



Digital-Based Student Administration Services and Principals' Digital Competence in Elementary Schools of Alu District

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ABSTRACT

The integration of digital technology into school administration is essential for improving efficiency and educational service quality, yet research on digital student administration in rural elementary schools remains limited. This study examined the implementation of digital-based student administration services in elementary schools in Region I of Alu District, Indonesia, focusing on administrative practices, principals' digital competence, supporting and inhibiting factors, and service quality. A qualitative case study was conducted with eight principals and fifty-six teachers selected through purposive sampling. Data were collected through observations, interviews, and documentation and analyzed using the interactive model of Miles, Huberman, and Saldaña. The findings showed that digitalization has been implemented across student admission, data management, transfer administration, learning support, evaluation, reporting, counseling, and graduation services. Its implementation was supported by principals' digital competence, infrastructure, government support, and human resources, while internet limitations, inadequate devices, and uneven digital skills remained key challenges. Overall, digital-based student administration improved efficiency, data accuracy, information accessibility, and educational service quality, underscoring the importance of principals' digital competence in sustaining digital transformation in rural elementary schools.

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1. INTRODUCTION

The rapid advancement of information and communication technology (ICT) has fundamentally transformed educational systems worldwide. Schools are increasingly expected to integrate digital technologies not only into teaching and learning processes but also into administrative and managerial functions to improve institutional effectiveness, efficiency, transparency, and accountability. Digital transformation in education refers to the systematic integration of digital technologies into educational governance, learning environments, and administrative services to create more responsive, data-driven, and sustainable educational systems (OECD, 2023; UNESCO, 2023, 2024). Rather than representing merely the adoption of technological tools, digital transformation involves organizational, managerial, and cultural changes that improve the quality of educational services and institutional performance (Ahn & Nyström, 2024).

According to UNESCO (2023), technology should serve education, not education serve technology, emphasizing that digital innovation should enhance educational quality, equity, governance, and learning outcomes rather than becoming an end in itself. Similarly, the OECD (2023) argues that effective digital education ecosystems integrate digital infrastructure, student information systems, learning management systems, digital assessment platforms, and competent human resources to support evidence-based decision-making and continuous institutional improvement. These perspectives indicate that digital transformation is a comprehensive organizational process requiring appropriate governance, leadership, and digital competence (Aspandi & Muttaqin, 2025; Bond *et al.*, 2023).

Within educational management, student administration represents one of the most critical components because it encompasses administrative services from student admission to graduation. Effective student administration ensures accurate data management, timely reporting, efficient service delivery, and informed decision-making. The transition from conventional paper-based administration to integrated digital systems has enabled schools to improve data accuracy, reduce administrative workload, facilitate real-time information access, and strengthen institutional accountability. Recent studies have also demonstrated that digital transformation positively influences teachers' professional competence, technological literacy, and institutional effectiveness by creating more efficient administrative and educational processes (Kabakus *et al.*, 2025; Marnoko, 2025).

In Indonesia, the implementation of digital educational administration has been supported through national information systems such as Dapodik, E-Rapor, and ARKAS, which facilitate student data management, academic reporting, financial planning, and educational monitoring (Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi., 2024). These initiatives are aligned with the national vision of accelerating digital transformation to improve public services, including education, through integrated digital ecosystems and data-driven governance. Despite these developments, the implementation of digital student administration remains uneven, particularly in rural elementary schools where technological infrastructure, internet connectivity, and digital competence vary considerably (Castaño-Muñoz *et al.*, 2025; Li, 2025; Ndjama, 2025). This disparity highlights the need to examine how digital administration is implemented in rural school contexts and the factors that influence its effectiveness.

Previous studies have predominantly examined digital learning, educational technology integration, or teachers' digital competence, whereas limited attention has been given to the comprehensive implementation of digital student administration services and the role of principals' digital competence in supporting educational transformation at the primary school

level (Lukman & Yune, 2025; Tondeur *et al.*, 2023). Addressing this research gap, the present study investigates digital-based student administration services in elementary schools in Region I of Alu District, Indonesia. Specifically, the study examines information technology development, school administrative transformation, digital student administration, principals' digital competence, and their implications for improving the effectiveness, efficiency, and quality of educational services.

