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# Adaptive Leadership in Digital Transformation: A Comparative Case Study of Principal Management Strategies Across Contrasting Resource Contexts

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**Abstract**
Digital transformation in education faces implementation challenges despite adequate technological infrastructure, with teachers experiencing difficulties in digital administrative tasks. This study examined how school principals enhance teachers' administrative effectiveness in the digital era through Planning, Organizing, Actuating, and Controlling (POAC) management framework across contrasting resource contexts. A comparative qualitative case study was conducted at SDN 1 Pasirwangi and SDN 1 Padaasih, Garut Regency, involving two principals, twelve teachers, and four administrative staff. Data were collected through in-depth interviews, participatory observation, and document analysis from August to September 2025, analyzed using Miles and Huberman's interactive model with source and method triangulation. Both schools achieved substantial digital administrative effectiveness through contextually adapted POAC implementation. SDN 1 Pasirwangi employed structured systems with formal ICT teams and participatory planning, optimizing government-provided infrastructure. SDN 1 Padaasih compensated for limited resources through intensive principal engagement, informal peer networks, and creative adaptation strategies. Unexpectedly, teacher age showed no correlation with digital competence development. Adaptive leadership implementation of POAC principles constitutes the critical success factor, transcending infrastructure availability. Leadership quality, particularly in fostering teacher motivation and providing solution-oriented supervision, determines digital transformation outcomes more significantly than resource abundance, challenging infrastructure-centric assumptions in educational technology literature.

## INTRODUCTION

The digital transformation of educational systems has fundamentally reshaped how schools operate and how teachers fulfill their professional responsibilities. Teachers' competence in Information and Communication Technology (ICT) has emerged as a critical determinant of educational quality, enabling improvements in learning delivery, school management, lesson planning, assessment procedures, and performance reporting through enhanced speed, accuracy, and effectiveness (Kormakova, 2021; Cabero et al., 2020; Nuryani & Handayani, 2020). This represents not merely a technical upgrade but a paradigmatic shift requiring systematic leadership and effective management structures (Heavin & Power, 2018).

Empirical studies have demonstrated that judicious application of information technology substantially facilitates teachers' administrative functions. Ramlah et al. (2025) found that planned technological implementation can significantly reduce administrative burden, while international research indicates that digital competence is essential for teachers to integrate technology pedagogically and improve educational outcomes (Redecker, 2017). However, despite regulatory frameworks such as Permendikbud Ristek No. 40 of 2021 mandating systematic competency

development through principal leadership, a substantial gap persists between policy intentions and ground-level realities.

Field observations reveal a concerning disconnect between theoretical advantages and actual implementation outcomes. Many teachers continue experiencing significant difficulties with digital administrative tasks, often reporting feelings of being overwhelmed (Indiarto, 2023). While many schools possess adequate technological infrastructure, optimal utilization remains elusive due to insufficient guidance and support mechanisms (Putra et al., 2021). International studies identify infrastructure limitations, inadequate training, and lack of technical support as primary barriers to ICT integration (Hew & Brush, 2007). These findings suggest that infrastructure availability alone does not guarantee effective implementation—management and leadership approaches play pivotal roles in determining success (Light & Pierson, 2013).

Existing scholarship has established the importance of transformational leadership in facilitating technology integration (Supermane, 2019; Schmitz et al., 2023). Recent research demonstrates that principals' digital leadership encompasses vision articulation, technology competence development, teacher capacity building, change management, and innovation culture cultivation (Al Hawamdeh & Al-Edenat 2025). Studies have identified various approaches including structured training programs (Maulana et al., 2025), internal technical support teams (Hayati & Indra, 2025), intensive personal guidance (Hidayat & Kustandi, 2021), supportive leadership styles (Tanjung, 2025), and improvement-oriented evaluations (Zamrudi & Shaddiq, 2025). However, comprehensive qualitative investigations analyzing management strategies in schools with contrasting characteristics remain scarce. Most existing studies either identify problems without examining solutions in depth or discuss theoretical frameworks without adequate empirical grounding in diverse contexts (Ifinedo & Kankaanranta, 2021). Particularly absent are comparative analyses illuminating how different approaches achieve success under varying resource conditions.

