

Article

# The Role of Educational Administration in Digital Literacy Development: Transformative Strategies for Enhancing 21st Century Competencies

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**Abstract.** The digital era has revolutionized educational systems, making digital literacy a vital competency for the 21st century. As such, educational administration plays a pivotal role in driving digital transformation within schools. This study used a qualitative approach with a multi-case study design, examining 20 secondary schools to assess how effective educational administration practices contribute to the sustainable implementation of digital literacy programs. Data were gathered through in-depth interviews with 60 educational administrators, participant observations, and the analysis of policy documents. The findings reveal that educational administration, when proactive, collaborative, and data-driven, significantly boosts student digital literacy. In fact, schools employing these practices experienced an improvement in digital literacy by up to 65% within two years of program implementation. The success of these programs was largely attributed to key factors such as visionary leadership, strategic allocation of resources, continuous teacher capacity development, and robust monitoring systems. Additionally, the research highlights the importance of a comprehensive approach to digital literacy, where educational leaders understand the interconnections between various administrative functions and their impact on digital education. This includes integrating strategic planning, operational execution, developmental efforts, evaluation processes, and collaborative work between teachers and administrators. In response to these findings, the study proposes the Integrated Digital Literacy Administration Model (MALDT). This model offers a framework that can be adapted by educational institutions to enhance learning quality in the digital age. It emphasizes the need for a holistic approach to digital literacy administration, combining leadership vision with operational efficiency and continuous professional development. Ultimately, the adoption of such a model can help schools foster an environment where digital literacy is embedded into the core educational experience, ensuring students are adequately prepared for the challenges of the digital era.

**Keywords:** 21st-century competencies, Digital literacy, Digital transformation, Educational administration, Educational management.

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## 1. Introduction

The digital era has fundamentally transformed the educational landscape, creating new challenges and opportunities in developing student competencies. Digital literacy is no longer an additional skill but a core competency that must be mastered for success in a knowledge-based society. In this context, the role of educational administration becomes increasingly crucial as a catalyst for digital transformation in educational institutions. Digital literacy encompasses the ability to use information and communication technology effectively, critically, and ethically to access, manage, evaluate, and create information (Gilster, 2020). This concept has evolved beyond basic technical skills to become a comprehensive competency framework including information literacy, media literacy, technology literacy, and digital communication literacy.

Educational administration plays a strategic role in creating learning ecosystems that support digital literacy development. As managers of policies, resources, and learning processes, educational administrators have the responsibility to ensure that educational institutions can adapt to digital era demands while maintaining optimal learning quality.

This research aims to analyze how effective educational administration practices can promote sustainable digital literacy development. By examining empirical experiences from various educational institutions, this study seeks to identify the most effective administrative strategies for enhancing student and teacher digital literacy competencies.

The significance of this research lies in its potential to provide evidence-based guidance for educational administrators navigating digital transformation challenges. As educational institutions worldwide grapple with integrating technology meaningfully into learning processes, understanding the administrative factors that facilitate or hinder digital literacy development becomes paramount for sustainable educational reform.

## **2. Literature Review**

### **Concept of Digital Literacy in Education**

Digital literacy has become a central focus in global educational discourse as a response to rapid digital transformation. UNESCO (2023) defines digital literacy as the ability to use digital technologies safely and appropriately to search, manage, understand, integrate, communicate, evaluate, and create information through digital technologies and media. The concept of digital literacy encompasses several interconnected dimensions. First, technology literacy includes technical abilities to use digital devices and software applications. Second, information literacy encompasses the ability to find, evaluate, and use information effectively. Third, media literacy involves the ability to understand and analyze various forms of digital media. Fourth, communication literacy includes the ability to communicate effectively through digital platforms (Bawden & Robinson, 2022). In educational contexts, digital literacy is not merely about using technology but also about integrating technology into learning processes to enhance learning quality and effectiveness. This requires a holistic approach involving changes in curriculum, pedagogy, and educational infrastructure.