2. METHODS

This study employed a qualitative case study approach to examine the implementation of digital-based student administration services and principals' digital competence in eight elementary schools in Region I of Alu District, Polewali Mandar Regency, West Sulawesi, Indonesia. A total of 18 participants, consisting of eight principals and fifty-six teachers, were selected through purposive sampling based on their involvement in school administration. Data were collected through observations, semi-structured interviews, and documentation to explore digital administrative practices, supporting and inhibiting factors, and their impact on educational service quality. The data were analyzed using the interactive model of Miles, Huberman, and Saldaña, which includes data condensation, data display, and conclusion drawing and verification. To ensure the trustworthiness of the findings, source and technique triangulation, member checking, and audit trail procedures were employed.

The collected data were analyzed using the interactive model proposed by Miles, Huberman, and Saldaña, which consists of data condensation, data display, and conclusion drawing and verification (Qomaruddin & Sa'diyah, 2024). During the data condensation stage, interview transcripts, observation notes, and documentation records were organized, coded, and categorized according to the research objectives. The categorized data were subsequently displayed in descriptive narratives and analytical matrices to facilitate interpretation. Conclusions were drawn through continuous comparison of findings from different data sources and were verified throughout the research process to ensure consistency and accuracy. This iterative analytical process enabled the researchers to identify recurring patterns, relationships, and emerging themes across participants' responses. The integration of multiple data sources also strengthened the credibility of the findings by ensuring that the interpretations were supported by converging evidence.

To maintain the confidentiality of participants, all interview data were anonymized using identification codes. The code P refers to Principal, while T refers to Teacher. The accompanying number indicates the sequence of participants involved in the study. Therefore, P1–P8 represent the eight participating principals, whereas T1–T8 represent the fifty-six participating teachers. These codes are used consistently throughout the Results and Discussion sections when presenting interview excerpts.

To ensure trustworthiness, the study employed source triangulation, technique triangulation, member checking, and audit trail procedures. Source triangulation was conducted by comparing information obtained from principals, teachers, observations, and documentation. Technique triangulation involved comparing findings derived from different data collection methods. Member checking was carried out by confirming interview interpretations with participants, while audit trails were maintained to document the research process systematically. These strategies enhanced the credibility, dependability, confirmability, and transferability of the research findings can be seen **Figure 1**.

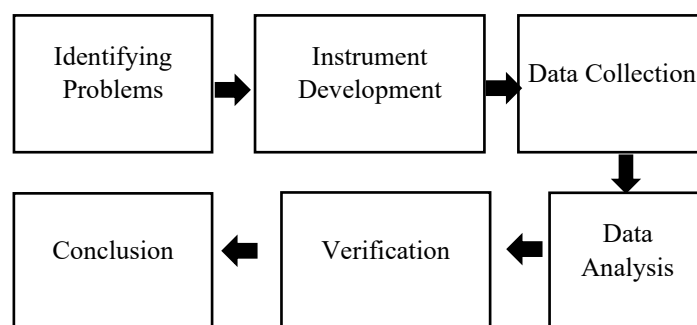


Figure 1. Research procedure

3. RESULTS AND DISCUSSION

3.1. Implementation of Digital-Based Student Administration Services

The findings indicate that elementary schools in Region I of Alu District have gradually implemented digital-based student administration services in various aspects of school management. The implementation covers student admission, student data management, transfer administration, daily administrative services, learning support, evaluation and reporting, counseling services, and graduation administration. Although the level of implementation varies among schools, digital technology has become an important component of administrative management and educational service delivery.

The implementation of digital-based student administration services reflects broader efforts to modernize educational management practices in elementary schools. Digital technologies enable schools to manage administrative processes more efficiently by reducing paperwork, accelerating information exchange, and improving data accessibility. In addition, the use of digital systems contributes to greater transparency and accountability because administrative records can be stored, updated, and monitored systematically. These advantages demonstrate that digital transformation is not merely a technological change but also an organizational strategy aimed at improving the quality of educational services and institutional performance.

