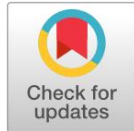


<https://research.adra.ac.id/index.php/ijen/>
P - ISSN: 2988-1579
E - ISSN: 2988-0092



From Mud to Megabytes: A Narrative Journey of Digital Transformation and Data Management Resilience at SD Negeri Tambakrejo 03 Semarang

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ABSTRACT

Background. Digital transformation requires schools to manage information efficiently and securely. However, many elementary schools still rely on fragmented paper-based records that are vulnerable to loss and damage. At SD Negeri Tambakrejo 03 Semarang, recurring floods exposed the fragility of conventional data management and highlighted the need for a more resilient digital solution.

Purpose. This study aimed to develop the Pusporejotiga application as an integrated platform for school data management and to evaluate its feasibility, practicality, and effectiveness.

Method. This study employed a Research and Development (R&D) approach using the Borg and Gall model. The research involved the principal, teachers, and administrative staff. Data were collected through interviews, observations, questionnaires, and documentation and analyzed using qualitative and quantitative techniques.

Results. The Pusporejotiga application achieved a feasibility score of 90%, indicating that it was highly suitable for implementation. User evaluations produced an average practicality score of 4.46 out of 5, demonstrating a very high level of usability. The average effectiveness score increased from 53.8 before implementation to 89.0 after implementation, representing a 65.4% improvement. The application improved data accessibility, information organization, reporting efficiency, and data security while reducing administrative workload. It also transformed a context characterized by document vulnerability and fear of data loss into a model of digital resilience.

Conclusion. The Pusporejotiga application effectively supports digital transformation and strengthens organizational resilience. The model provides a practical framework for protecting educational data and improving administrative performance, particularly in schools facing environmental risks such as flooding.

KEYWORDS

Digital School Administration, Education Management Information System, School Data Management

Citation: Setianingsih, Y. W., Nurkolis, Nurkolis., Prayito, M., & Waewchimplee, W. (2026). From Mud to Megabytes: A Narrative Journey of Digital Transformation and Data Management Resilience at SD Negeri Tambakrejo 03 Semarang. *International Journal of Educational Narrative*, 4(3), 849–863.

<https://doi.org/10.70177/ijen.v4i3.3530>

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Received: February 11, 2026

Accepted: April 15, 2026

Published: June 27, 2026



INTRODUCTION

The rapid advancement of information and communication technology has accelerated digital transformation across various sectors, including education. Schools are increasingly required to manage information efficiently and accurately to support data-driven decision-making. Digital transformation in education extends beyond the use of instructional technologies and includes the

modernization of governance, administration, and information management practices (Aldosemani, 2022; Ouyang & Bai, 2026; Scherer et al., 2019). The digitalization of educational administration has been shown to improve operational efficiency, transparency, and the quality of educational services (Alias et al., 2026; Pettersson et al., 2024; Sun et al., 2026).

Data management is a strategic component of effective and accountable educational administration. Accurate and accessible data are essential for program planning, performance evaluation, stakeholder reporting, and evidence-based policy development. Educational information systems enable the integration of student, teacher, infrastructure, academic, and administrative data within a single platform, facilitating efficient access to information and supporting managerial processes (Ncube & Ngulube, 2025; Ouyang & Bai, 2026; Sun et al., 2026). Furthermore, the systematic use of data strengthens evidence-based decision-making and contributes to organizational effectiveness in schools (Mandinach & Schildkamp, 2021; Ouyang & Bai, 2026).

The successful implementation of digital systems in schools is strongly influenced by the leadership of school principals. Principals function as change agents who establish strategic direction, formulate supportive policies, and cultivate a technology-oriented organizational culture. Research has demonstrated that digital leadership significantly influences technology adoption and educational innovation (Gamage et al., 2026; Hasan, 2026; Koh et al., 2026; Shah & Mola, 2026). In addition, school leaders who embrace innovation can encourage collaboration, knowledge sharing, and organizational learning throughout the digital transformation process (Hamouche et al., 2026; Irby et al., 2022; Ullah et al., 2025).

Digital transformation in education also requires adaptive and visionary leadership. School leaders are expected not only to provide technological infrastructure but also to integrate technology into management and learning processes in a sustainable manner (Koh et al., 2026; Pettersson et al., 2024). Such integration contributes to the development of educational institutions that are responsive to changing technological and societal demands.