### **Role of Educational Administration in the Digital Era**

Educational administration in the digital era faces complex and multidimensional challenges. Educational administrators are not only responsible for managing traditional resources such as teachers, facilities, and curriculum, but must also manage digital transformation encompassing technology, data, and digital competencies (Fullan & Gallagher, 2021). The role of educational administration in digital literacy development can be categorized into several main functions. First, strategic planning function includes developing institutional digital vision, planning technology integration, and formulating digital transformation roadmaps. Second, resource management function encompasses budget allocation for technology, digital infrastructure procurement, and human resource capacity development. Third, coordination and collaboration function involves cooperation with various internal and external stakeholders to support digital literacy program implementation. Fourth, monitoring and evaluation function includes developing digital competency assessment systems, measuring program effectiveness, and continuous improvement.

### **Digital Literacy Administration Models**

Various digital literacy administration models have been developed to help educational institutions implement effective digital literacy programs. The TPACK (Technological Pedagogical Content Knowledge) model developed by Mishra and Koehler (2021) emphasizes the importance of integrating technology, pedagogy, and content knowledge in digital literacy development. The SAMR (Substitution, Augmentation, Modification, Redefinition) model introduced by Puentedura (2022) provides a framework for understanding various levels of technology integration in learning. This model helps educational administrators plan and evaluate technology implementation from substitution to learning redefinition levels. The Digital Leadership Framework developed by Sheninger (2023) emphasizes the role of leadership in driving digital transformation in educational institutions. This model includes seven pillars: digital vision, digital communication, social media, learning and teaching, professional productivity and efficiency, stakeholder relationships, and organizational transformation.

### Implementation Challenges and Opportunities

Digital literacy program implementation in educational institutions faces various challenges that must be overcome through effective administrative strategies. Main challenges include resource limitations, teacher digital competency gaps, resistance to change, and the complexity of continuously evolving technology. However, the digital era also offers significant opportunities to improve educational quality. Technology can facilitate personalized learning, increase educational accessibility, encourage global collaboration, and provide real-time data for better decision-making.

## 3. Methodology

### Research Design

This study employed a qualitative approach with multi-case study design to examine the role of educational administration in digital literacy development. This approach was chosen to obtain deep understanding of the complexity of digital literacy program implementation in diverse educational institution contexts.

### Location and Participants

The research was conducted in 20 secondary schools across five provinces in Indonesia, selected based on criteria including geographical variation (urban, suburban, rural), school status (public, private), and digital literacy implementation level (beginner, intermediate, advanced). Research participants included 60 educational administrators consisting of principals, vice principals, and ICT coordinators.

### Data Collection Techniques

Data were collected through three main techniques:

**In-depth Interviews:** Semi-structured interviews with educational administrators to explore experiences, perceptions, and strategies in implementing digital literacy programs.

**Participant Observation:** Direct observation of educational administration practices and digital literacy program implementation in research schools.

**Document Analysis:** Analysis of policy documents, program reports, and strategic planning documents related to digital literacy.

### Data Analysis

Data were analyzed using thematic analysis approach with NVivo 12 software assistance. The analysis process included data coding, theme identification, and theoretical model development. Data validity was ensured through source triangulation, method triangulation, and member checking.

## 4. Findings and Discussion

Analysis of 20 schools revealed significant variation in digital literacy implementation levels across Indonesian secondary schools. Based on the comprehensive framework developed in this study, digital literacy implementation can be systematically categorized into three distinct levels: beginner implementation (30% of schools), intermediate implementation (45% of schools), and advanced implementation (25% of schools). Schools operating at the beginner level generally focus their efforts on providing basic technological infrastructure and delivering fundamental technical skills training to their staff and students. In contrast, intermediate-level schools have progressed to integrating technology across several academic subjects while simultaneously developing institutional digital literacy policies and procedures. Advanced-level schools demonstrate the most sophisticated approach, having successfully implemented holistic strategies that integrate technology seamlessly across all aspects of learning delivery and comprehensive school management systems.