One of the most visible forms of digital transformation is the use of Dapodik as the primary database for managing student information. Schools utilize Dapodik to record student identities, family information, enrollment status, academic records, and transfer administration (Ministry of Education, Culture, Research, and Technology, 2024). Teachers reported that the system facilitates data storage, retrieval, and reporting processes, thereby improving administrative efficiency and data accuracy. The use of cloud-based platforms such as Google Drive further supports document storage and information accessibility.

The utilization of Dapodik has significantly improved the quality of student data management across all eight participating schools. All principals reported that centralized digital records enabled administrators to access accurate and up-to-date student information more efficiently than the previous paper-based system. They also indicated that reliable digital data supported planning and decision-making by facilitating the identification of student needs, monitoring enrollment trends, and preparing administrative reports. Furthermore, participants consistently stated that digital databases reduced the risk of data loss and duplication, which had been common in conventional administrative practices.

“Student data are managed through Dapodik, student verification systems, and cloud-based storage platforms such as Google Drive.” (T1)

The findings suggest that digital administration contributes to more systematic and reliable student data management. This finding supports the argument of UNESCO (2023) that digital

information systems enhance institutional efficiency and strengthen educational governance through better data management practices.

These findings also indicate that digital information systems function as strategic resources for educational improvement. Beyond supporting administrative activities, digital data provide valuable information that can be utilized for monitoring educational outcomes and evaluating school performance. As schools increasingly rely on data-driven management approaches, the ability to manage and interpret digital information becomes essential for achieving organizational effectiveness and continuous improvement.

In addition to student data management, schools have begun implementing digital systems for student admission processes. Several schools utilize electronic registration forms and digital documentation to facilitate admissions. Participants indicated that digital admission services simplify data collection and reporting procedures while reducing administrative workload.

The implementation of digital admission systems has provided significant benefits for schools in managing prospective student registration. Compared with conventional admission procedures, digital registration allows information to be collected more systematically and efficiently. Electronic forms facilitate data verification and minimize errors that may occur during manual data entry. In addition, digital records can be stored securely and accessed whenever needed, improving the continuity and reliability of administrative processes. These findings indicate that digital admission services contribute to more efficient educational management while supporting transparency and accountability in student enrollment procedures.

"Online admission systems are very helpful because they simplify data collection and reporting processes." (P1)

Although digital admission systems offer numerous advantages, their implementation remains influenced by external factors. Several participants emphasized that parents' digital literacy and access to technological devices affect the effectiveness of online registration processes. In rural areas, some families continue to experience difficulties in utilizing digital platforms due to limited internet access and inadequate technological resources. Therefore, schools frequently combine digital and conventional procedures to ensure that all prospective students receive equal opportunities to access educational services.

Despite these benefits, implementation challenges remain, particularly in relation to parents' digital literacy and unequal access to digital devices. These findings are consistent with Rogers' (2003) Diffusion of Innovation Theory, which emphasizes that successful adoption of technological innovations depends on users' readiness and access to supporting resources.

Digital transformation has also influenced teaching and learning support services. Schools increasingly utilize laptops, projectors, smart televisions, and Chromebooks for instructional purposes. Teachers reported that digital tools facilitate lesson preparation, student assessment, and classroom management.

Observation data indicated that all eight participating schools had implemented E-Rapor for student assessment and reporting. Interview data further revealed that the majority of teachers perceived digital reporting systems as reducing the time needed to calculate grades and prepare report cards. Participants consistently emphasized that automated data processing minimized administrative errors and improved the accuracy of academic records.

"Digital systems greatly assist teaching and learning processes in the classroom." (T1)

The findings further that digital technologies facilitate communication between schools and parents regarding students' academic progress. Through digital reporting systems and

online communication platforms, information can be shared more quickly and effectively. This enhanced communication strengthens collaboration among educational stakeholders and supports more responsive interventions when students encounter academic or behavioral difficulties.

