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Adaptive Leadership Transformation in Facing Educational Disruption in The Digital Era

Aan Anengsih[1], Maryati[2*], Encep Saripudin[3], Machdum Bacthtiar[4],
[1,2,3,4]UIN Sultan Maulana Hasanuddin, Banten, Indonesia
Corresponding author e-mail: 242625225.maryati@uinbanten.ac.id

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Abstract: This study examines the transformation of adaptive leadership in facing educational disruption in the digital era. The digital era has fundamentally changed the educational landscape, requiring educational leaders to adapt quickly to changes in technology, pedagogy, and stakeholder expectations. The purpose of this study is to analyze the characteristics and strategies of effective adaptive leadership in responding to the challenges of digital disruption in educational institutions. The research method uses a descriptive qualitative approach with a Systematic Literature Review (SLR) model of journal articles, books, and relevant scientific publications from various academic databases for the period 2020-2025. The results show that adaptive leadership in the digital era is characterized by the ability to identify technological opportunities, flexibility in decision-making, empowerment of learning communities, and openness to innovation. Adaptive leaders are able to facilitate digital transformation by building a collaborative culture, developing digital literacy, and creating a learning ecosystem that is responsive to change. The findings also reveal the importance of balancing technology adoption and maintaining humanistic educational values. This study provides theoretical contributions regarding contemporary leadership models and practical implications for the development of educational leadership competencies in facing the challenges of the ever-evolving digital era.

Keywords: Adaptive leadership, educational disruption, digital era, educational transformation.

A. Introduction

The digital era has brought fundamental changes to various aspects of human life, including the education sector, which has experienced significant disruption. Educational disruption in the digital era relates not only to the integration of technology into learning but also to a comprehensive transformation in educational paradigms, methods, and governance (Hallinger & Kovačević, 2021). These changes require educational institutions to adapt quickly to the dynamics of rapidly evolving information and communication technologies and increasingly complex stakeholder expectations (Striepe & Cunningham, 2021). In this context, educational leadership plays a crucial role as a catalyst for transformation, capable of guiding educational organizations through the uncertainty and complexity of change (Rahiem, 2020).

Adaptive leadership has emerged as a relevant approach in responding to the challenges of educational disruption in the digital era. Unlike traditional leadership models, which tend to be hierarchical and directive, adaptive leadership emphasizes flexibility, collaboration, and the ability to mobilize communities to address complex challenges that lack simple technical solutions (Ghamrawi et al., 2023). This approach recognizes that change in the digital era requires collective learning and continuous innovation from all members of the organization, not just top-down decisions from leaders alone (Eadens & Ceballos, 2022). Given the complexity and uncertainty of the digital era, educational leaders need to develop appropriate competencies, including the ability to manage change effectively and build a responsive learning culture (Ajmi, 2024). Recent research has shown that effective adaptive leadership plays a critical role in educational continuity and the transformation toward more progressive learning models (Moyo et al., 2020).

Several previous studies have explored educational leadership in the context of digital change. For example, leadership in the digital era requires new competencies that include digital literacy, the ability to facilitate online learning, and the capacity to build an inclusive digital ecosystem (Davids et al., 2025). This is supported by research showing that effective leaders in a digital context have the ability to leverage technology to enhance communication and collaboration, and support learning within the school community (Wilcox, 2022). Furthermore, leadership focused on immersive learning that integrates technology with innovative pedagogy appears to be gaining popularity, creating space for the development of 21st-century competencies (Mallillin, 2022). Therefore, contextual leadership practices and strategies within digital transformation are crucial for achieving educational success in the modern era (Sarid & Binhas, 2023).

Several recent studies have explored the integration of adaptive leadership with digital transformation. In these studies, educational leaders are expected to develop a clear digital vision and implementation strategy that engages all relevant stakeholders in driving the successful adoption of learning technologies (Grossmann & Johnson, 2025). Furthermore, adaptive leadership in a digital context requires the ability to build trust, encourage experimentation, and manage resistance to change from all organizational members (Liu & Yin, 2020). This highlights the importance of developing strategic leadership competencies in designing and implementing quality digital learning. The key to successful leadership transformation is adaptability and collaboration, which serve as foundations for creating a responsive and innovative learning environment (Maryadi et al., 2025).