Despite the growing importance of digital transformation, many elementary schools continue to face challenges in managing educational data. Manual data processing and fragmented applications often result in duplicated work, reporting delays, and data loss. Ineffective information management practices can increase teachers' administrative workload and reduce the time available for instructional activities. Previous studies on digital transformation emphasize the need for systemic change to ensure that technological innovations are implemented comprehensively rather than in isolated or fragmented ways (Fagerlund et al., 2025; Sun et al., 2026).

Beyond technical considerations, data security and sustainability have become critical concerns, particularly for schools located in disaster-prone environments. Digitalization provides safer and more flexible mechanisms for storing, retrieving, and protecting information during unexpected disruptions. The resilience of educational organizations is increasingly linked to their ability to adapt to technological developments and environmental challenges (Virella & Zeisner, 2026).

This situation is particularly relevant to SD Negeri Tambakrejo 03 Semarang, a school located in an area that frequently experiences seasonal flooding. During one major flood event, water inundated several school facilities and damaged important administrative records, including student files, school archives, and planning documents that had been maintained in physical form. Some documents became unreadable, while others were permanently lost, creating substantial difficulties in administrative reporting, program planning, and managerial decision-making. The incident revealed the vulnerability of conventional paper-based data management and became a catalyst for organizational change. As strategic assets, school data must be protected and remain accessible to

support effective educational governance. Previous studies have demonstrated that digital transformation improves governance quality and organizational effectiveness in educational institutions (Alias et al., 2026; Atar et al., 2025; Kavak & Rusu, 2025).

To address these challenges, the Pusporejotiga application was developed as an integrated digital platform for managing school data. Web-based information systems have been shown to improve administrative efficiency, data accuracy, and service quality in educational settings (Pan, 2025; Sun et al., 2026). In addition, digital platforms facilitate real-time data management, enabling principals to perform planning, organizing, implementation, and supervision functions more effectively.

The literature indicates that digital transformation not only improves administrative efficiency but also contributes to overall organizational performance. Digital leadership has been identified as a key factor influencing educational quality, institutional performance, and the successful implementation of technology-based innovations in schools (AlDhaheri et al., 2026; Koh et al., 2026; Orkamo et al., 2025; Pettersson et al., 2024). Furthermore, digital transformation is an essential component of the broader shift toward technology-based education in the era of Industry 4.0 and Society 5.0, which requires the integration of technology, management, and organizational culture (Alias et al., 2026; Chotisarn & Phuthong, 2026; Vieira et al., 2026).

Previous studies have extensively examined educational information systems and digital transformation in schools. However, most investigations focus on the general implementation of digital technologies, institutional readiness, or digital leadership within secondary schools and higher education contexts (AlDhaheri et al., 2026; Koh et al., 2026; Orkamo et al., 2025; Pettersson et al., 2024). Existing research also tends to evaluate technology adoption after implementation rather than examining how digital solutions are developed in response to specific organizational problems. Moreover, studies that position digital transformation as a strategy for organizational resilience in schools facing environmental disruptions remain limited.

This study addresses these limitations by investigating the development of the Pusporejotiga application within the unique context of an elementary school affected by recurring floods and document loss. Unlike previous studies that primarily focus on technology adoption, this research examines how a locally developed digital solution emerged from a crisis situation and supported organizational resilience through improved data governance. Therefore, the novelty of this study lies in integrating digital transformation, educational data management, and organizational resilience within a disaster-prone elementary school setting.

Accordingly, this study aims to develop the Pusporejotiga application as a digital solution for school data management at SD Negeri Tambakrejo 03 Semarang and to evaluate the application in terms of validity, practicality, and effectiveness. The findings are expected to contribute to the advancement of educational information systems and provide practical insights for elementary schools undertaking digital transformation initiatives.

RESEARCH METHODOLOGY

This study employed a Research and Development (R&D) approach to develop and evaluate the Pusporejotiga application as a digital platform for school data management. The R&D approach was selected because it enables researchers not only to design an innovative product but also to assess its feasibility and effectiveness in real user contexts (Chotisarn & Phuthong, 2026b). Research and development in education aims to produce practical solutions that address actual problems through systematic validation and testing procedures.