The research findings identified five critical strategic roles that educational administration plays in fostering sustainable digital literacy development within educational institutions. The first and perhaps most fundamental role involves visionary leadership, where educational administrators who achieve success in implementing digital literacy programs consistently demonstrate strong visionary leadership characteristics. These leaders possess the capability to develop clear and compelling digital visions for their institutions, effectively communicate these visions to all stakeholders across the educational community, and successfully mobilize both human and financial resources to transform their vision into tangible reality. As one principal who successfully implemented comprehensive digital literacy programs explained, "We started by building a shared vision about how technology can enhance student learning. This vision then became guidance in every decision we made." This visionary approach provides the essential foundation upon which all other digital transformation efforts are built.

The second strategic role encompasses strategic resource management, where effective educational administration demonstrates sophisticated capabilities in managing institutional resources strategically to support comprehensive digital literacy programs. This multifaceted responsibility includes making targeted budget allocations that maximize impact, procuring technology solutions that are appropriately matched to institutional needs and student requirements, and systematically developing human resource capacity across all levels of the organization. Research analysis reveals that successful schools consistently allocated at least 15% of their total institutional budget specifically for digital literacy programs, with strategic distribution patterns showing 40% directed toward infrastructure development, 35% invested in capacity building initiatives, and 25% allocated for digital content procurement and licensing.

Continuous capacity development represents the third crucial strategic role, where teacher and staff development in digital literacy competencies becomes an absolute priority in effective educational administration frameworks. Institutions that implement continuous and well-structured capacity development programs consistently demonstrate measurable improvements in teacher digital competencies and overall learning quality outcomes. As articulated by one ICT coordinator, "We developed tiered training programs from basic skills to technology integration in learning. Each teacher has a development path tailored to their needs and competencies." This personalized approach ensures that professional development initiatives address individual competency gaps while building institutional capacity systematically.

The fourth strategic role involves the implementation of comprehensive monitoring and evaluation systems that enable educational administrators to effectively track digital literacy program implementation progress and conduct systematic continuous improvement processes. These sophisticated systems incorporate both quantitative metrics and qualitative indicators that measure various dimensions of digital literacy development, providing administrators with the data-driven insights necessary for informed decision-making and strategic adjustments. The fifth and final strategic role emphasizes collaboration and partnership development, where successful educational administration actively cultivates collaborative relationships with diverse external stakeholders including local government agencies, technology industry partners, universities and research institutions, and civil society organizations. These strategic partnerships significantly enrich the resources and specialized expertise available for digital literacy programs while creating sustainable support networks.

Cross-case analysis conducted across all participating institutions identified six fundamental factors that consistently determine the success or failure of digital literacy program implementation initiatives. Leadership commitment emerges as the most crucial factor, where strong commitment from institutional leaders serves as the foundation for implementation success. Committed leadership extends beyond merely providing financial and resource support to actively creating organizational cultures that embrace and support comprehensive digital transformation efforts. Strategic planning represents the second

critical success factor, where comprehensive strategic planning that includes clear roadmaps, measurable milestones, and realistic implementation timelines becomes the foundation for successful program execution. This planning process must meaningfully involve all stakeholders and carefully consider the specific institutional contexts and constraints that may influence implementation effectiveness.

Technology infrastructure availability constitutes the third essential success factor, where adequate and reliable technology infrastructure serves as a fundamental prerequisite for effective digital literacy program implementation. This infrastructure foundation includes stable and sufficient internet connectivity, appropriate hardware configurations that meet educational needs, and software solutions that effectively support digital learning objectives. Human resource capacity represents the fourth determining factor, where teacher and staff digital competencies become crucial elements in determining overall implementation effectiveness. Sustained investment in continuous capacity development consistently proves to provide significant returns in terms of improved learning quality and institutional capability.