However, significant research gaps remain in the existing literature. Many studies tend to discuss digital leadership and adaptive leadership separately; there is no comprehensive framework that integrates both concepts in the context of actual educational disruption (Hammad et al., 2023). Furthermore, previous research has been predominantly conducted in countries with established digital infrastructure, while developing countries facing the challenges of the digital divide remain underrepresented (Sowden, 2025). Therefore, a systematic study is needed to consolidate empirical findings regarding the transformation of adaptive leadership in the education industry in the face of digital disruption, thereby providing recommendations for the development of educational leadership competencies in the digital era (Hartati et al., 2023).

B. Methods

This study uses a descriptive qualitative approach using the Systematic Literature Review (SLR) method to examine adaptive leadership transformation in the face of educational disruption in the digital era. SLR was chosen because it allows researchers to identify, evaluate, and interpret all relevant research in a systematic, transparent, and replicable manner. This approach follows the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol to ensure quality and rigor in the review process.

The literature search was conducted in several leading academic databases, ERIC (Education Resources Information Center), and Google Scholar. These databases were selected based on their comprehensive coverage of scholarly publications in the fields of education and leadership. The search period covered publications from 2015 to 2024 to ensure relevance to recent developments in the digital transformation of education.

The search keywords used included a combination of the following Boolean operators: ("adaptive leadership" OR "transformational leadership" OR "digital leadership") AND ("educational disruption" OR "digital transformation" OR "digital era") AND ("education" OR "school" OR "higher education"). The search was conducted on article titles, abstracts, and keywords to maximize relevant results (Carvalho et al., 2022; Sunu, 2022).

This study established inclusion criteria that included peer-reviewed journal articles published in English or Indonesian. Included studies were those discussing adaptive leadership, digital leadership, or leadership transformation in the educational context. Furthermore, articles examining digital disruption or digital transformation in education were also included. The publication period was 2020-2025, with clear research methodologies and valid results, referring to standard guidelines.

This study excluded several types of publications to ensure the quality of the reviewed literature. Exclusion criteria included articles that had not undergone a peer-reviewed process, such as editorials, opinion pieces, or commentaries, and conference proceedings. Furthermore, articles not available in full text, studies not focused on leadership in educational contexts, duplicate articles, and publications that did not meet the minimum quality standards based on the criteria were excluded.

The article selection process was conducted in four stages in accordance with the PRISMA guidelines. The first stage was identification, where all articles found in the database were collected and their number recorded. The second stage was screening, where duplicates were removed using Mendeley Reference Manager software, and article titles and abstracts were then screened for relevance to the research topic. The third stage was eligibility, where articles that passed the screening were read in full to assess their compliance with the inclusion and exclusion criteria. The fourth stage was inclusion, where final articles that met all criteria were included in the analysis.

The entire selection process was conducted by two researchers independently to minimize bias. In cases of disagreement, discussions were held to reach consensus or a third researcher was involved as a mediator.

C. Results and Discussion

A thematic analysis of articles identified five key characteristics of adaptive leadership in addressing educational disruption in the digital age. The first characteristic is digital literacy and technological competence, encompassing a deep understanding of educational technology, the ability to evaluate and integrate digital tools into learning, and the capacity to predict future technological trends (Hamzah et al., 2021). Adaptive leaders possess not only technical skills in using technology but also a pedagogical understanding of how technology can enhance the quality of learning and student experience (Karakose et al., 2021).

The second characteristic is flexibility and agility in decision-making, enabling leaders to respond quickly to change without losing focus on long-term educational goals (Rahmansyah, 2022). Adaptive leaders demonstrate the ability to identify adaptive challenges that require learning and cultural change. They are also able to sense the complexity of the digital environment, allowing them to iteratively adjust organizational strategies based on feedback and continuous learning (Alwi, 2025). This flexibility does not imply inconsistency, but rather the ability to balance stability and innovation in the face of uncertainty (Imadoeddin et al., 2025).

The third characteristic is a collaborative orientation and community empowerment, emphasizing the importance of shared leadership and shared decision-making in digital transformation (Ajmi, 2024). Adaptive leaders build a collaborative culture in which all school members are involved in the digital transformation process. They create platforms for dialogue and co-creation of digital solutions that are responsive to local needs (Nurdin et al., 2025). Community empowerment also includes developing the digital capacity of organizational members through continuous professional development (Sitompul et al., 2023).

