et al., 2023; Mollah et al., 2023).
Challenges in Digital Transformation	Differing perceptions among stakeholders create barriers; cohesive communication and motivation strategies are crucial (Rauseo et al., 2023).
Leadership for Innovation & Sustainability	Digital leadership enhances institutional adaptability, innovation, and resilience through collaboration and stakeholder inclusion (Madrid et al., 2024).

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Table 7: Number and Details of Primary Studies Database

No	Authors	Title	Year	Journal	Scopus	WoS
1	Zhu R.; Alias B.S.; Hamzah M.I.M.; Hamid M.R.A.	A Threefold Examination of University Digital Leadership, Teacher Digital Competency, and Teacher Technology Behaviour for Digital Transformation of Education	2024	International Journal of Learning, Teaching and Educational Research	/	
2	Müller S.D.; Konzag H.; Nielsen J.A.; Sandholt H.B.	Digital transformation leadership competencies: A contingency approach	2024	International Journal of Information Management	/	
3	Hidayat R.; Patras Y.E.; Muliyawati Y.	Digital Leadership and Professional Commitment to Enhance Teacher Innovativeness as a Priority Strategy	2024	International Journal of Learning, Teaching and Educational Research	/	
4	Ghamrawi N.; M. Tamim R.	A typology for digital leadership in higher education: the case of a large-scale mobile technology initiative (using tablets)	2023	Education and Information Technologies	/	
5	Durrani N.; Makhmetova Z.; Kadyr Y.; Karimova N.	Leading Schools During a Global Crisis: Kazakhstani School Leaders' Perspectives and Practices	2024	SAGE Open	/	
6	Bastidas V.; Oti-Sarpong K.; Nochta T.; Wan L.; Tang J.; Schooling J.	Leadership of urban digital innovation for public value: A competency framework	2024	IET Smart Cities	/	
7	Juliana; Suwarto; Pramono R.; Prasetya A.	Leadership Agility of Indonesian School Leaders During a Crisis: A Grounded Theory Approach	2024	Journal of Educational and Social Research	/	

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8	Holm R.; Villman E.; Bjørkelo B.; Helgesen J.H.I.; Boe O. (Holm et al., 2024)	Police Leadership Education: Digital Didactics, Perceived Learning and Perceived Increased Competence as Police Leaders	2024	Nordisk Tidsskrift for Utdanning og Praksis	/	
9	Rauseo M.; Harder A.; Glassey-Previdoli D.; Cattaneo A.; Schumann S.; Imboden S. (Rauseo et al., 2023)	Same, but Different? Digital Transformation in Swiss Vocational Schools from the Perspectives of School Management and Teachers	2023	Technology, Knowledge and Learning	/	
10	Madrid C.; Chimborazo L.; Morales-García W.C.; Quispe-Sanca D.; Huancahuire-Vega S.; Sánchez-Garcés J.; Saintila J. (Madrid et al., 2024)	Digital Competencies and Transformational Leadership as Predictors of Job Performance in University Teachers	2024	Journal of Educators Online	/	
11	Helmi A.; Bastidas V.; Oti-Sarpong K.; Schooling J. (Helmi et al., 2024)	Sustainable urban digital innovation: A socio-technical competency-based approach to evaluation	2024	Sustainable Cities and Society	/	
12	Reis-Andersson J. (Reis-Andersson, 2024b)	Leading the digitalisation process in K–12 schools – The school leaders' perspective	2024	Education and Information Technologies	/	
13	Zhang X.; Wang P.; Peng L. (Zhang, Wang, & Peng, 2024)	Developing a Competency Model for Human Resource Directors (HRDs) in Exponential Organizations Undergoing Digital Transformation	2024	Sustainability (Switzerland)	/	