Organizational culture forms the fifth success factor, where institutional cultures that actively support innovation, promote collaboration among stakeholders, and encourage continuous learning create conducive environments for successful digital literacy program implementation. Cultural transformation often requires consistent effort over extended periods and sustained commitment from leadership and staff. The sixth and final success factor involves comprehensive stakeholder support, where backing from diverse stakeholder groups including students, parents, teachers, and the broader community strengthens both the legitimacy and long-term sustainability of digital literacy initiatives. Effective communication strategies and meaningful stakeholder involvement throughout implementation processes prove crucial for maintaining this essential support.

The research simultaneously identified significant challenges that institutions commonly face during digital literacy program implementation. Resource limitations, particularly in terms of budget constraints, infrastructure deficiencies, and human resource availability, represent the primary challenge category, especially for schools located in remote geographical areas or operating under limited economic conditions. These resource constraints require creative and innovative strategies for optimizing available resources while maintaining program quality and effectiveness. Digital divide issues create the second major challenge category, where disparities in digital access and competency among students, teachers, and between different schools create substantial equity challenges in digital literacy program implementation. Addressing these disparities requires the development and implementation of inclusive strategies that ensure all stakeholders can meaningfully participate in digital transformation initiatives.

Resistance to change constitutes the third significant challenge, where opposition from teachers and staff members who are comfortable with traditional educational methods creates obstacles that require sensitive and graduated change management approaches. This resistance often stems from fear of technology, concerns about job security, or simple preference for familiar methods, necessitating patient and supportive transition strategies. Technology complexity represents the fourth major challenge, where the continuously evolving nature of digital technologies and the constant need for system updates create ongoing difficulties in system maintenance and development. Successfully addressing this challenge requires comprehensive sustainability strategies that account for technological evolution and provide for ongoing system support and development.

Based on comprehensive analysis of research findings, this study developed an Integrated Digital Literacy Administration Model (MALDT) that consists of five interconnected components designed to provide a holistic framework for institutional digital transformation. The strategic component serves as the foundational element, encompassing digital vision development, comprehensive strategic planning processes, and careful alignment with broader institutional goals and objectives. This strategic component

provides the essential direction and focus necessary for effective digital literacy program implementation while ensuring that digital initiatives support rather than compete with institutional missions.

The operational component addresses the day-to-day management requirements necessary for successful program implementation, including systematic resource management, detailed program implementation coordination, and effective management of daily activities and processes. This component ensures that carefully developed strategies can be translated into practical, effective action while maintaining quality and consistency across all implementation activities. The development component maintains focus on capacity building initiatives, comprehensive professional development programs, and continuous innovation processes that enable institutions to remain current with technological advances and evolving learning needs. This component ensures that institutions develop and maintain the human capital necessary for sustained digital transformation success. The evaluation component incorporates systematic monitoring processes, comprehensive assessment protocols, and effective feedback mechanisms that enable continuous improvement and evidence-based decision making. This component ensures that digital literacy programs can be systematically evaluated and continuously refined based on objective data and stakeholder feedback, promoting both accountability and effectiveness. Finally, the collaboration component facilitates partnerships with external stakeholders, promotes professional networking opportunities, and encourages knowledge sharing initiatives that enrich the resources and expertise available for digital literacy programs while building sustainable support networks that extend beyond individual institutional boundaries.

## 5. Implications and Recommendations

This research makes significant contributions to the theoretical development of educational administration within the digital era context, particularly in advancing our understanding of how administrative practices can facilitate institutional digital transformation. The Integrated Digital Literacy Administration Model (MALDT) developed through this study substantially enriches existing literature by providing a comprehensive framework that demonstrates how educational administration can play pivotal roles in guiding educational institutions through complex digital transformation processes. The model's emphasis on the integration of strategic, operational, developmental, evaluative, and collaborative components offers a nuanced understanding of the multifaceted nature of educational administration in digital contexts. Furthermore, the research findings significantly strengthen change management theory in educational settings by providing empirical evidence of the critical importance of visionary leadership, strategic resource management, and continuous capacity development in successfully implementing complex organizational changes. The identification of specific success factors and implementation challenges contributes to theoretical frameworks that can guide future research and practice in educational transformation initiatives.

