



Adaptive Leadership of Principals: A Literature Review of the Challenges of Technology and Globalization in 21st Century Education

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Article Info

Article history:

Received April 30, 2025
Approved June 01, 2025

Keywords:

*Adaptive Leadership,
Principals, 21st Century
Education*

ABSTRACT

The 21st century education faces major challenges due to technological advances and globalization that affect various aspects of learning. Principals as the main leaders in schools have a key role in managing these changes. This study aims to analyze the application of adaptive leadership by principals in facing the challenges of technology and globalization through literature studies. Based on the theory of Adaptive Leadership by Heifetz and Laurie, this study examines how principals can apply the principles of adaptive leadership to create a learning environment that is responsive to external changes and improves the quality of education amidst uncertainty. The methodology used is literature study, by analyzing various scientific articles, previous research, and relevant education policies. The results of the analysis show that principals who apply adaptive leadership are able to integrate technology into learning and adjust the curriculum to the demands of globalization. Principals also play an important role in building a culture of collaboration and innovation in schools to overcome the challenges of 21st century education. This study provides theoretical and practical contributions to the development of adaptive education policies, as well as providing recommendations for principals in leading change in the educational environment.

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How to cite: Oktaviani, W. N., Apriani, S., Heri, A., Djenjen, D., & Iskandar, S. (2025). Adaptive Leadership of Principals: A Literature Review of the Challenges of Technology and Globalization in 21st Century Education. *Jurnal Ilmiah Global Education*, 6(2), 906–915. <https://doi.org/10.55681/jige.v6i2.3787>

INTRODUCTION

The 21st century education faces major challenges influenced by technological advances and globalization, which require significant changes in the way principals lead and manage educational institutions. Adaptive leadership, as an approach that emphasizes flexibility and responsiveness to environmental changes, is increasingly considered important in dealing with the uncertainty and complexity faced by schools (Heifetz & Laurie, 2009). Amid the rapid development of digital technology, principals are required to be able to integrate technological innovations into learning, while maintaining the quality of education and meeting the demands

of globalization (Baltaci & Balci, 2017). Globalization affects education through rapid information exchange, internationally oriented curriculum changes, and pressure to improve the quality of education globally (Miller, Noble, & McQuillan, 2022).

In this context, Utari (2023) introduces the Adaptive Supervision Model, which aims to help educators manage these dynamic challenges by promoting adaptive practices and flexible leadership in the face of changing educational landscapes. In the context of higher education, Ibardaloza (2023) argues that adaptive leadership behaviors are crucial in driving organizational effectiveness, particularly in institutions that are increasingly affected by technological and global shifts. In line with these challenges, Corrigan and Merry (2022) highlight that principals must not only adapt to technological changes but also lead their schools through complex and unpredictable circumstances, requiring leadership that is both flexible and forward-thinking. However, although there is a lot of research discussing educational leadership, the lack of in-depth studies on the application of adaptive leadership by principals in facing specific 21st century challenges, such as digitalization and globalization, is a gap that needs to be addressed. Several previous studies have focused more on traditional leadership or on general challenges in education without linking the influence of rapid changes in the times (Nelson & Squires, 2017; Khoso, Sahito, & Kerio, 2024). This study aims to fill this gap by analyzing the application of adaptive leadership of school principals in managing technological change and globalization, as well as providing recommendations for the development of educational policies that are more adaptive and responsive to future challenges (Purwanto, Sari, & Sujanto, 2025). Thus, this study has an urgency to present a new perspective in educational leadership that not only leads to administrative management, but also to dynamic and innovative change management in the digital era.

21st century education is faced with rapid and complex changes, with technological advances and globalization affecting all aspects of learning and educational management. Principals as school-level leaders play a key role in managing these changes, and adaptive leadership is a pressing need to face these challenges. In this context, principals must not only adapt to rapid changes in technology and curriculum, but also lead schools to develop 21st century skills needed by students (Özen & Yavuz, 2024). Globalization leads to the need to align curricula with international standards and provide students with opportunities to compete globally (Busakwe, 2023). However, despite these clear challenges, many previous studies have only discussed educational leadership in general without integrating important elements such as technological change and globalization in the educational context (Baltaci & Balci, 2017). Therefore, there is a research gap that needs to be filled, namely how principals can manage and navigate this complexity using an adaptive leadership approach based on innovation and collaboration (Corrigan & Merry, 2022). This research is very relevant, because principals are expected not only to be managers, but also agents of change who can lead schools to face the digital era and globalization effectively (Noble, 2021). Thus, this study provides an important contribution in understanding how adaptive leadership can be applied concretely in facing the challenges of technology and globalization, which is not only beneficial for educational leadership theory but can also provide practical implications for school policy and development in the 21st century (Maulana et al., 2024).