The development model was adapted from Borg and Gall, consisting of ten stages: (1) preliminary information gathering, (2) planning, (3) initial product development, (4) preliminary field testing, (5) revision of the initial product, (6) main field testing, (7) operational product revision, (8) operational field testing, (9) final product revision, and (10) dissemination. This model remains widely applied in educational development studies because it ensures that products are systematically refined through iterative testing and evaluation (Chotisarn & Phuthong, 2026b; Winitisiri & Srikoon, 2026).

The preliminary information-gathering stage involved literature review, observation, interviews, questionnaires, and document analysis to identify problems and user needs related to data management. Needs analysis is an essential step in developing educational information systems because it ensures that the product reflects actual user requirements (Chotisarn & Phuthong, 2026b). During the planning stage, researchers formulated product specifications, system architecture, user requirements, and evaluation instruments.

The initial product was developed as a web-based application prototype according to the established design specifications. Previous studies have shown that web-based information systems improve administrative efficiency and data accuracy in educational institutions (Ferraioli et al., 2026; Gnambs et al., 2026).

Preliminary field testing was conducted on a limited scale involving five users consisting of the school principal, one administrative staff member, the school operator, and two teachers who regularly handled administrative data. The purpose of this stage was to identify technical issues, evaluate usability, and gather initial user feedback before wider implementation. During the trial, participants were asked to perform common data management tasks, including entering student data, updating teacher records, retrieving archived documents, and generating reports. Several technical constraints emerged during this stage, including inconsistencies in data-entry formats, difficulties in navigating certain menus, and delays in loading large document files. Users also suggested simplifying several interface features to improve accessibility. These findings provided important input for revising the application and enhancing system functionality prior to large-scale testing.

Following product revision, main field testing and operational field testing were conducted to evaluate application effectiveness under actual school conditions. Previous studies emphasize that iterative testing is essential for ensuring usability, system stability, and the long-term sustainability of educational technology implementation (Fang et al., 2026; Mohammadi et al., 2025). Feedback obtained during these stages was used to refine the platform before the final revision and dissemination process.

The study was conducted at SD Negeri Tambakrejo 03, Gayamsari District, Semarang City, over a seven-month period from July to December 2025. Research participants included the principal, teachers, administrative staff, and the school operator as the primary users of the appli (Emary et al., 2023) user perspectives.

Research instruments consisted of semi-structured interviews, observation sheets, expert validation forms, and documentation studies. Interviews were used to explore user experiences and needs related to data management, while observations were conducted to evaluate application use in practice. Expert validation forms assessed product quality in terms of usability, functionality, data security, and effectiveness in addressing administrative problems. Documentation studies provided supporting evidence such as school records, reports, and application usage data. The use of multiple instruments strengthened data validity through methodological complementarity (Emary et al., 2023).

Data collection techniques included interviews, observations, and documentation. Interviews were conducted during the needs-analysis stage to obtain detailed information regarding existing

data-management practices. Observations were carried out during both preliminary investigations and operational trials to identify technical issues and evaluate application performance. Documentation was used to collect supporting evidence, including administrative reports and records of system implementation.

Data were analyzed using qualitative and quantitative approaches. Qualitative analysis was applied to interview, observation, and documentation data to understand user experiences and implementation processes. Quantitative analysis was used to assess product feasibility and effectiveness based on validation and trial results. In educational development studies, data analysis serves to evaluate product quality, usability, and user acceptance (Chotisarn & Phuthong, 2026b).

To ensure data credibility, source triangulation was employed. Data obtained from different informants and collection methods were compared to develop a more accurate and comprehensive understanding of the research phenomenon. Triangulation has been recognized as an effective strategy for strengthening trustworthiness and validity in educational research (Emery et al., 2023). Through a systematic development process and multi-stage validation, this study sought to produce a feasible and effective digital platform that supports data management and strengthens organizational resilience in schools.

RESULT AND DISCUSSION

The research findings began with a needs analysis to identify problems related to data management at SD Negeri Tambakrejo 03 Semarang. Based on interviews and observations, school data management had previously been conducted manually and scattered across various physical documents and non-integrated digital files. This condition resulted in difficulties in data retrieval, delays in administrative reporting, and risks of data loss or damage due to environmental factors. Teachers and educational staff reported that administrative processes required considerable time because information had to be repeatedly entered and searched across multiple documents. The principal also experienced difficulties obtaining accurate and up-to-date information for program planning and decision-making.