Interview data from teachers consistently indicated that digital technologies support classroom teaching and learning activities. For example, Teacher 1 (T1) stated,

"Digital systems greatly assist teaching and learning processes in the classroom." Similarly, Teacher 18 (T18) explained,

"Preparing learning materials and recording students' progress have become much easier because everything is managed digitally."

These interview findings were consistent with classroom observations conducted in all eight participating schools, which showed that teachers routinely used digital applications, including Microsoft Office, Google Drive, Smart TVs, LCD projectors, and E-Rapor to support instructional activities. Documentary evidence, such as lesson plans, digital attendance records, and electronic assessment reports, further confirmed the integration of digital technologies into classroom practices.

The integration of digital technology into administrative and instructional activities reflects a broader transformation toward data-driven and technology-enhanced educational management. Similar findings were reported by OECD (2023), which highlighted the role of digital ecosystems in improving institutional effectiveness and educational service delivery can be seen table 1.

Table 1. Scope of digital student administrative services across participating schools

Digital Administrative Services	School 001	School 004	School 014	School 018	School 019	School 023	School 034	School 035
Digital student enrollment (PPDB)	✓	✓	✓	✓	✓	✓	✓	✓
Student database (Dapodik)	✓	✓	✓	✓	✓	✓	✓	✓
Student transfer administration	✓	✓	✓	✓	✓	✓	✓	✓
Daily attendance management	✓	✓	✓	✓	✓	✓	✓	✓
Digital assessment (E-Rapor)	✓	✓	✓	✓	✓	✓	✓	✓
Counseling records	✓	✓	✓	△	✓	△	✓	△
Graduation and alumni records	✓	✓	✓	✓	✓	✓	✓	✓

Note: ✓ = Implemented; △ = Partially implemented

Table 1. demonstrates that all participating schools have implemented digital administrative services for student enrollment, student databases, attendance management, assessment, and reporting. However, counseling services remain partially digitalized in several schools, indicating that the implementation of digital administration has not yet reached the same level across all service components. These findings suggest that while digital transformation has become an integral part of school administration, some areas still require further technological integration can be seen **Figure 2**.

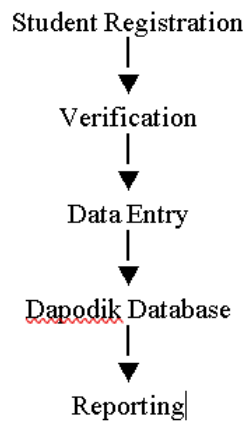


Figure 2. Digital workflow for student enrolment

As presented in **Table 2** and **Figure 2**, digital technologies have been integrated into multiple administrative processes, including student enrollment, student data management, assessment, and reporting. The digital workflow demonstrates how administrative information flows from student registration to centralized data storage in Dapodik before being used for reporting and decision-making. This integration reflects a broader transformation toward data-driven and technology-enhanced educational management. Similar findings were reported by OECD (2023), which highlighted the role of digital ecosystems in improving institutional effectiveness and educational service delivery.

Another important aspect of digital administration concerns counseling and student support services. Although counseling activities are still primarily conducted through direct interaction, digital communication platforms such as WhatsApp and online messaging applications have become valuable tools for maintaining communication among teachers, students, and parents. These technologies facilitate information sharing, consultation, and follow-up activities related to students' academic and personal development. As a result, digital communication contributes to more responsive and accessible student support services within schools.

Digital-Based Student Administration Services in Elementary Schools are supported by several electronic devices and supporting applications as in the following Figure 3.



Figure 3. Service supporting devices and applications

Overall, the findings demonstrate that digital-based student administration services have become an integral component of educational management in elementary schools. The integration of digital technologies across administrative, instructional, and communication processes supports more efficient service delivery, enhances data accuracy, and strengthens institutional accountability. These outcomes indicate that digital transformation has the potential to improve both organizational performance and educational service quality in rural school settings.

The findings reveal that principals' digital competence constitutes a key factor influencing the implementation of digital-based student administration services. Four dimensions of competence emerged from the data analysis: technical competence, data-driven managerial competence, digital pedagogical leadership, and transformational readiness.

