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Enhancing Efficiency in Student Attendance Recording through Implementation of a Digital Presence System: A Field Study in Elementary Schools

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ABSTRACT

Student attendance management is an essential component of school administration that affects both learning discipline and institutional accountability. This study aimed to examine the implementation of a digital presence system to improve the efficiency and accuracy of attendance recording at SDN Taman Kalijaga Permai. The research employed a qualitative descriptive approach through field observation, in-depth interviews, and documentation to obtain a comprehensive understanding of the digital system's impact on administrative performance and classroom routines. Data were collected from teachers, students, and school administrators who actively used the digital attendance platform based on QR code technology. The findings revealed that the digital presence system significantly reduced the time needed for attendance recording and minimized manual errors in data entry. Teachers reported improved convenience and accuracy, while students demonstrated increased punctuality and accountability. Furthermore, the school administration benefited from easier access to real-time attendance reports, which supported transparent data management and decision-making. These results indicate that the use of digital presence systems contributes to both administrative efficiency and behavioral discipline among students. The study implies that successful technology adoption in elementary schools depends on teacher readiness, infrastructure support, and digital literacy. Schools are encouraged to integrate continuous training and stakeholder collaboration to ensure system sustainability. Future research could expand to multiple schools or examine the long-term effects of digital attendance on student performance and engagement.

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1. INTRODUCTION

Student attendance management is one of the most essential elements in the educational process because it represents both student discipline and institutional accountability. The regularity of attendance reflects students' level of engagement, motivation, and commitment toward learning activities conducted in schools. Empirical evidence shows that students with consistent attendance demonstrate better academic performance, higher concentration, and more stable emotional development (Zalil et al., 2024). Conversely, irregular attendance and frequent absenteeism often result in learning gaps, reduced comprehension, and lower achievement levels. In elementary education, where character and habits are first developed, the habit of punctual attendance plays a central role in building learning responsibility. Thus, managing attendance accurately and efficiently becomes a key administrative task that directly affects the quality of school operations. Attendance data are not only used for daily monitoring but also for evaluating school performance and making academic policy decisions. For schools that seek to improve governance and transparency, attendance accuracy becomes an important benchmark of reliability. The modern education system requires efficient information management that supports data-driven decision-making by teachers and administrators. Therefore, attendance management must evolve beyond manual recording into a systematic, technology-based process that ensures precision and accountability.

In the context of Indonesian elementary education, attendance recording is still predominantly manual, especially in public schools such as SDN Taman Kalijaga Permai. Teachers usually record attendance using paper-based registers that consume substantial time during class hours. Manual recording processes are prone to errors such as duplication, misplacement of data, or even loss of attendance records due to physical damage (Buchori et al., 2024). These limitations often lead to inaccurate reports that disrupt administrative coordination between teachers and school administrators. The inefficiency of manual attendance systems also affects teaching productivity, as teachers spend valuable instructional time marking attendance instead of focusing on learning activities. Furthermore, the absence of real-time data access hinders school leaders from monitoring attendance patterns quickly and accurately. Such administrative delays may reduce the school's responsiveness to absenteeism or irregular attendance behavior among students. The cumulative effect of these inefficiencies undermines transparency and accountability in educational management. In this situation, schools are encouraged to adopt digital systems that simplify administrative procedures and improve data reliability. Digital transformation, therefore, becomes an inevitable step in strengthening educational management and enhancing operational efficiency.

Technological advancements in information and communication technology (ICT) have opened opportunities to improve attendance management through automation and digital integration. The emergence of digital presence systems utilizing QR code technology provides a more accurate and practical method for recording student attendance (Fauzi et al., 2021). With this system, teachers can easily document attendance using smartphones or tablets, while data are automatically stored in secure cloud databases. Ertmer & Ottenbreit (2020) revealed that teachers' confidence and digital literacy are crucial factors in the successful use of such systems. Research by Bagus Arisena et al. (2023) showed that web-based attendance systems improved data speed and accessibility but lacked empirical evidence from classroom implementation. Similarly, Ridwan et al. (2023) found that teachers experienced increased satisfaction, although technical challenges remained unresolved. Handayani (2025) linked digital attendance with teacher performance but ignored its influence on student behavioral discipline. These prior studies emphasize the operational and technological aspects but rarely explore how digital presence systems transform both administrative and pedagogical dimensions simultaneously. Thus, the integration of digital attendance technology in

elementary schools still requires in-depth analysis to understand its holistic impact on educational efficiency.

The identification of the research gap is critical to establish the contribution of this study. Based on previous studies, most existing research tends to emphasize system development or teacher adoption rather than practical field application in real educational contexts. None of those studies specifically investigated how digital attendance influences both administrative performance and student engagement within elementary schools. The lack of empirical observation at the classroom level leaves unanswered questions about how digital attendance systems shape learning discipline and daily school routines. Furthermore, many studies were conducted in secondary or higher education, with limited attention to elementary environments that possess distinct administrative and pedagogical characteristics. This gap shows the necessity of conducting a field study focusing on the actual implementation of digital presence systems in primary schools. SDN Taman Kalijaga Permai, as a representative of urban elementary schools, provides an appropriate setting for exploring the system's effectiveness. The findings from this location are expected to reveal how digital attendance can strengthen the relationship between administrative accuracy and student responsibility. In addressing this research gap, this study seeks to provide concrete evidence derived from real classroom interactions. Hence, it not only evaluates technology usage but also analyzes its influence on behavioral and managerial outcomes within the school ecosystem.