The challenges became more evident following several flood incidents that affected the school. Important administrative documents were stored in physical archives, making them vulnerable to water damage and loss. As a result, retrieving historical records often became difficult and time-consuming. These conditions highlighted the need for a more resilient and integrated approach to data management. A summary of the initial conditions of school data management prior to application development is presented in Table 1.

Table 1. Summary of Needs Analysis Results

Aspect	Condition Before Development	Impact
Data storage	Manual documents and separate files	Risk of data loss
Data access	Not centralized	Slow and inefficient
Reporting	Manual process	Time-consuming
Data security	Low	Vulnerable to damage or loss
Decision-making	Based on limited data	Suboptimal

Table 1 indicates that the major problems were associated with fragmented data storage, limited accessibility, and weak data security. These findings confirmed the need for an integrated digital platform capable of improving efficiency, accessibility, and organizational resilience. Based on the needs analysis, a web-based prototype of the Pusporejotiga application was developed as an

integrated platform for managing school data. The application was designed to support administrative activities while ensuring that important records could be stored securely and accessed efficiently. The main features developed in the application are presented in Table 2.

Table 2. Main Features of the *Pusporejotiga* Application

No	Feature	Function
1	Student data	Storage and updating of student information
2	Teacher & staff data	Personnel information
3	Facilities and infrastructure	School inventory management
4	School administration	Academic and non-academic documents
5	Document storage	Digital archiving
6	Search system	Fast data access
7	User access rights	Role-based security

Table 2 shows that the application was designed comprehensively to accommodate various school administrative needs within a single platform. Among the developed features, the user access rights system played a particularly important role. This feature assigned different levels of authority to principals, teachers, administrative staff, and school operators. Such differentiation was necessary because users possessed varying levels of digital literacy and administrative responsibility. Without access restrictions, there would be a greater risk of accidental modification or deletion of important records. Through role-based access control, users could only access functions relevant to their duties, thereby improving security, reducing operational errors, and strengthening accountability in data management.

The initial product was subsequently validated by educational technology experts and school management practitioners to assess its feasibility prior to user trials. Expert evaluation results across various quality aspects of the application are presented in Table 3.

Table 3. Expert Validation Scores (Likert Scale 1–5)

Evaluation Aspect	Mean Score
Application usefulness	4.5
Ease of use	4.4
Feature completeness	4.6
Data security	4.3
Suitability to school needs	4.7

Table 3 indicates that all aspects received high scores, with an overall mean of 4.5, categorized as very good. The highest score was obtained for suitability to school needs (4.7), indicating that the application effectively addressed the challenges identified during the needs analysis stage. To provide a more quantitative assessment, feasibility was also calculated as a percentage, as shown in Table 4.

Table 4. Product Feasibility Percentage

Aspect	Percentage
Usefulness	90%
Ease of use	88%
Features	92%
Security	86%
Suitability to needs	94%
Average	90% (Very Feasible)

Table 4 demonstrates that the application achieved an overall feasibility score of 90%, placing it in the “very feasible” category. The highest percentage was observed for suitability to user needs

(94%), suggesting strong alignment between the developed features and actual school requirements. Following expert validation, the application was tested with users to determine its practicality. The practicality test involved nine respondents consisting of the principal, teachers, and administrative staff. The results are presented in Table 5.

Table 5. User Practicality Test Results (n = 9)

Aspect	Mean Score (1–5)	Category
Ease of use	4.4	Very good
Interface clarity	4.3	Good
Access speed	4.5	Very good
Work support	4.6	Very good
User satisfaction	4.5	Very good
Average	4.46	Very practical

Table 5 shows that the application achieved a very high level of practicality, with an average score of 4.46. The highest score was obtained for work support (4.6), indicating that users perceived the platform as highly beneficial in facilitating administrative activities.

The practicality findings were reinforced by user experiences during the operational trial. Several teachers reported significant changes in how they managed administrative information after using the application. One teacher explained:

“Previously, finding a student’s record could take several minutes because we had to search through folders and different files. With the Pusporejotiga application, I can find the same information in just a few seconds. It was surprising to see how much time could be saved.” (Teacher Interview, 2025)

Another teacher emphasized the benefits of centralized storage:

“Before the application was available, we often worried that documents might be misplaced or difficult to locate. Now all information is stored in one place, making our work much easier and more organized.” (Teacher Interview, 2025)

These testimonies suggest that the application improved not only technical efficiency but also users’ confidence and satisfaction in managing school information. An operational trial was subsequently conducted to assess effectiveness under actual school conditions. A comparison of conditions before and after implementation is presented in Table 6.