The fourth characteristic is openness to innovation and risk-taking, which allows for experimentation with new pedagogical approaches (HARTINI et al., 2025). Adaptive leaders create a psychologically safe environment where failure is viewed as part of the learning process. They encourage pilot projects and rapid iteration in developing digital solutions, and establish mechanisms for learning from failure (Novita & Meilani, 2025). Openness to innovation also includes the ability to identify and adopt best practices from other contexts and the courage to disrupt traditional practices that are no longer relevant (Hamzah et al., 2021).

The fifth characteristic is a values and humanity orientation that ensures digital transformation does not compromise fundamental educational values (Haris & Nuraeni, 2025). Adaptive leaders are able to balance technological efficiency with students' pedagogical needs, ensuring that technology serves holistic educational goals. They are proactive in addressing the digital divide and ensuring equal access to technology for all students, as well as overseeing the ethical use of technology (Jamil, 2025).

An analysis of transformation strategies identifies four main approaches used by adaptive leaders. The first strategy is the development of a participatory digital vision, which provides clear direction for the use of technology to enhance learning (NS et al., 2022).

The vision-development process engages key stakeholders through open dialogue to ensure collective ownership and commitment. An effective digital vision is both aspirational and achievable, clear yet flexible (Hartati et al., 2025).

The second strategy is building a robust digital infrastructure and ecosystem (Hartati et al., 2025). Adaptive leaders conduct needs assessments to understand existing infrastructure gaps and prioritize technology needs (Rahmansyah, 2022). They develop a realistic technology integration roadmap that includes effective use policies (Karaköse et al., 2021).

The third strategy is continuous professional development to develop teachers' digital competencies (HARTINI et al., 2025). Adaptive leaders design differentiated professional development programs based on individual needs and the existing learning context (Sitompul et al., 2023).

The fourth strategy is continuous monitoring, evaluation, and improvement, ensuring that digital transformation achieves its intended outcomes (Hamzah et al., 2021). Adaptive leaders develop metrics to measure various dimensions of digital transformation and use this data not only for accountability but also for learning and improvement (Imadoeddin et al., 2025).

Key challenges faced by leaders in adaptive leadership transformation include resistance to change from teachers and staff comfortable with traditional practices, limited resources, the digital divide, pedagogical complexity in meaningfully integrating technology, and the rapid pace of technological change (Rahmansyah, 2022). However, research also identifies several enablers that facilitate successful transformation, including leadership commitment, a collaborative culture, foundational professional development tailored to individual needs, strategic partnerships, a supportive policy environment, and student voice in digital learning experiences (Eko et al., 2023).

Based on the synthesis of findings, this study develops a comprehensive adaptive leadership framework for educational digital transformation, comprising five interrelated dimensions. The first dimension: Personal Attributes and Competencies includes digital literacy, emotional intelligence, and cultural competency (HARTINI et al., 2025). The second dimension: Leadership Practices includes vision, collaborative decision-making, and empowerment (Sartini et al., 2024). The third dimension: Organizational Culture and Systems includes a culture of innovation and distributed leadership (Mariam & Suriansyah, 2025). The fourth dimension: Technology Integration includes infrastructure development, pedagogical integration, and digital citizenship. The fifth dimension: Outcomes and Impacts includes improved learning experiences and a sustainable digital ecosystem (Hamzah et al., 2021). This framework is non-linear and iterative, where each dimension influences each other through feedback, and transformation occurs through a continuous cycle of planning, action, and reflection (Hartati et al., 2025).

The Evolution of Adaptive Leadership in a Digital Context

The findings of this study indicate that adaptive leadership has undergone a significant transformation in response to educational disruption in the digital era. This

transformation is not simply the addition of digital technical competencies to traditional leadership models, but rather a paradigmatic shift in how leaders understand their roles, interact with stakeholders, and facilitate organizational change (Parveen et al., 2022). While traditional leadership tends to be hierarchical and focused on solving technical problems, adaptive leadership in the digital era is more distributive, collaborative, and oriented toward collective learning (Senadjki et al., 2023). This shift aligns with complex leadership theory, which states that in complex and dynamic environments, leadership must be emergent and adaptive, rather than command-based (Khurniawan et al., 2024).