This study addresses this gap by examining how school principals enhance teachers' administrative effectiveness in the digital era through a comparative case study of SDN 1 Pasirwangi and SDN 1 Padaasih in Garut Regency. The research employs George R. Terry's (1977) Planning, Organizing, Actuating, and Controlling (POAC) management framework, investigating how principals systematically design, organize, implement, and supervise digitization initiatives to improve teachers' digital administrative capabilities. This framework provides a systematic approach to organizational goal achievement (Narindro et al., 2020; Terry & Franklin, 1982). The central research question is: How do school principals play their roles in improving the effectiveness of teachers' administrative tasks in the digital era, and what factors contribute to their success despite varying resource conditions?

The significance lies in its comparative approach examining two schools that achieved success through different pathways and under distinct constraints. By comparing these schools, this study identifies critical success factors and provides both theoretical contributions and practical benefits for schools confronting similar challenges. The novelty resides in its detailed analysis of managerial solutions that emerged organically in educational settings, moving beyond problem identification to document concrete strategies and outcomes (Yin, 2014). By demonstrating how adaptive implementation of management theory can achieve success regardless of facility availability, this research contributes to both theoretical understanding and practical application in educational leadership, ultimately supporting improved educational quality through effective digital transformation.

## METHODS

This study employed a qualitative research approach with a comparative case study design, specifically chosen to enable an in-depth examination of the phenomenon under investigation within its real-life context (Yin, 2014). The comparative case study method was deemed most appropriate for this research as it allowed for systematic analysis of how school principals in two distinct settings implement management strategies to improve teachers' administrative effectiveness in the digital era,

while simultaneously identifying contextual factors that influence implementation outcomes. This methodological approach facilitated the exploration of similarities and differences between cases, thereby generating richer theoretical and practical insights (Creswell, 2014).

The research was conducted at two purposively selected elementary schools in Garut Regency, West Java, Indonesia: SDN 1 Pasirwangi and SDN 1 Padaasih. These schools were deliberately chosen based on specific criteria, including their documented success in implementing digital administrative systems, contrasting resource availability conditions, and willingness to participate in the research. The selection of these two schools enabled meaningful comparison between a school with adequate government-provided technological infrastructure and one operating with limited facilities yet achieving comparable success through alternative strategies. The study was conducted over a two-month period from August to September 2025, providing sufficient time for comprehensive data collection and triangulation.

Research participants comprised key stakeholders directly involved in digital administrative implementation, including school principals as primary informants, teachers at various experience levels, and administrative staff. The snowball sampling technique was utilized to identify additional informants, beginning with the principals and extending to other relevant participants until data saturation was achieved (Patton, 2019). This approach ensured that diverse perspectives were captured while maintaining focus on individuals with substantive knowledge and experience related to the research phenomenon. In total, the study involved two principals, twelve teachers, and four administrative staff members across both schools.

Data collection was conducted through three complementary methods to ensure comprehensive understanding and enhance credibility. First, in-depth semi-structured interviews were conducted with all participants, utilizing interview protocols aligned with the POAC framework to explore planning, organizing, actuating, and controlling dimensions of principals' management practices. Second, participatory observation was employed to document actual practices, interactions, and contextual dynamics within each school environment, with particular attention to how digital administrative tasks were executed and supported. Third, document analysis was performed on relevant materials including school digitalization plans, training records, monitoring reports, and official correspondence to corroborate interview and observation data.