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14	Awodiji O.A.; Naicker S.R. (Awodiji & Naicker, 2024)	A comparative evaluation of the leadership development needs of basic school leaders in the 4.0 era	2024	Frontiers in Education	/	/
15	Bastidas V.; Oti-Sarpong K.; Nochta T.; Wan L.; Tang J.; Schooling J. (Bastidas et al., 2023)	Leadership for responsible digital innovation in the built environment: A socio-technical review for re-establishing competencies	2023	Journal of Urban Management	/	
16	Eng T.-Y.; Mohsen K.; Wu L.-C. (Eng, Mohsen, & Wu, 2023)	Wireless information technology competency and transformational leadership in supply chain management: implications for innovative capability	2023	Information Technology and People	/	
17	Theotokas I.N.; Lagoudis I.N.; Syntychaki A.; Prosilias J. (Theotokas, Lagoudis, Syntychaki, & Prosilias, 2024)	Factors affecting E-HRM practices in Greek shipping management companies: the role of organizational culture, cultural intelligence, and innovation	2024	Journal of Shipping and Trade	/	
18	Marbawi; Faliza N.; Yahya A.; Malinda R.; Santika P. (Faliza et al., 2024)	Influence of Leadership and Digital Competence on Marketing Performance: Mediation by Innovation, Moderation by Competition	2024	Journal of Ecohumanism	/	
19	Mollah M.A.; Choi J.-H.; Hwang S.-J.; Shin J.-K. (Mollah et al., 2023)	Exploring a Pathway to Sustainable Organizational Performance of South Korea in the Digital Age: The Effect of Digital Leadership on IT Capabilities and Organizational Learning	2023	Sustainability (Switzerland)	/	
20	Reis-Andersson J. (Reis-Andersson, 2024a)	Leaders' perceptions of digitalisation in K–12 education: influencing arrangements for leading the expansion of digital technologies	2024	Discover Education	/	

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21	Connolly, C; O'Brien, E; O'Ceallaigh, TJ (Connolly et al., 2023)	Ensuring Knowledge Sustainability in a Digital Era: Empowering Digital Transformation Through Digital Educational Leadership	2023	Technology Knowledge and Learning		/
22	Henry, E; Chandler, C; Laux, J; Noble, CC; Corbie, G; Fernandez, CSP; Dave, G (Henry et al., 2024)	Evaluating Leadership Development Competencies of Clinicians to Build Health Equity in America	2024	Journal of Continuing Education in The Health Professions		/
23	Mun, M; Chanchlani, S; Lyons, K; Gray, K (Mun, Chanchlani, Lyons, & Gray, 2024)	Transforming the Future of Digital Health Education: Redesign of a Graduate Program Using Competency Mapping	2024	Jmir Medical Education		/
24	Xu, CY; Hania, A; Waqas, M (Xu, Hania, & Waqas, 2024)	Guiding the digital generation: role of principals' leadership, ICT competence, and teacher professional competence in fostering digital citizenship among university students	2024	Education and Information Technologies		/
25	Zhan, H; Cheng, KM; Wijaya, L; Zhang, SC (Zhan et al., 2024)	Investigating the mediating role of self-efficacy between digital leadership capability, intercultural competence, and employability among working undergraduates	2024	Higher Education Skills and Work-Based Learning		/
26	Kroeplin, J; Maier, L; Lenz, JH; Romeike, B (Kroeplin, Maier, Lenz, & Romeike, 2024)	Knowledge Transfer and Networking Upon Implementation of a Transdisciplinary Digital Health Curriculum in a Unique Digital Health Training Culture: Prospective Analysis	2024	Jmir Medical Education		/

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Discussion And Conclusion

This study successfully achieved its objectives by identifying the core digital leadership competencies essential for driving successful transformations in educational and organizational settings. It further analyzed well-established leadership frameworks and competency models that facilitate digital innovation and organizational change. Additionally, the study examined the pivotal role of digital leadership in fostering teacher competencies and enhancing organizational learning, while also highlighting the challenges and potential solutions related to digital transformation within both education and organizations.

However, despite these valuable contributions, the study acknowledges certain limitations. The scope of the research was primarily focused on published journal articles, thus excluding other valuable sources, such as conference proceedings and books, which could provide broader perspectives. Furthermore, the findings draw from studies conducted across various global contexts, limiting their direct applicability to specific educational systems or regions. The study also relied on secondary data from a systematic literature review, meaning it lacked empirical validation through primary research, such as surveys or case studies.

To address these limitations and further advance the understanding of digital leadership, future research should focus on empirical studies (both quantitative and qualitative) to validate the identified competencies in real-world settings across diverse educational environments. Expanding the research to encompass various educational levels such as primary, secondary, and higher education and different organizational structures would provide more comprehensive insights. Additionally, future studies should investigate the long-term impacts of digital leadership competencies on student outcomes, institutional success, and workforce development. Lastly, exploring the role of AI-driven leadership tools and digital transformation strategies will be crucial in shaping future leadership practices and driving organizational change.

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