The findings indicate that principals' digital competence consists of four interrelated dimensions: technical competence, managerial competence, digital pedagogical leadership, and readiness for digital transformation. This finding was consistently supported by both principals and teachers. One principal explained, "A principal must not only know how to operate digital applications but also ensure that teachers are able to use them effectively in their daily administrative work" (P2). Another principal similarly stated, "Digital competence is reflected in our ability to manage school data, supervise digital administration, and encourage teachers to adopt technology" (P6). This view was reinforced by a teacher who commented, "The principal always motivates us to use digital platforms and provides guidance whenever we encounter difficulties" (T11). Another teacher added, "Our principal regularly monitors the use of digital applications and encourages continuous learning among teachers" (T24). These findings suggest that principals' digital competence extends beyond technical skills and includes managerial, pedagogical, and leadership capacities that enable effective organizational transformation. In the context of educational digitalization, principals are expected not only to use technology but also to create an environment that encourages teachers and staff to adopt digital innovations in their daily practices. Consequently, digital competence has become an essential requirement for effective educational leadership in the twenty-first century.

Technical competence refers to principals' ability to utilize digital devices and educational applications effectively. Most principals demonstrated proficiency in operating computers, administrative software, and educational management systems such as Dapodik, E-Rapor, and ARKAS. This competence enabled them to supervise digital administrative processes and support technology integration within schools.

The findings indicate that technical competence serves as the foundation for digital leadership (Zhao & Fu, 2024). Principals who possess adequate technological skills are better equipped to understand digital administrative processes and provide guidance to teachers and school staff. Their familiarity with educational applications allows them to monitor administrative activities more effectively and address technical challenges encountered during implementation. Furthermore, technical competence increases principals' confidence in promoting technological innovation and encourages broader acceptance of digital systems within the school community.

"We use Dapodik, Microsoft Word, Microsoft Excel, and several other digital applications to support school administration." (P2)

These findings are consistent with contemporary perspectives on digital competence, which emphasize the importance of technological literacy among educational leaders. The ability to operate and manage digital applications enables principals to support organizational efficiency and ensure that technological resources are utilized optimally. Therefore, technical

competence should be viewed as a prerequisite for successful digital transformation within educational institutions.

Beyond technical skills, principals demonstrated data-driven managerial competence by utilizing digital information for planning, monitoring, evaluation, and decision-making. Student records, attendance reports, and academic achievement data were frequently used as evidence in managerial processes.

Data-driven managerial competence emerged as a particularly important aspect of digital leadership. The findings suggest that principals increasingly rely on digital information when identifying educational needs, monitoring school performance, and developing improvement programs. The availability of accurate and up-to-date data allows school leaders to make more objective decisions and allocate resources more effectively. As a result, digital information systems contribute not only to administrative management but also to strategic planning and institutional development.

The findings further indicate that principals function as digital pedagogical leaders by encouraging teachers to participate in technology training programs and professional learning activities. Through continuous support and supervision, principals contribute to the development of a digital culture within schools.

Digital pedagogical leadership is reflected in principals' efforts to create learning environments that encourage innovation and continuous professional development. Participants reported that principals actively support teacher participation in workshops, training programs, and collaborative learning activities related to educational technology. These initiatives not only improve teachers' digital competencies but also promote the integration of technology into instructional practices. Consequently, principals play a crucial role in fostering a school culture that values innovation, collaboration, and lifelong learning.

"ICT training programs are implemented periodically to improve teachers' technological capabilities." (P1)

The findings suggest that digital pedagogical leadership extends beyond administrative supervision. Principals act as facilitators of professional growth by providing opportunities for teachers to develop their technological knowledge and skills. This role is particularly important in rural schools, where access to professional development opportunities may be more limited than in urban educational settings.

These findings support Hallinger's educational leadership framework, which emphasizes the strategic role of instructional leadership in promoting educational innovation and organizational improvement.