To ensure data quality and trustworthiness, this study implemented multiple validation strategies as recommended by Lincoln and Guba (1985). Source triangulation was applied by comparing data obtained from principals, teachers, and administrative staff to verify consistency and identify divergent perspectives. Method triangulation involved cross-checking findings across interviews, observations, and documents to strengthen interpretive validity. Additionally, member checking procedures were conducted whereby preliminary findings were shared with key informants to confirm accuracy and enhance credibility of interpretations. Data analysis followed Miles, Huberman, and Saldaña's (2014) interactive model, proceeding through systematic stages of data condensation, data display through matrices and narrative summaries, and iterative conclusion drawing and verification. This rigorous analytical process enabled the identification of patterns, themes, and relationships within and across cases, ultimately revealing how different management approaches contribute to administrative effectiveness in contrasting contexts.

## RESULTS AND DISCUSSION

### Results

The effectiveness of teachers' administrative tasks in the digital era emerged as highly contingent upon principals' leadership approaches and management strategies. This study's comparative analysis of SDN 1 Pasirwangi and SDN 1 Padaasih revealed that despite significant differences in available technological resources, both schools achieved substantial improvements in teachers' digital administrative capabilities through distinct yet equally effective managerial pathways. These findings

are organized according to the POAC management framework, examining how each component contributed to administrative effectiveness across the two contrasting contexts.

***Planning: Resource Optimization Versus Creative Adaptation***

The planning phase demonstrated fundamentally different yet successful approaches aligned with each school's resource conditions. At SDN 1 Pasirwangi, planning centered on maximizing government-provided digital infrastructure, particularly Chromebook devices distributed through Ministry of Education initiatives. The principal implemented participatory planning sessions where teachers collaboratively evaluated various digital applications and platforms before institutional adoption. As one teacher articulated, "We were not just told to fill in the data, but we were invited to discuss which applications were most effective and why we should use them" (Teacher, SDN 1 Pasirwangi, September 6, 2025). This inclusive approach fostered teacher ownership and reduced resistance to technological change. The principal established clear timelines for digital transition, allocated specific responsibilities for application testing, and created systematic protocols for data entry procedures. Documentation analysis revealed comprehensive digitalization roadmaps that specified targets, success indicators, and contingency measures.

Conversely, at SDN 1 Padaasih, planning necessitated creative problem-solving due to limited institutional technology provision. The principal reframed resource constraints as opportunities for innovation, encouraging teachers to leverage personal devices and explore low-cost digital solutions. A teacher explained, "Because there were no Chromebooks [provided by the government], the principal encouraged us to think, 'How can we be more creative?' In the end, we used our own laptops, and it worked" (Teacher, SDN 1 Padaasih, September 8, 2025). The principal developed flexible implementation schedules accommodating varying levels of teacher technological readiness and established partnerships with local internet cafés to address connectivity limitations. Planning documents emphasized adaptability and incremental progress rather than uniform timelines, recognizing the heterogeneity of teacher circumstances.

***Organizing: Formal Structures Versus Informal Networks***

Organizational strategies reflected each school's contextual realities while effectively facilitating technical support and resource allocation. SDN 1 Pasirwangi established formal organizational structures through the creation of an ICT Team comprising digitally proficient teachers designated as technical support personnel. This team maintained clear role delineations, scheduled support hours, and documented troubleshooting protocols. A teacher described the system's functionality: "We have an ICT Team, so if there are technical problems, we report them directly to them. Their division of tasks is clear" (Teacher, SDN 1 Pasirwangi, September 6, 2025). Observation data confirmed the team's systematic approach, including maintenance logs, technical request forms, and regular equipment audits. The principal allocated dedicated time within the school schedule for ICT Team operations and provided recognition for their contributions.

At SDN 1 Padaasih, organization relied on informal peer support networks anchored by designated "Digital Ambassadors" rather than formal teams. The principal identified technologically capable teachers and empowered them as peer mentors without rigid structural hierarchies. These ambassadors provided ad hoc assistance through informal consultations, WhatsApp support groups, and collaborative work sessions. Despite the informal structure, effectiveness was comparable to SDN 1 Pasirwangi's formal approach. Teachers reported high satisfaction with accessibility and responsiveness, stating that assistance felt more personalized and less intimidating than formal technical support channels. The principal maintained oversight through periodic check-ins with ambassadors rather than structured reporting mechanisms.