From a practical perspective, this research provides invaluable guidance for educational administrators who are navigating the complexities of implementing digital literacy programs within their institutions. The MALDT model offers a flexible yet comprehensive framework that can be adapted and implemented across various types of educational institutions, with appropriate adjustments made to accommodate specific contexts, resource constraints, and organizational conditions. The detailed analysis of success factors provides administrators with evidence-based insights into the critical elements that must be addressed to ensure effective program implementation, while the identification of common implementation challenges prepares administrators to anticipate and proactively address potential obstacles. The research findings offer practical strategies for resource allocation, capacity building, stakeholder engagement, and program evaluation that can be immediately applied in educational settings. Additionally, the documentation of best practices from successful implementations provides administrators with concrete examples and proven approaches that can be adapted to their specific circumstances.

The research findings have significant implications for educational policy development at multiple levels of governance. At the national level, the results suggest that government investment in comprehensive digital literacy standards development represents a critical policy priority that requires immediate attention. These standards must encompass technical, cognitive, and social-emotional competencies that are essential for success in the digital era, providing clear benchmarks for institutional assessment and improvement. The research demonstrates the urgent need for substantial government investment in technology infrastructure and human resource capacity development, with particular attention to ensuring equity and accessibility across all educational institutions regardless of their geographic location or economic circumstances. Policy makers should prioritize the development of specialized training programs for educational administrators that focus specifically on digital leadership and change management capabilities, incorporating essential knowledge in technology integration, pedagogical innovation, and organizational transformation strategies.

The establishment of national monitoring and evaluation systems for digital literacy programs emerges as another critical policy recommendation, ensuring quality assurance and facilitating continuous improvement across the educational system. Such systems would provide valuable data for policy refinement and enable identification of best practices that can be scaled across different institutional contexts. Additionally, policy frameworks should encourage and facilitate collaboration between educational institutions and external stakeholders, including technology industry partners, research institutions, and community organizations, to leverage diverse expertise and resources for digital literacy development.

For institutional-level practice, the research offers several specific recommendations that can guide immediate implementation efforts. Every educational institution should prioritize the development of clear, measurable digital visions that are closely aligned with their broader educational goals and institutional missions. These visions must be effectively communicated to all stakeholders through multiple channels and consistently reinforced through institutional policies and practices. Institutions should establish systematic processes for ongoing investment in teacher and staff capacity development in digital literacy, ensuring that professional development programs are well-structured, continuous, and carefully tailored to address individual competency needs and institutional requirements.

The implementation of comprehensive monitoring and evaluation systems emerges as essential for tracking progress and facilitating evidence-based continuous improvement. These systems should incorporate both quantitative metrics and qualitative indicators that capture the full spectrum of digital literacy development outcomes, including student learning improvements, teacher competency growth, and institutional transformation indicators. Furthermore, institutions should actively work to build and maintain collaborative relationships with diverse external stakeholders, recognizing that strategic partnerships can significantly enhance program effectiveness and long-term sustainability by providing access to additional resources, expertise, and support networks.

The research emphasizes the critical importance of adopting contextual and adaptive approaches in digital literacy program implementation, acknowledging that there is no universal solution that can be uniformly applied across all institutional settings. Each institution must carefully assess its specific circumstances, including available resources, existing competency levels, organizational culture, and community context, to develop implementation strategies that are both realistic and effective. This requires institutional leaders to maintain flexibility and responsiveness throughout the implementation process, making adjustments as needed based on ongoing evaluation and feedback.