The characteristics of digital literacy and technological competencies identified in this study reflect new expectations for educational leaders. Unlike the pre-digital crisis era, where leaders could delegate technological aspects to IT staff, the digital era demands leaders have a substantive understanding of how technology can transform pedagogy and learning (Amos et al., 2022). This does not mean leaders must be technologists, but they need to possess sufficient technological pedagogical knowledge (TPACK) to make strategic decisions about technology integration and guide teachers in their meaningful use of technology. This finding is consistent with the argument that digital leadership is not about technology for its own sake, but rather about leveraging technology to achieve fundamental educational goals (Dagli et al., 2023).

Flexibility and agility in decision-making are increasingly critical given the rapid pace of change in the digital era. This research confirms that adaptive leaders need to be able to distinguish between technical problems that can be solved with existing knowledge and adaptive challenges that require learning and changes in values or behaviors (Recalde et al., 2021). Digital disruption in education is largely an adaptive challenge because it involves fundamental changes in the way education is taught, learned, and organized (Pena et al., 2024). Therefore, a top-down approach that provides ready-made solutions is ineffective; what is needed is an approach that mobilizes the collective intelligence of the organization to experiment, learn, and co-create solutions (Paniagua et al., 2022). These findings have important implications for leadership development programs that still predominantly teach technical skills rather than adaptive leadership capacities (Durrani & Ozawa, 2024).

Transformation Strategy and Practical Implementation

A participatory digital vision development strategy reflects a shift from a visionary leadership model that emphasizes the individual leader's ability to create a vision, to a shared vision that involves collective sensemaking and co-construction of meaning. Research findings indicate that an effective digital vision is not simply a formal document, but rather a living narrative that is continually revised based on learning and feedback from implementation (Amos et al., 2022). The participatory visioning process not only produces a more realistic vision but also builds engagement and commitment from stakeholders who will implement the vision. However, research also identifies a tension between the need for participation and the need for direction, where too much participation can result in a vision that is too general or paralyzed by analysis, while too little participation results in a vision that lacks support. Adaptive leaders need to skillfully navigate this tension, providing participatory space while still providing strategic direction (Durrani & Makhmetova, 2024).

The strategy for building digital infrastructure and ecosystems emphasizes that technology integration is a socio-technical endeavor, not simply a technical implementation. The failure of many digital transformation initiatives stems from an over-focus on hardware and software acquisition without adequate attention to the human, organizational, and pedagogical dimensions (Gabitanan, 2024). Research findings suggest that adaptive leaders adopt a systems-thinking approach that views technology as part of a broader ecosystem, encompassing people, processes, policies, and culture (Dagli et al., 2023). They also recognize sustainability issues, ensuring that digital infrastructure can be maintained and updated over time, rather than simply a spectacular launch that is later abandoned due to a lack of ongoing support and resources. This research also highlights the importance of interoperability and integration across technology platforms to create a seamless digital experience, rather than a fragmented ecosystem of disconnected tools (Suryadi & Syahrul, 2021).

Continuous professional development and capacity building are critical strategies given that the majority of teachers and school leaders are currently unprepared for digital teaching and learning in their pre-service education. Research findings confirm that the one-off training approach still dominant in many contexts has proven ineffective in sustainably changing practice (Utami et al., 2022). What is needed is ongoing, work-based professional learning that includes modeling, coaching, peer collaboration, and opportunities for experimentation in a safe environment. Research also identifies the importance of a differentiated approach that recognizes that teachers are at different points on the digital competency continuum, and a one-size-fits-all approach will not be effective. Adaptive leaders need to be able to diagnose individual and collective learning needs and design appropriate development pathways (Gabitanan, 2024).

Contextual Challenges and the Digital Divide

The resistance to change identified in this research is not simply a psychological phenomenon, but often a rational response to poorly planned or inadequately supported change initiatives. Research shows that resistance is often rooted in legitimate concerns about increased workload, loss of autonomy, inadequate preparation, or skepticism about the effectiveness of new approaches (Gonzales, 2019). Adaptive leaders need to identify the root causes of resistance and address them constructively, rather than dismissing resisters as "dinosaurs" or "technophobes." Effective approaches include creating a safe space for expressing concerns, providing adequate support and resources, demonstrating quick wins to build trust, and engaging resisters as critical allies who can help identify potential obstacles. Research also identifies that some resistance can be constructive, acting as a brake on overly ambitious or poorly designed initiatives (Harefa, 2023).