Another significant dimension identified in this study is transformational readiness. The findings indicate that principals generally demonstrate positive attitudes toward technological change and recognize the importance of digital transformation for improving educational services. Their willingness to adopt innovation encourages teachers and staff to participate in organizational change processes. This readiness is particularly important because digital transformation often requires adjustments in work practices, communication patterns, and institutional culture.

Taken together, the four dimensions identified in this study—technical competence, data-driven managerial competence, digital pedagogical leadership, and transformational readiness—form an integrated framework of principals' digital competence. These dimensions interact with one another and collectively influence the effectiveness of digital administration implementation. Principals who demonstrate competence across these dimensions are better positioned to lead digital transformation initiatives and improve the quality of educational services in their schools can be seen **Table 2**.

Table 2. Dimensions of principals’ digital competence

Dimension	Key Indicators
Technical Competence	Operation of computers, educational software, and digital platforms
Data-Driven Managerial Competence	Utilization of digital information for planning and decision-making
Digital Pedagogical Leadership	Support for teachers’ technology integration and professional development
Transformational Readiness	Commitment to innovation and organizational digital transformation

Source: Research Findings (2026)

The study identified several factors that support the implementation of digital-based student administration services. Technological infrastructure, including computers, laptops, internet connectivity, and digital applications, was considered the most important enabling factor. Participants also highlighted the role of principal leadership, government assistance, and the availability of competent teachers and school operators.

Among the identified supporting factors, technological infrastructure emerged as the most fundamental requirement for successful digital transformation. The availability of computers, internet access, and educational applications enables schools to implement digital administrative services more effectively. Without adequate infrastructure, even highly motivated school personnel may encounter difficulties in utilizing digital technologies. Therefore, infrastructure development should be considered a strategic investment for improving educational management and service delivery.

Leadership support also plays a critical role in determining the success of digital transformation initiatives. The findings indicate that principals who actively encourage technology utilization and provide continuous supervision create more favorable conditions for innovation. Their commitment influences teachers’ willingness to adopt digital practices and contributes to the establishment of a school culture that values technological development. This finding reinforces the argument that leadership remains one of the most important determinants of organizational change in educational settings.

Government assistance and human resource capacity were also identified as important enabling factors. Support from educational authorities through technology programs, internet facilities, and training opportunities provides schools with additional resources for digital development. At the same time, the presence of competent teachers and school operators facilitates the implementation of digital administration because technological knowledge can be shared and applied more effectively across the organization (Khalis, 2025).

However, several challenges continue to hinder implementation. The most significant obstacles include limited internet connectivity, insufficient technological devices, unequal digital competencies among teachers, and dependence on school operators for technical administrative tasks.

Despite substantial progress, digital transformation remains a complex process that involves various organizational and contextual challenges. Internet connectivity continues to be a major concern, particularly in rural areas where network coverage and service quality may be inconsistent. Participants emphasized that unstable internet access often disrupts administrative activities and limits the utilization of online applications. Consequently, technological infrastructure alone is insufficient unless supported by reliable connectivity.

Another important challenge concerns disparities in digital competence among educational personnel. While some teachers demonstrate strong technological skills, others

continue to experience difficulties in operating digital systems. These differences influence the consistency of implementation and may create dependence on a limited number of technologically competent individuals, particularly school operators. Therefore, continuous professional development programs are necessary to ensure that digital competencies are distributed more evenly across school personnel.

“Internet limitations greatly affect the implementation of digital administration in our school.” (P1)

These findings confirm previous studies suggesting that successful digital transformation requires not only technological resources but also organizational readiness and human resource development.

Overall, the findings suggest that supporting and inhibiting factors should not be viewed separately, see **Table 3**. Instead, they interact dynamically and collectively influence the success of digital transformation initiatives. Schools that possess adequate infrastructure, effective leadership, and competent human resources are generally better positioned to overcome implementation challenges and sustain digital innovation over time.