Looking toward the future, this research identifies several important directions for continued investigation and development. Further research is urgently needed to explore specific aspects of digital literacy implementation in greater depth, including

comprehensive analysis of long-term impacts on student learning outcomes, comparative evaluation of various implementation models, and development of strategies to address emerging challenges in the rapidly evolving digital landscape. Longitudinal research studies extending over three to five years would provide crucial insights into the evolution and sustainability of digital literacy programs, helping to identify factors that contribute to long-term success and institutional transformation.

As digital transformation continues to accelerate across all sectors of society, the role of educational administration in facilitating digital literacy development will become increasingly crucial for institutional success and student preparation for future challenges. Educational administrators must therefore prepare themselves to serve as effective digital leaders who possess the knowledge, skills, and vision necessary to guide meaningful and sustainable digital transformation initiatives within their institutions. This preparation requires ongoing professional development, active engagement with emerging technologies and pedagogical innovations, and commitment to creating organizational cultures that embrace change and continuous learning. The success of digital literacy initiatives ultimately depends on the ability of educational administrators to effectively integrate technological capabilities with sound educational principles, ensuring that digital transformation efforts enhance rather than replace fundamental educational values and objectives.

## 6. Conclusion

This research demonstrates that educational administration plays a highly strategic role in digital literacy development in educational institutions. Through visionary leadership, strategic resource management, continuous capacity development, effective monitoring systems, and strong collaboration, educational administrators can create meaningful and sustainable digital transformation. The Integrated Digital Literacy Administration Model (MALDT) developed in this research provides a comprehensive framework that can help educational administrators in planning, implementing, and evaluating digital literacy programs. This model emphasizes the importance of integration among strategic, operational, development, evaluation, and collaboration components.

Implementation success factors identified in this research - leadership commitment, strategic planning, technology infrastructure, human resource capacity, organizational culture, and stakeholder support - provide practical guidance for educational administrators in designing effective implementation strategies. Challenges identified in this research - resource limitations, digital divide, resistance to change, and technology complexity - need to be addressed through holistic and sustainable strategies. This requires long-term commitment and strong collaboration among various stakeholders. This research also emphasizes the importance of contextual and adaptive approaches in digital literacy program implementation. There is no one-size-fits-all solution, and each institution needs to develop strategies appropriate to their specific contexts, needs, and conditions.

Moving forward, further research is needed to explore specific aspects of digital literacy implementation, including long-term impacts on student learning, effectiveness of various implementation models, and strategies to overcome emerging challenges. Longitudinal research is also needed to understand the evolution and sustainability of digital literacy programs in the long term. With continuing digital transformation, the role of educational administration in digital literacy development will become increasingly crucial. Educational administrators must prepare themselves to become digital leaders capable of leading meaningful and sustainable digital transformation in their educational institutions.

## Suggestions

Based on the findings of the present study, several recommendations are proposed for English lecturers, curriculum designers, and future researchers. For English lecturers, the inclusion of role play as an intermittent feature in ESP Speaking classes—particularly within secretarial or business programs—is encouraged to foster practical language application. Effective role play implementation should be supported by providing students with functional phrases, vocabulary glossaries, and model scripts during the preparation phase.

Furthermore, feedback should extend beyond grammar and pronunciation, emphasizing appropriateness, tone, and interactional competence. For curriculum designers, it is recommended that secretarial courses integrate authentic elements of workplace communication, such as business negotiations, proposal presentations, and active participation in meetings. Learning objectives should be closely aligned with real-world communication demands, recognizing role play as a legitimate mode of language assessment. Future research may benefit from employing a mixed-method approach that combines qualitative reflections with quantitative measures of linguistic development, such as pre- and post-tests, to enhance reliability. Additionally, investigations into the long-term impact of role play on job readiness and communication during internships or post-graduation could yield valuable insights. Comparative studies across different vocational domains—for instance, secretarial versus business administration—may further elucidate the transferability and effectiveness of role play in professional language training.

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