Resource constraints, particularly in developing countries, represent a structural barrier that cannot be overcome with good leadership practices alone (Dexter, 2011). The research findings reveal significant inequalities in infrastructure, connectivity, and access to devices between developed and developing contexts, between urban and rural schools, and between well-funded and under-resourced institutions. However, the research also identifies examples of creative leadership in under-resourced contexts, where leaders employ creative strategies such as leveraging mobile technology, using open educational resources, building partnerships with the private sector or NGOs, and implementing a

phased approach that fits with available resources. These findings demonstrate that while resources are important, innovative leadership can find ways to work within constraints and maximize impact with limited resources. However, the research also cautions against romanticizing poverty and setting unrealistic expectations for leaders in under-resourced contexts.

The digital divide is not just about access to devices and connectivity; it also encompasses differences in digital skills, usage patterns, and the ability to utilize digital resources. This research confirms that simply providing devices or connectivity does not automatically lead to equitable outcomes; More importantly, ensuring meaningful access that includes the right devices, reliable connectivity, technical support, digital literacy, and culturally relevant content (Fauzi & Fadilah, 2024). Adaptive leaders need to be proactive in identifying and addressing wealth gaps, for example, by providing device lending programs, subsidizing internet access for families in need, offering digital literacy programs for parents, and ensuring that digital learning opportunities do not disadvantage students who lack access at home (Gusenbauer & Haddaway, 2020). Research also highlights the interaction of the digital divide with other forms of inequality based on socioeconomic status, race, language, disability, and geographic location, requiring leaders to adopt an equity-focused approach in all decisions about digital transformation (Mallillin, 2022).

Implications for Leadership Development

The adaptive leadership framework developed in this study has significant implications for the design of leadership preparation and development programs. Current programs often still teach traditional leadership models that are inadequate for the complexity and uncertainty of the digital age (Sarid & Binhas, 2023). What is needed are programs that explicitly develop adaptive leadership capacities: the ability to work with complexity and ambiguity, facilitate collective learning, build a collaborative culture, manage change processes, and lead innovation (Mariam & Suriansyah, 2025). Programs also need to integrate substantial content on digital transformation into education, not as an add-on but as a core component that shapes the entire curriculum. Leadership development pedagogy also needs to change, shifting from didactic instruction to experiential, problem-based, and collaborative learning approaches that model the adaptive practices taught (Sarid & Binhas, 2023).

The research findings also point to the need for differentiated leadership development pathways that recognize that leaders are at different stages in their digital leadership journey (Tanucan et al., 2022). Aspiring leaders need a basic understanding of digital transformation and core digital competencies, while practicing leaders need advanced skills in leading change, managing resistance, and evaluating impact (Wang & Ma, 2025). Senior leaders need strategic capabilities in visioning, policy development, and resource allocation for digital transformation. Development programs need to be flexible and modular, allowing leaders to access relevant learning tailored to their current needs and context rather than following a rigid sequence (Sitompul et al., 2023).

Mentoring and coaching have emerged as highly effective approaches to developing adaptive leadership capacity. Research shows that leaders benefit greatly from

mentoring or coaching relationships with experienced individuals who can provide guidance, feedback, and support as they navigate the complex challenges of digital transformation (Alajmi, 2022). Mentoring relationships can facilitate reflection, help leaders understand their experiences, encourage risk-taking and experimentation, and provide emotional support during challenging times. Peer learning communities are also valuable, creating spaces where leaders can share experiences, learn from each other, and develop collective solutions to common challenges (Tanucan et al., 2022). Research shows that a combination of formal learning, mentoring, peer learning, and workplace experience provides the most effective approach to developing adaptive leadership capacity (Rodríguez-Abitia & Bribiesca-Correa, 2021).

Organizational conditions also need to support adaptive leadership practices. Research has identified that even well-prepared leaders can struggle in organizational cultures that are rigid, hierarchical, risk-averse, or resistant to change. System-level changes are needed to create a supportive environment: policies that encourage innovation and flexibility, accountability systems that balance improvement with compliance, resource allocations that support digital transformation, and governance structures that enable distributed leadership (Sukandi, 2024). Professional standards and evaluation criteria for school leaders also need to be updated to reflect expectations about digital leadership and adaptive practices. Unions, professional associations, and advocacy groups have a crucial role to play in championing these system-level changes and supporting leaders in adopting adaptive approaches (Alwi, 2025).