***Actuating: Systemic Motivation Versus Personal Engagement***

The actuating phase revealed divergent motivational strategies that effectively mobilized teachers toward digital competence development. At SDN 1 Pasirwangi, motivation emerged from transparent systemic support and collaborative culture cultivation. The principal established norms of collective

problem-solving and normalized help-seeking behaviors. A senior teacher noted, "We are not afraid to ask questions because the principal always says, 'if there is a problem, don't keep quiet, just ask your friends or me'" (Senior Teacher, SDN 1 Pasirwangi, September 6, 2025). The principal implemented recognition systems celebrating teachers' digital innovations, created platforms for sharing best practices, and maintained consistent encouragement through faculty meetings and individual check-ins. Observation data documented the principal's visible presence during digital training sessions, signaling institutional prioritization of technological competence.

In contrast, SDN 1 Padaasih's principal employed intensive personal engagement as the primary motivational mechanism. The principal frequently worked alongside teachers during digital task completion, providing hands-on guidance and emotional support. A particularly illustrative observation was recounted by a teacher: "The principal was once seen sitting next to a teacher, helping to enter data into the E-rapor application. That personal attention was very motivating" (Teacher, SDN 1 Padaasih, September 8, 2025). This approach transformed the principal from distant administrator to collaborative partner, reducing teachers' anxiety about technological competence deficits. The principal's willingness to engage directly with technical challenges modeled perseverance and normalized the learning process, fostering psychological safety for teachers struggling with digital transitions.

***Controlling: Solution-Oriented Supervision***

Both principals implemented supervision approaches characterized by formative feedback and constructive problem-solving rather than punitive accountability. At SDN 1 Pasirwangi, the principal established digital monitoring systems tracking teachers' task completion rates, data accuracy, and platform utilization. However, these metrics informed supportive interventions rather than sanctions. When deficiencies were identified, the principal investigated underlying causes and provided targeted assistance. A teacher explained, "When a teacher is late, the principal will ask about the problem and provide a solution, not just a punishment" (Teacher, SDN 1 Pasirwangi, September 6, 2025). Documentation revealed regular progress reports that highlighted improvements alongside remaining challenges, maintaining focus on continuous development.

SDN 1 Padaasih employed less formal monitoring mechanisms, relying primarily on direct observation and informal progress conversations. The principal maintained awareness of teachers' digital administrative performance through classroom visits and casual interactions rather than systematic data collection. When difficulties were identified, the principal immediately provided hands-on assistance or connected teachers with appropriate peer support. This responsive approach prevented problems from accumulating while maintaining teacher dignity and motivation.

***Unexpected Findings: Age and Experience Non-Correlation***

A particularly noteworthy unexpected finding emerged regarding teacher demographics and digital adaptation. Initial assumptions suggested that younger teachers would demonstrate greater facility with digital administrative tasks, yet data revealed no consistent correlation between age and digital competence development. Several senior teachers at both schools exhibited remarkable adaptability and enthusiasm for digital tools, while some younger teachers displayed resistance or difficulty. At SDN 1 Padaasih, a 52-year-old teacher became a Digital Ambassador, actively supporting colleagues despite initial technological inexperience. This teacher attributed success to the principal's patient encouragement and the absence of age-based assumptions. Conversely, at SDN 1 Pasirwangi, a 28-year-old teacher required extensive support, citing overwhelming administrative demands rather than technological incompetence as the primary barrier. These findings suggest that management approaches prioritizing personalized support and intrinsic motivation may be more influential than demographic factors in determining digital adaptation success.