Although there has been a lot of research on educational leadership, a significant gap still exists in terms of the application of adaptive leadership by principals to face the challenges of technology and globalization in 21st century education. Many previous studies have discussed educational leadership in general, but have not touched in depth on how principals can adaptively lead changes related to the development of digital technology and the influence of globalization (Baltaci & Balci, 2017; Maulana et al., 2024). Most studies focus more on traditional leadership models or static leadership theories, without integrating the dynamic changes that occur due to technological advances and the demands of globalization (Miller et al., 2022; Özen & Yavuz, 2024). In addition, studies on adaptive leadership in the education sector tend to be limited to leadership at the macro level, such as at the education policy level, and not

many have discussed the specific strategies implemented by principals in navigating technological change and globalization in the context of education at the school level (Khoso et al., n.d.; Nelson & Squires, 2017). This gap creates an opportunity for research to further explore the role of principals in managing change by adopting adaptive leadership, particularly in integrating new technologies and addressing global challenges in education. Dunn (2020) explores how educational leaders can apply adaptive leadership to lead through complexity and change.

This study aims to fill this gap by providing new insights into how adaptive leadership can be practically applied by principals to address the challenges of 21st-century education, which have not previously been widely discussed in the existing literature (Corrigan & Merry, 2022; Widodo, 2023). Therefore, this study focuses on the adaptation of principal leadership in the face of technological change and globalization, and how this can improve the effectiveness of education at the school level.

This study offers a novel contribution by providing deeper insights into the role of school principals in managing major changes caused by technology and globalization. Although many previous studies have examined school leadership, this study introduces a more specific perspective on adaptive leadership, specifically related to the challenges of implementing new technologies and globalization in the context of 21st century education. Previously, studies such as those conducted by Miller et al. (2022) and Sumiati et al. (2024) provided an overview of adaptive leadership in the education sector, but were still limited in a more general context and did not specifically focus on globalization and digital technology. This study fills the gap by exploring how school principals can adapt quickly in integrating new technologies into the curriculum and learning process, while facing the challenges of deepening globalization.

Wang (2018) offers insight into how adaptive leadership can positively influence educational outcomes as principals navigate these challenges. In addition, this study also provides a practical model and adaptive leadership strategies that can be applied in schools to lead change effectively. As stated by Corrigan and Merry (2022), school principals must have the skills to manage complex changes, especially in uncertain situations such as those caused by rapid technological developments and the influence of globalization. The proposed model in this study aims to provide a practical framework that can be used by school principals to encourage collaboration, digital skills development, and global curriculum integration in schools.

This study also challenges existing theories, by correcting educational leadership approaches that only focus on traditional leadership. For example, Purwanto et al. (2025) showed that the application of adaptive leadership in the digital era has not been widely discussed in depth, especially in the context of technology-based education and the challenges of globalization. Thus, this study fills the gap in the literature on adaptive leadership in the education sector, by providing a clearer understanding of practical strategies and implementation of leadership in schools facing changing times.

The main objective of this study is to develop a deeper understanding of the role of adaptive leadership of principals in responding to the challenges faced by 21st century education, particularly related to technological change and globalization. In this context, adaptive leadership becomes very important to ensure that schools can adapt quickly to complex external dynamics. This study aims to identify adaptive leadership strategies used by principals in responding to these challenges. As part of the specific objectives, this study also aims to present concrete examples of the application of adaptive leadership in the field, with a focus on how principals manage technological change and the integration of global curriculum in learning. For example, research by Corrigan and Merry (2022) emphasizes the importance of principals to adapt to technological change in the increasingly globally connected world of education. In addition, this study will provide practical recommendations for the development of more adaptive and responsive education policies, in order to support a more flexible and innovative educational transformation. For example, a study by Maulana et al. (2024) showed that principals who apply adaptive leadership tend to be more effective in implementing new technologies in schools, while maintaining an inclusive and collaborative learning culture. Thus, this research is expected to

contribute to the development of an adaptive leadership model that can be widely applied in various educational contexts, to support the achievement of 21st century educational goals that are more relevant and responsive to developments in the era.

This study is closely related to previous studies that discuss adaptive leadership in the context of education, especially in facing the challenges of technological change and globalization. For example, research by Baltaci and Balci (2017) on complexity leadership provides a strong theoretical foundation, but has not specifically highlighted the adaptive leadership of principals in 21st-century education faced with rapid technological change (Baltaci & Balci, 2017). In addition, research by Miller et al. (2022) which discusses leadership for adaptive change in Catholic schools also shows the relevance of adaptive leadership theory, but is more limited to a religious context and has not comprehensively discussed the integration of technology and the challenges of globalization in education (Miller et al., 2022).