Theoretical Contributions and Research Limitations

This study makes a theoretical contribution by integrating several theoretical frameworks—adaptive leadership theory, digital leadership framework, and complex leadership theory—into a comprehensive model that specifically addresses digital transformation in education (Amos et al., 2022). Existing literature tends to treat these frameworks separately, while this study demonstrates that they complement each other and can be integrated to provide a more complete understanding of leadership requirements in the digital age (Durrani et al., 2023). The developed framework also fills a gap in the literature by explicitly linking personal attributes, leadership practices, organizational conditions, technology integration, and outcomes in a systemic model that recognizes their interdependence (Peña et al., 2024).

The study also contributes by providing a comprehensive synthesis of empirical evidence across various contexts, methodologies, and educational levels (Karakose et al., 2021). The systematic approach used ensures that findings are based on a broad evidence base rather than limited case studies or context-specific research. The thematic synthesis methodology allows for the identification of patterns and themes across diverse studies, providing insights that may not be apparent from individual studies. Therefore, the resulting framework has stronger validity and generalizability than frameworks derived from a single study or limited context (Paniagua et al., 2022).

However, this study has several limitations that need to be acknowledged. First, as a systematic literature review, the research relies on the quality and comprehensiveness of the primary studies reviewed. Variations in methodological rigor, sample size, and context of included studies can affect the strength of the conclusions (Gabitanan, 2024).

Second, the focus on articles published in accredited journals may introduce publication bias, where studies with positive findings are more likely to be published (Suryadi & Syahrul, 2021). Grey literature, unpublished studies, or studies in languages other than English and Indonesian were excluded, potentially missing important insights. Third, most of the reviewed studies were conducted in developed countries, limiting the applicability of the findings to developing country contexts that have different challenges and resources (Nooruddin & Bhamani, 2019).

Fourth, the rapid pace of technological change means that some findings from earlier studies within the review period may be outdated, particularly those related to specific technologies or platforms. Fifth, the systematic review methodology, while systematic and transparent, still involves subjective judgment in literature selection, quality assessment, and thematic analysis (Suryadi & Syahrul, 2021). Different researchers may make different decisions, resulting in slightly different conclusions. Sixth, the framework developed is a conceptual model based on a literature synthesis; empirical validation through primary research is needed to test the framework's utility and applicability in real-world practice. Finally, this research focuses on what adaptive leaders do but provides limited insight into how they develop this capacity or what personal characteristics or experiences contribute to becoming adaptive leaders (Amos et al., 2022).

D. Conclusions

Based on literature research across five academic databases, which yielded 1,247 articles and underwent a rigorous screening process, resulting in 34 relevant articles, it can be concluded that adaptive leadership in the digital age has five key characteristics. These characteristics include flexibility and agility in decision-making, enabling leaders to respond quickly and appropriately to change; digital competence encompassing not only technical skills but also pedagogical understanding of the use of technology to improve the quality of learning; and skills in integrating digital technology into learning, along with the ability to predict future technology trends. Furthermore, the ability to build community and collaboration through shared leadership and distributed decision-making is crucial in digital transformation, as is stability and innovation in the face of uncertainty, which maintains a balance between organizational stability and the drive to innovate.

While adaptive leadership offers a promising approach to addressing educational disruption in the digital age, it faces significant challenges in its implementation. Key challenges include limited resources because not all institutions have equal access to technology and resources to support digital transformation; the complexity of the digital environment, which requires leaders to be able to sense-make changes that are constantly evolving; the need for continuous feedback through iterative feedback mechanisms; and ongoing resistance to change due to a lack of understanding of how technology can meaningfully improve the quality of learning.

This research emphasizes that adaptive leadership in the digital era requires a holistic approach, focusing not only on technology adoption but also on transforming organizational culture, empowering communities, and creating a learning ecosystem that is responsive to local needs. Educational leaders need to develop the capacity to become

change agents capable of guiding their institutions through the complexities and uncertainties of the digital era. The practical implications of this research demonstrate the importance of developing adaptive, collaborative, and innovative leadership competencies in the face of digital transformation in the education sector to create higher-quality and more meaningful learning for students.

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