**Discussion**

This study's central finding affirms that principals' systematic implementation of POAC management principles substantially enhances teachers' administrative effectiveness in digital contexts, regardless of technological resource availability. Both SDN 1 Pasirwangi and SDN 1 Padaasih achieved comparable effectiveness outcomes through contextually adapted management strategies, demonstrating that leadership approaches constitute more critical success factors than infrastructure alone. This finding directly addresses the research question regarding how principals enhance administrative task effectiveness and identifies adaptive management as the key contributing factor across varying resource conditions.

The findings strongly corroborate Terry's (1977) foundational premise that management effectiveness depends on systematic planning, organizing, actuating, and controlling rather than on resource abundance per se. This study extends this theoretical foundation by demonstrating how POAC principles operate differently yet effectively across contrasting resource contexts in educational settings. At SDN 1 Pasirwangi, the principal's approach exemplified efficiency-oriented management, optimizing provided resources through structured systems. At SDN 1 Padaasih, transformational leadership compensated for resource limitations through intensive personal engagement and creative problem-solving. Both approaches remained faithful to POAC principles while adapting implementation modalities to contextual realities.

Contemporary digital leadership frameworks further illuminate these findings. The principals' behaviors align with dimensions identified by Supermane (2019), who emphasized that transformational leadership in digital contexts requires vision articulation, capacity building, and innovation culture cultivation. Recent research by Kasim & Surya (2025) similarly concluded that school leaders play central roles in leveraging technology for improvement, with leadership quality superseding infrastructure quality as the determinant variable. This study's findings provide concrete empirical validation of these theoretical propositions through detailed comparative case analysis.

The differential effectiveness of formal versus informal organizational structures challenges assumptions that standardized management models universally apply. At SDN 1 Pasirwangi, formal ICT Teams functioned effectively within a context of adequate resources and institutional capacity for structured systems. However, at SDN 1 Padaasih, informal peer networks proved equally functional despite resource limitations that precluded formal structure establishment. This finding resonates with research in developing country contexts documenting how resource constraints necessitate organizational innovation (Joshi & Khatiwada, 2024).

This study diverges from prior research emphasizing infrastructure as the primary barrier to technology integration. While studies accurately identify obstacles such as limited technological resources and insufficient technical support (Tosuntaş et al., 2019; Abedi et al., 2023), they may underestimate leadership's compensatory capacity. SDN 1 Padaasih's success despite minimal infrastructure demonstrates that intensive principal engagement and teacher motivation cultivation can substantially mitigate resource limitations. This repositions infrastructure as one variable among several, with leadership quality potentially exerting greater influence on implementation outcomes.

The contrasting motivational strategies employed at the two schools illuminate important nuances regarding teacher engagement. At SDN 1 Pasirwangi, systemic supports and collaborative cultures fostered intrinsic motivation through collective efficacy development, aligning with research demonstrating that transformational leadership enhances teacher innovation by creating supportive environments (Supermane, 2019). The principal's emphasis on psychological safety—explicitly normalizing help-seeking and question-asking—directly addressed teachers' fear of technological incompetence exposure, a known barrier to technology adoption (Fernández-Batanero et al., 2021).

Conversely, SDN 1 Padaasih's principal achieved comparable motivational outcomes through intensive personal engagement rather than systemic structures. This approach particularly benefited teachers experiencing high anxiety regarding technological change, providing immediate emotional support alongside technical guidance. The principal's visible participation in teachers' digital work

modeled vulnerability and perseverance, qualities identified by Vermeulen et al. (2022) as characteristic of transformational leaders who foster teacher innovation. The unexpected finding regarding age and digital competence non-correlation reinforces that motivation and support quality supersede demographic factors, contradicting assumptions treating younger teachers as inherently more technologically capable and suggesting that age-inclusive approaches avoiding generational stereotypes may prove more effective.

Theoretically, this study enriches POAC management theory by demonstrating its applicability across diverse educational contexts and establishing that adaptive implementation rather than rigid adherence determines effectiveness. Practically, the study offers school leaders concrete models for digital transformation under varying resource conditions. Schools with adequate infrastructure can implement structured ICT support teams and formal monitoring systems as demonstrated at SDN 1 Pasirwangi. Schools facing resource constraints can adopt creative adaptation strategies and intensive personal engagement approaches as exemplified at SDN 1 Padaasih. Both pathways require principals to prioritize teacher motivation cultivation, provide consistent support, and maintain solution-oriented supervision emphasizing development over compliance.