Table 6. Comparison Before and After Implementation

Aspect	Before	After
Data access speed	Slow	Fast
Data organization	Unstructured	Structured
Report preparation	Manual	Automated
Data security	Low	More secure
Work efficiency	Low	High

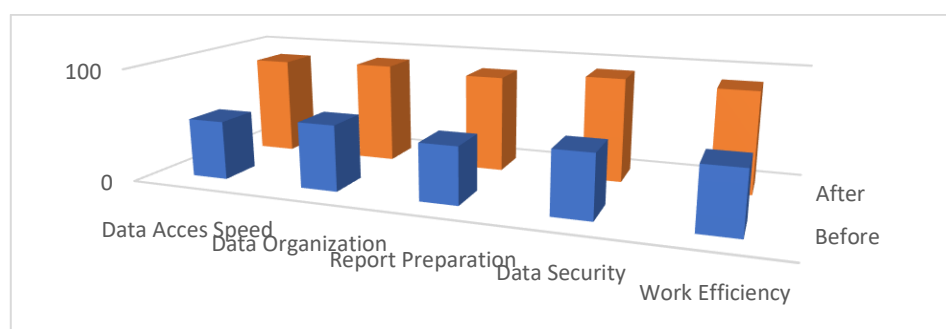
Table 6 indicates improvements in all aspects of school data management after implementation of the *Pusporejotiga* application. To further quantify effectiveness, scores before and after implementation were measured, as shown in Table 7.

Table 7. Effectiveness Scores Before and After Implementation

Aspect	Before	After
Data access speed	52	88
Data organization	58	90
Report preparation	50	86
Data security	55	92
Work efficiency	54	89

Table 7 shows consistent improvements across all effectiveness indicators. To provide a more comprehensive assessment, percentage increases were calculated for each aspect. Data access speed increased by 69.2%, data organization by 55.2%, report preparation by 72.0%, data security by 67.3%, and work efficiency by 64.8%. Overall, the average effectiveness score increased from 53.8 before implementation to 89.0 after implementation, representing an improvement of 65.4%.

The largest increase occurred in report preparation, suggesting that automated reporting features substantially reduced administrative workload. Significant improvements in data security and data organization indicate that the application effectively addressed long-standing challenges related to document storage and information retrieval. The visualization of effectiveness improvements before and after using the *Pusporejotiga* application is presented in Graph 1.

**Graph 1.** Effectiveness Scores Before and After Implementation

Graph 1 visually illustrates the substantial gains achieved after implementation of the *Pusporejotiga* application. The upward trend is evident across all measured indicators, demonstrating the consistency of the intervention's impact. The most notable improvements occurred in report preparation and data access speed, reflecting the benefits of centralized storage and automated administrative functions. Significant gains were also observed in data security and data organization, indicating that the application successfully addressed vulnerabilities associated with fragmented records and document loss.

The pattern presented in Graph 1 suggests that the application did not merely digitize existing administrative procedures but fundamentally transformed how information was stored, accessed, and utilized within the school. This finding is particularly important given the school's previous experiences with flood-related document damage. Consequently, the application contributed not only to administrative efficiency but also to organizational resilience by ensuring that critical educational data remained secure, accessible, and recoverable.

Based on all stages of development, validation, practicality testing, and effectiveness testing, the *Pusporejotiga* application was found to be feasible, practical, and effective as a digital platform for school data management. Beyond quantitative improvements, the implementation of the application represented a broader cultural shift within the school. What began as a response to document loss and administrative challenges evolved into a more systematic, data-driven approach to school management. School personnel reported greater confidence in handling information, faster access to records, and reduced concerns regarding document security. In this sense, the school's

journey from vulnerable paper-based archives to an integrated digital platform reflects not only technological adoption but also the development of organizational resilience. The transformation from “mud” to “megabytes” illustrates how a crisis became an opportunity for innovation and sustainable improvement in educational management.