Table 3. Supporting and inhibiting factors

Supporting Factors	Inhibiting Factors
Technological infrastructure	Limited internet connectivity
Principal leadership	Insufficient digital devices
Government support	Unequal digital competence
Human resource capacity	Dependence on school operators

3.2. Proposed Conceptual Model and Discussion

Based on the findings, this study proposes a conceptual model demonstrating that principals’ digital competence serves as the primary driver of digital-based student administration services. The model suggests that effective digital leadership facilitates the implementation of digital administration systems, which subsequently improve administrative efficiency, information accessibility, and educational service quality.

The proposed model highlights the central role of school leadership in translating technological resources into meaningful organizational outcomes. Although infrastructure and digital applications provide the necessary technological foundation, their effectiveness largely depends on how school leaders utilize and manage these resources. Principals with strong digital competencies are more capable of encouraging innovation, coordinating stakeholders, and ensuring that digital technologies are integrated into daily administrative practices (Tawil & Al-Tarawneh, 2026).

This model extends previous studies on digital leadership by integrating leadership competence and administrative digitalization within a single framework. From a theoretical perspective, the model contributes to the growing literature on digital leadership and educational management by demonstrating the interconnected relationship between leadership competence, digital administration, and educational service quality. Have often examined these variables separately, whereas the present study integrates them into a comprehensive framework that reflects the realities of rural elementary schools.

From a practical perspective, the model provides guidance for policymakers, educational authorities, and school leaders seeking to strengthen digital transformation initiatives. The findings suggest that investments in technology should be accompanied by efforts to enhance principals’ digital competencies, improve professional development opportunities, and expand access to reliable technological infrastructure. Such integrated

strategies are more likely to produce sustainable improvements in educational management and service quality.

The findings demonstrate that digital transformation in rural elementary schools is not merely a technological issue but also a leadership and organizational development process (Handayani *et al.*, 2025). Therefore, strengthening principals' digital competence should become a strategic priority in educational reform initiatives.

The conceptual model developed in this study may also serve as a foundation for future research. Quantitative studies could be conducted to test the relationships among digital competence, administrative digitalization, and educational service quality using larger samples and different educational contexts. From **Figure 3.**, such investigations would contribute to a deeper understanding of how digital leadership influences organizational performance and educational outcomes.

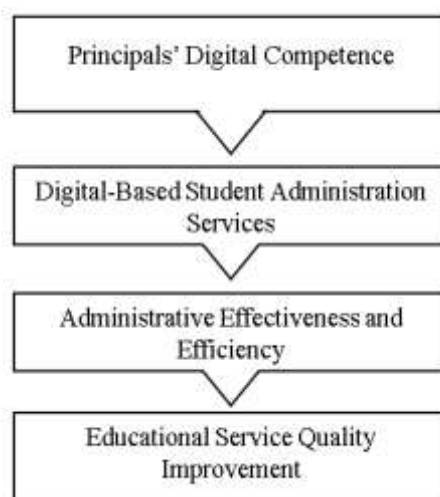


Figure 3. Proposed conceptual model of digital-based student administration services

4. CONCLUSION

This study examined the implementation of digital-based student administration services in elementary schools in Region I of Alu District and explored the role of principals' digital competence in supporting digital transformation. The findings indicate that digital administration has been implemented across various aspects of student management, including student admission, student data management, transfer administration, learning support, evaluation and reporting, counseling services, and graduation administration. The implementation of digital systems has improved administrative efficiency, enhanced data accuracy, facilitated information accessibility, and contributed to the overall quality of educational services.

The study demonstrates that principals' digital competence is critical to implementing digital-based student administration services. Four competency dimensions were identified: technical competence, data-driven managerial competence, digital pedagogical leadership, and transformational readiness. Implementation was supported by infrastructure, leadership, government assistance, and human resources, while limited internet access, inadequate devices, and unequal digital competencies remained key challenges. The study proposes a conceptual model positioning principals' digital competence as a key driver of sustainable digital transformation in rural elementary schools, offering practical insights for policymakers, school leaders, and educational institutions.

This study contributes to the literature on digital leadership by integrating principals' digital competence and digital-based student administration services into a single conceptual framework. It also offers practical guidance for developing sustainable digital transformation strategies in rural elementary schools.

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6. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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