For education policymakers, the findings suggest that digital transformation initiatives should allocate resources to principal leadership development alongside infrastructure provision. While infrastructure remains important, leadership capacity to adapt management strategies and foster teacher motivation may yield greater returns on investment. Professional development programs for principals should emphasize adaptive management skills, transformational leadership competencies, and creative resource utilization strategies rather than assuming that infrastructure provision alone ensures successful implementation.

This study's limitations warrant acknowledgment. The research examined only two elementary schools in a single Indonesian regency, limiting generalizability across diverse educational contexts, administrative levels, and cultural settings. Case study methodology provides rich contextual understanding but cannot establish causal relationships or quantify effect sizes. The two-month data collection period captured implementation processes but could not assess long-term sustainability of the observed practices. Future research should employ longitudinal designs tracking digital transformation outcomes over multiple years to determine whether initial effectiveness persists or requires ongoing leadership intervention. Additionally, quantitative studies measuring relationships between specific POAC implementation dimensions and teacher effectiveness metrics could complement this study's qualitative findings.

Particularly valuable would be research examining how principal turnover affects digital transformation sustainability, as both schools' successes appear highly dependent on current principals' sustained engagement. Studies investigating organizational factors enabling successful leadership transitions would provide crucial insights for sustainable digital transformation. Finally, research exploring student learning outcomes associated with improved teacher administrative effectiveness would strengthen the argument for prioritizing digital administrative systems, connecting teacher efficiency gains to ultimate educational quality improvements.

This study's conceptual contribution resides in demonstrating that POAC management principles, when adaptively implemented, enable effective digital transformation across resource contexts that previous literature might characterize as success versus failure scenarios. The findings challenge implicit assumptions that adequate infrastructure constitutes a prerequisite for digital administrative effectiveness, instead positioning adaptive leadership as the critical variable determining whether available resources—however limited—translate into teacher competence development. By comparing two successful cases with divergent resource profiles, the study identifies leadership adaptability, teacher motivation cultivation, and solution-oriented supervision as transferable success factors applicable across contexts.

## CONCLUSION

This study concludes that principals' adaptive implementation of POAC management principles constitutes the decisive factor in enhancing teachers' digital administrative effectiveness, transcending resource availability constraints. Through comparative analysis of SDN 1 Pasirwangi and SDN 1 Padaasih, the research demonstrates that systematic planning, effective organizing, strategic actuating, and solution-oriented controlling enable successful digital transformation across divergent technological contexts. The study's theoretical contribution lies in extending POAC theory by empirically validating its applicability and adaptability in contemporary digital educational settings, challenging infrastructure-centric assumptions prevalent in technology integration literature. Methodologically, the comparative case study approach illuminated how context-specific leadership adaptations achieve equivalent effectiveness outcomes, revealing that transformational leadership qualities—particularly teacher motivation cultivation and intensive personal engagement—compensate for resource limitations. These findings carry significant practical implications for educational administrators and policymakers, suggesting that leadership development investments may yield greater returns than infrastructure provision alone. Schools can adopt either structured support systems or intensive personal engagement models depending on their resource profiles, provided principals maintain focus on teacher psychological safety, collaborative cultures, and continuous formative feedback. However, this study's limitations include restricted geographical scope, potential principal-dependency of observed practices, and short-term observation periods that cannot assess long-term sustainability. Future research should employ longitudinal designs examining digital transformation sustainability beyond individual leadership tenures, quantitative studies measuring relationships between specific POAC dimensions and effectiveness metrics, and cross-cultural comparative analyses validating findings across diverse educational systems. Such investigations would strengthen the theoretical framework while providing practical guidance for sustainable educational digital transformation globally.

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