The findings demonstrate that the development of the Pusporejotiga application significantly improved data management practices at SD Negeri Tambakrejo 03 Semarang. Prior to implementation, school information was stored in fragmented physical archives and separate digital files, making retrieval slow and increasing the risk of document loss. These findings are consistent with previous studies showing that digital transformation is necessary to improve administrative efficiency, data traceability, and service quality in educational institutions ([Caskurlu et al., 2025](#); [Howley, 2020](#); [Villa-Torrano et al., 2025](#)). However, unlike many previous studies that focus primarily on technology adoption in stable organizational environments, this study demonstrates how digital transformation emerged as a response to practical challenges associated with document vulnerability and environmental disruption. This finding suggests that organizational problems can serve as catalysts for technological innovation and institutional change.

The successful development of the Pusporejotiga application confirms the importance of designing digital solutions based on local needs. The application integrates student records, personnel information, facilities management, and administrative documents into a single platform, thereby reducing data fragmentation and improving accessibility. This result supports previous research indicating that educational information systems enhance administrative performance and information management quality ([Maican & Lixandroiu, 2016](#); [Park et al., 2025](#); [Schneider et al., 2026](#)). Nevertheless, this study extends existing knowledge by showing that locally developed platforms can effectively address context-specific challenges that may not be accommodated by generic information systems. The strong alignment between application features and user needs appears to be a key factor contributing to its successful implementation.

The high validation scores obtained from experts indicate that the application met important quality standards related to usability, functionality, security, and suitability. These findings are consistent with studies emphasizing that educational technology products developed through user-centered approaches tend to achieve higher acceptance and implementation readiness ([Jabeen, 2025](#); [Kouhsari et al., 2026](#)). The positive validation results may be explained by the extensive needs-analysis process conducted before development, which allowed researchers to identify actual problems experienced by users. This finding reinforces the principle that educational technology should be developed not merely as a technological innovation but as a solution to authentic organizational needs.

The high practicality ratings from principals, teachers, and administrative staff further demonstrate that the application was compatible with existing school workflows. This finding aligns with studies showing that user-friendly educational information systems improve administrative effectiveness, user satisfaction, and organizational performance ([Maya-Jariego et al., 2023](#); [Okoye et al., 2025](#); [Park et al., 2025](#)). User interviews revealed that participants particularly valued the ability to retrieve records quickly and access centralized information. The positive response may be attributed to the simplicity of the interface and the reduction of repetitive administrative tasks that previously consumed substantial time and effort. These results suggest that user acceptance is influenced not only by technological quality but also by the perceived usefulness of the innovation in solving everyday problems.

The effectiveness results indicate substantial improvements in data access, organization, reporting, security, and work efficiency after implementation. These findings are consistent with

research demonstrating that digital transformation improves workflows, accelerates information access, and enhances operational coordination within organizations (Avci et al., 2025; Deogaonkar, 2025; Eberl et al., 2025; Hariyani et al., 2025; Kouhsari et al., 2026). However, the magnitude of improvement observed in this study may also be explained by the considerable gap between the previous manual procedures and the newly integrated digital platform. When organizations transition from fragmented information management practices to centralized systems, improvements tend to be more visible because multiple inefficiencies are addressed simultaneously. Therefore, the effectiveness of the application reflects both the quality of the technology and the extent of organizational challenges that existed prior to implementation.

One particularly important finding concerns data security. The school had previously experienced risks associated with flood-related damage to physical archives, making document preservation a significant concern. In this context, digital transformation functioned not only as a strategy for improving efficiency but also as a mechanism for strengthening organizational resilience. This finding supports studies showing that organizations adopting digital technologies are generally better prepared to respond to operational disruptions and information-loss risks (Virella & Zeisner, 2026; Zhu et al., 2026). Unlike previous studies that primarily emphasize efficiency gains, the present study highlights the protective role of digital platforms in safeguarding educational information under adverse environmental conditions. The findings therefore contribute to the growing literature linking digital transformation with resilience and risk management in educational organizations.

The findings also demonstrate the strategic role of school leadership in supporting digital transformation. The availability of integrated and accessible information enabled the principal to monitor school conditions more effectively, evaluate programs, and make evidence-based decisions. This result is consistent with previous studies indicating that leaders who effectively utilize data and technology are better able to strengthen governance and improve organizational performance (Avci et al., 2025; Cheng et al., 2025; Mandinach & Schildkamp, 2021). The effectiveness of the application therefore cannot be separated from leadership support, which encouraged adoption, facilitated implementation, and promoted a culture of data-informed decision-making within the school.