This study fills this gap by developing a more applicable adaptive leadership model for principals operating in an increasingly globally connected and technology-influenced educational environment. Thus, this study seeks to correct and develop previous theories that tend to consider adaptive leadership as a concept that is too general, without emphasizing its practical application in managing the very dynamic changes in today's world of education. The position of this research is to develop and expand the application of adaptive leadership, with a focus on technology integration and response to globalization, which can be applied by school principals to ensure the success of digital transformation and strengthening of global curriculum in schools (Khosro et al., 2023). This research is expected to enrich the existing literature by offering deeper insights into adaptive leadership at the school level in the context of the highly dynamic and complex challenges of the 21st century.

METHODS

This study uses a literature study approach to analyze the role of adaptive leadership of school principals in facing the challenges of technology and globalization in 21st century education. This approach was chosen because it provides an opportunity for researchers to review and summarize the results of relevant previous studies, as well as present in-depth theoretical findings in the context of current education. Literature studies allow researchers to conduct theoretical synthesis, thematic analysis, and integration of empirical data to produce a more comprehensive understanding of complex issues, such as the application of adaptive leadership in facing the challenges that arise due to technological advances and globalization in the world of education (Cojocar, 2008; Baltaci & Balci, 2017).

This research process is divided into several systematic and structured stages, which include literature selection, selection of relevant sources, thematic analysis, and synthesis of information to produce deeper conclusions. Each stage has a clear purpose to ensure that this study not only discusses existing theories, but also enriches insights into the adaptive leadership of school principals in 21st century education.

1. Literature Source Selection

The first stage in this study was a search for relevant literature through various leading academic databases, such as Google Scholar, JSTOR, ScienceDirect, and ProQuest. The main focus of this literature search was to find articles related to adaptive leadership, educational leadership, globalization in education, and the challenges faced by principals in the 21st century. The articles taken consisted of various types of literature, including journal articles, dissertations, research reports, and books published in the last five years. The researcher ensured that the selected sources were relevant to the context of adaptive leadership and could provide insight into the challenges of technology and globalization in education (Khosro et al., 2023; Miller et al., 2022; Hartmann, 2023; Daubin, 2023; Utari, 2023).

2. Literature Selection and Categorization

After obtaining a number of literatures, the next stage was the selection and categorization of sources based on relevance and quality. The selected literature was then screened to ensure that articles that were not relevant or did not meet high academic quality standards were excluded from the analysis. Relevant sources were then categorized into main themes, such as adaptive leadership, the application of technology in education, and responses to the challenges of globalization. This categorization helps researchers to more systematically map the existing literature and find gaps that need to be filled by this study (Nicolaidis & McCallum, 2013).

3. Thematic Analysis

At this stage, researchers conduct a thematic analysis to explore key themes that emerge in the relevant literature. These themes include adaptive leadership strategies, challenges faced by principals, and leadership models applied in managing changes caused by technological developments and globalization. Researchers then analyze how each previous study contributes to the understanding of adaptive leadership in the educational context and identify patterns that emerge in how principals respond to these challenges. Hernandez (2019) reimagines the roles of high school principals and principal supervisors as adaptive leaders, highlighting how their leadership can evolve to better respond to the changing needs of schools in the modern educational landscape. Daubin (2023) examines how adaptive leadership is applied during times of great change and opportunity, which can provide important insights into how school principals can leverage leadership strategies to manage rapid changes in education.

Cassell (2022) explored the intersection of visual arts practice and adaptive leadership theory, offering insights into how adaptive leadership can be applied within creative educational practices, which could inform how school principals approach innovative leadership strategies in education. Gallagher (2023) explored adaptive leadership strategies used by special education directors to build adaptive capacity, highlighting practices that could inform principals in diverse educational settings as they navigate technological and global shifts. Hartmann (2023) argues that adaptive leadership is crucial in helping principals manage rapid changes in education due to the impact of technology and globalization. Thus, the reference from Hartmann (2023) is placed as an additional support for the theory of adaptive leadership in the context of 21st-century education. This analysis is important for understanding the dynamics of adaptive leadership that develop in the education system, as well as for identifying variables that influence the success of implementing such leadership in schools (Miller et al., 2022; Baltaci & Balci, 2017).