From a theoretical perspective, this study contributes to the literature on educational digital transformation by demonstrating that technological innovation can emerge from organizational crises and environmental vulnerabilities. The findings extend previous discussions of educational information systems by integrating concepts of digital transformation, organizational resilience, and educational management. Rather than viewing digitalization solely as a technological process, this study suggests that it should be understood as a broader organizational adaptation strategy that enables institutions to respond more effectively to uncertainty and disruption.

From a practical perspective, the findings provide evidence that elementary schools can develop and implement locally tailored digital platforms to improve administrative performance and protect institutional data. Schools located in disaster-prone areas may particularly benefit from adopting similar systems because digital archiving reduces the risk of document loss while improving accessibility and efficiency. The results also highlight the importance of conducting comprehensive needs analyses, involving users throughout the development process, and ensuring leadership support during implementation. These factors appear to be essential for achieving successful and sustainable digital transformation in educational settings.

Overall, the findings indicate that the Pusporejotiga application fulfills the three principal criteria of a successful development product: feasibility, practicality, and effectiveness. More importantly, the study demonstrates that digital transformation can become a pathway toward organizational resilience when technological innovation is aligned with local needs and contextual

challenges. In the Indonesian educational context, these findings reinforce broader international evidence regarding the importance of educational information systems in improving service quality while also offering new insights into how schools can transform crisis experiences into opportunities for sustainable organizational improvement (Cheng et al., 2025; Okoye et al., 2025; Virella & Zeisner, 2026).

CONCLUSION

This study demonstrates that the development and implementation of the Pusporejotiga application successfully transformed data management practices at SD Negeri Tambakrejo 03 Semarang from fragmented, paper-based administration into an integrated digital platform. The application effectively addressed long-standing challenges related to data accessibility, administrative efficiency, information security, and organizational coordination. More importantly, the transformation extended beyond technological adoption by changing how information was stored, managed, and utilized to support school governance and decision-making.

The findings highlight that digital transformation can function as a strategy for organizational resilience, particularly in schools exposed to environmental risks such as flooding. By replacing vulnerable physical archives with a secure and accessible digital platform, the school strengthened its capacity to protect critical information, maintain administrative continuity, and respond more effectively to potential disruptions. The experience of SD Negeri Tambakrejo 03 Semarang illustrates how a crisis can become a catalyst for innovation and sustainable institutional improvement.

The Pusporejotiga model offers a practical framework for strengthening digital resilience in elementary schools, especially those located in coastal, flood-prone, or environmentally vulnerable areas. The integration of centralized data storage, role-based access control, digital archiving, and rapid information retrieval demonstrates how locally developed digital solutions can simultaneously improve administrative performance and reduce organizational vulnerability. Consequently, the model provides a valuable reference for schools seeking to enhance data security, governance quality, and preparedness for future challenges.

Ultimately, the journey from “mud” to “megabytes” represents more than the successful development of an educational application. It reflects a broader process of organizational adaptation in which digital innovation becomes a means of preserving institutional knowledge, strengthening resilience, and supporting sustainable educational management in an increasingly uncertain environment.

DECLARATION OF AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this work the author(s) used ChatGPT in order to support academic writing improvement, including language polishing, clarity enhancement, and structural refinement of the manuscript in accordance with scholarly standards. After using this tool/service, the author(s) reviewed and edited the

ACKNOWLEDGEMENT

The authors would like to express their sincere gratitude to the Principal, teachers, and administrative staff of SD Negeri Tambakrejo 03 Semarang for their support, cooperation, and active participation throughout the research process. Their valuable assistance and willingness to provide data and feedback greatly contributed to the successful development and implementation of the *Pusporejotiga* application.

The authors also extend their appreciation to the experts who provided constructive suggestions during the validation process, which significantly improved the quality of the developed product. In addition, the authors are grateful to all parties who supported this study, both directly and indirectly, thereby enabling the completion of this research.

AUTHORS' CONTRIBUTION

Author 1: Conceptualization; Methodology; Investigation; Data curation; Formal analysis; Writing-original draft.

Author 2: Supervision; Methodology; Validation; Writing-review and editing.

Author 3: Supervision; Validation; Project administration; Writing-review and editing.

DECLARATION OF COMPETING INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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