4. Synthesis and Integration of Literature

Synthesis is a crucial stage in this study, where the researcher integrates the findings obtained from the existing literature and combines them to build a more comprehensive conceptual framework on adaptive leadership. The researcher connects existing theories with the real challenges faced by principals in managing education in the digital and global era. Hernandez (2019) contributes to this framework by proposing a reimagining of the roles of principals and their supervisors as adaptive leaders, demonstrating how these leadership positions can be transformed to meet the challenges of today's educational environment. Daubin (2023) contributes to this framework by analyzing how adaptive leadership can be especially effective during periods of great change and opportunity, highlighting strategies that can guide principals in navigating the dynamic challenges of the 21st-century educational landscape. Thus, the reference from Daubin (2023) is appropriate to include in these sections, particularly when discussing how adaptive leadership is applied in times of significant change and opportunity in education. Cassell (2022) contributes to this framework by examining the

relationship between visual arts and adaptive leadership in education, highlighting how the integration of arts practices can support adaptive capacity and innovative leadership in schools. Thus, the reference from Cassell (2022) would enrich the discussion by emphasizing the creative and interdisciplinary aspects of adaptive leadership in education.

Gallagher (2023) adds to this framework by detailing how special education directors use adaptive leadership strategies to build capacity, which can serve as a model for educational leaders navigating change in a rapidly evolving educational landscape. Thus, the reference from Gallagher (2023) would be appropriate in these sections, emphasizing the practical strategies and capacity-building aspects of adaptive leadership. This process helps the researcher to see the relationship between adaptive leadership and change strategies implemented by principals in dealing with increasingly complex problems. The existing literature on leadership theory and educational change is combined to form a more comprehensive perspective on the application of adaptive leadership in today's education world (Nicolaidis & McCallum, 2013; Kaufman, 2021).

5. Identification of Research Gaps and Contributions

At this stage, the researcher evaluates the existing literature to identify gaps in previous research, especially those related to the adaptive leadership of principals in dealing with technology and globalization. Previous research often focuses on educational leadership in general without considering the changes caused by technology and globalization that greatly affect education. This study aims to fill this gap by providing new insights into how principals can implement adaptive leadership in facing the highly dynamic and complex challenges of the 21st century. In addition, this study focuses on real practices and leadership models that can be applied in schools to lead change effectively in the context of digital and global education (Khosro et al., 2023).

The data analysis methods in this study focus on content analysis and thematic analysis. Content analysis is used to evaluate various elements of texts in the literature, by identifying key themes, main ideas, and relationships between concepts related to adaptive leadership in education. Meanwhile, thematic analysis allows researchers to identify consistent patterns and themes in previous studies, and to relate them to relevant theories of leadership and change in the context of 21st century education. This approach provides a more holistic picture of the application of adaptive leadership by school principals in facing the challenges of the times (Cojocar, 2008).

Through the methodology that has been explained, this study is expected to provide new insights into the adaptive leadership of school principals in facing major changes caused by technology and globalization. The findings of this study are expected to not only enrich the educational leadership literature, but also provide practical guidance that can be applied in schools to lead adaptive change in an increasingly global and digitally connected educational context.

RESULTS AND DISCUSSION

This study successfully identified and synthesized several important findings regarding the application of adaptive leadership by school principals in addressing the challenges of technology and globalization in 21st-century education. From the results of the literature review conducted, it was revealed that the implementation of adaptive leadership in school principals goes beyond the ability to manage internal changes within educational organizations, but also encompasses how school principals integrate educational technology into teaching and learning systems in schools. For example, research by Baltaci and Balci (2017) revealed that adaptive leadership focuses on a leader's ability to respond to rapidly changing external environments, particularly those related to technological advancements. This analysis shows that school principals who successfully implement adaptive leadership are able to address the challenges

arising from the adoption of new technologies, such as online learning, which has become increasingly important in responding to uncertainties caused by global pandemics and digital advancements (Cojocar, 2008).

Furthermore, the results of this study also show that school principals applying adaptive leadership tend to be more successful in confronting the impacts of globalization on education. For instance, a study conducted by Miller et al. (2022) found that schools led by principals with adaptive leadership are more able to adapt to curriculum changes influenced by global standards, and integrate international practices in teaching. School principals who adopt adaptive leadership recognize the importance of their role in shaping policies responsive to the demands of globalization, including introducing more inclusive and open curricula, as well as enhancing teachers' capabilities to teach in more diverse and global contexts (Miller et al., 2022). Moreover, the results of the analysis also indicate that adaptive leadership in schools can serve as a catalyst for driving innovation. Principals with this leadership style capitalize on opportunities to enhance the quality of education in more creative and evidence-based ways, encourage collaboration among teachers, and introduce various educational technologies that can facilitate more effective and efficient learning. Thus, the results of this study indicate that adaptive leadership has a significant positive impact in leading change and innovation in schools in the face of 21st-century challenges (Khosro et al., 2023).

The discussion of the results from this study indicates that adaptive leadership at the principal level is essential in managing the challenges arising from technology and globalization. These findings align with previous research, such as that presented by Baltaci and Balci (2017), who emphasized that adaptive leaders are capable of managing the complexities and uncertainties that occur in education, particularly in the digital age. With the rapid advancement of technology, school principals are required to adapt the curriculum and teaching methods to remain relevant in the changing times. This finding is also consistent with Khoso et al. (2023), which showed that principals who apply adaptive leadership are better able to manage changes, especially when dealing with the implementation of new technologies that require new skills and knowledge at the teaching and administrative levels. In line with this, Dias (2013) suggests that adaptive leadership should also be cultivated among teachers, as they play a crucial role in implementing innovative, technology-integrated teaching practices in the classroom, fostering creative and adaptive learning environments. In this regard, Yusoff et al. (2025) argue that adaptive leadership can act as a catalyst for educational digitization, enabling principals to drive the integration of digital technologies into teaching and administrative practices, thus enhancing the overall educational experience. This study reveals that adaptive leadership is not just about responding to change, but also about creating a culture of innovation that allows schools to remain relevant amidst the challenges of the times.

Özen and Yavuz (2024) emphasize that developing a complex adaptive leadership model is essential for fostering resilience in schools, enabling principals to lead effectively in the face of external and internal challenges. This model helps schools remain adaptable and resilient, particularly when facing rapid changes in educational environments driven by technological advancements and globalization. In line with these challenges, Perry (2011) highlights the importance of educational leaders not only addressing immediate challenges but also capitalizing on opportunities for innovation to foster long-term solutions that align with the evolving educational landscape. However, in the context of globalization, school principals face significant challenges in integrating global values into more localized educational systems. Özen and Turan (2019) propose the Complex Adaptive Leadership for School Principals (CAL-SP) framework, which emphasizes the importance of a multifaceted leadership approach to address the complexity and unpredictability of educational environments. This approach allows principals to navigate both local and global challenges more effectively. This study indicates that principals who are successful in addressing the challenges of globalization are those who can integrate international standards without losing their local identity. Rosel et al. (2025) explore the application of adaptive leadership in resource-constrained schools, highlighting how school

leaders in such contexts employ innovative leadership styles to effectively manage challenges and drive positive change despite limited resources.

Miller et al. (2022) also supports this finding, highlighting that the success of principals in adopting policies responsive to globalization greatly depends on their ability to adjust the global curriculum to meet local needs. Therefore, it is crucial for school principals to have a leadership vision that is not only adaptive to external changes but also sensitive to the social and cultural dynamics within the schools they lead. In this regard, adaptive leadership provides a framework that helps principals navigate the challenges of globalization in a way that benefits all stakeholders, particularly in terms of improving education quality and human resource development in schools. Based on these findings, it is important to emphasize that adaptive leadership is not just about managing current changes but also about anticipating potential future changes by implementing sustainable and inclusive long-term strategies, which can enhance educational sustainability in the face of the ever-evolving global challenges.

CONCLUSION

This study has successfully provided a deeper understanding of the application of adaptive leadership by school principals in addressing the challenges of technology and globalization in 21st-century education. Through a systematic literature review, it was found that principals who adopt adaptive leadership not only manage the internal changes occurring within schools but also play a crucial role in integrating technology into the learning process and adapting to the demands of globalization. Adaptive leadership has proven to have a positive impact on principals' ability to lead change, both in adopting educational technologies and in developing curricula that respond to global challenges. This finding also confirms that principals with high adaptability are more successful in creating an inclusive, innovative, and resilient environment that can face the uncertainties brought about by the advancements of the times.

The impact of this research is significant in providing both theoretical and practical contributions to the development of a relevant leadership model for the 21st century, particularly in the context of education increasingly influenced by technology and globalization. This study enriches existing literature by offering a new perspective on how school principals can implement adaptive leadership strategies to address the major changes occurring in the field of education. Furthermore, this research also provides practical recommendations that can be utilized by school principals and education policymakers in designing more effective, sustainable, and responsive change management strategies to meet global needs. Thus, this study not only broadens the understanding of adaptive leadership but also contributes to improving the quality of education at the school level, ultimately benefiting the development of education at both national and international levels.

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