The present research aims to examine the implementation and effectiveness of a digital presence system in improving the efficiency and accuracy of attendance management at SDN Taman Kalijaga Permai. This study employs a qualitative descriptive approach with field observation, interviews, and documentation to capture teachers', students', and administrators' experiences in using the system. The focus is not on software development but on understanding the real impact of digital presence on administrative workflows and student attendance discipline. By analyzing data qualitatively, the research seeks to explain how digital tools reshape daily school routines and contribute to transparent governance. The single and specific objective of this study is to analyze the effectiveness of a digital presence system in enhancing administrative efficiency and supporting student discipline in attendance. Through this focus, the study aims to provide empirical insights that are practically applicable to similar educational institutions. The results are expected to contribute to academic discussions on digital transformation in education, particularly in the context of basic schooling. Moreover, the findings will inform policymakers and educators about the prerequisites for sustainable technology integration in schools. Ultimately, this study emphasizes that technological innovation in attendance recording is not merely an administrative reform but a foundation for building accountable and data-driven learning environments.

2. METHODS

This study applied a qualitative descriptive design aimed at understanding the implementation and impact of a digital presence system on student attendance management at SDN Taman Kalijaga Permai, Cirebon. The qualitative descriptive approach was chosen to allow an in-depth exploration of the actual experiences, behaviors, and perceptions of school stakeholders in adopting a digital attendance system. The researcher directly observed and interacted with participants in the school environment to collect contextual and meaningful data related to the research focus.

2.1 Research Location and Participants

The research was conducted at SDN Taman Kalijaga Permai, an elementary school that has integrated a QR code–based digital attendance system into its daily learning routines. The school consists of 474 students distributed across 15 study groups (rombel), guided by 23 teachers,

supported by one principal, one operator, one security officer, and one janitor. Participants in this study were selected using a purposive sampling technique, focusing on individuals directly involved in the digital attendance process. The main subjects included:

a. Five classroom teachers, representing lower and upper grades;
b. Ten students from different grade levels who actively used the attendance application;
c. Three parents to provide perspectives on accessibility and monitoring; and
d. The school operator and principal as administrative informants.

This selection ensured a diverse yet relevant representation of stakeholders for understanding the digital attendance system's implementation.

2.2 Data Collection Techniques

Data were collected through observation, interviews, and documentation.

1. Observation was carried out during morning class routines to record how teachers and students used QR-based ID cards for attendance. Field notes captured the duration, procedure, and classroom dynamics during the process.
2. Semi-structured interviews were conducted with teachers, students, parents, and administrators to explore their experiences, perceptions, and challenges regarding the system. Interviews lasted approximately 30–45 minutes per participant.
3. Documentation included collecting attendance reports, system usage logs, and administrative documents related to student presence.

To ensure the validity of findings, data triangulation was implemented by comparing observation results, interview statements, and documentary evidence.

2.3 Data Analysis Techniques

The data analysis process followed the Miles & Huberman (2014) model, which consists of three interactive stages:

1. Data reduction, by selecting, summarizing, and focusing on relevant information related to the efficiency and behavioral aspects of digital attendance.
2. Data display, by organizing qualitative findings into narrative form and descriptive tables for easier interpretation.
3. Conclusion drawing and verification, by identifying patterns, relationships, and meanings within the data and verifying them through participant confirmation.

The analysis emphasized recurring themes such as efficiency, accuracy, user satisfaction, and obstacles in system implementation. Findings were validated through member checking, where participants confirmed the accuracy of the interpreted results.

Ethical principles were maintained throughout the research process. Participation was voluntary, informed consent was obtained, and confidentiality of personal information was ensured. The overall research procedure aimed to provide a comprehensive yet realistic depiction of how the digital presence system operates and influences attendance management in the daily routines of SDN Taman Kalijaga Permai.

3. FINDINGS AND DISCUSSION

3.1 Implementation of the Digital Presence System

Based on field observation, the digital presence system at SDN Taman Kalijaga Permai operates through a QR Code–based application installed on teachers' mobile devices. Teachers select the class, and students scan their personalized QR codes each morning at the school entrance. The data, including student names, dates, and check-in times, are automatically stored in the school database.

Interviews with teachers revealed that manual attendance previously required 10–15 minutes per class, while the digital system now takes only 3–4 minutes. This transition demonstrates improved efficiency and accuracy, enabling teachers to allocate more time for learning activities.

Table 1. Summary of Findings on the Implementation of the Digital Presence System

Data Source	Findings	Description
Observation	Attendance process duration	Average attendance recording: 3–4 minutes per class
Interview (Teacher)	User experience	Digital attendance easier and faster than manual methods
Documentation	Application evidence	Attendance data automatically stored in the cloud database

Source: Field Observation, Interview, and Documentation (2025)

The table above shows that the digital attendance system simplifies the administrative process and increases recording accuracy. Teachers feel more comfortable using the system as it reduces human error and repetitive manual work.

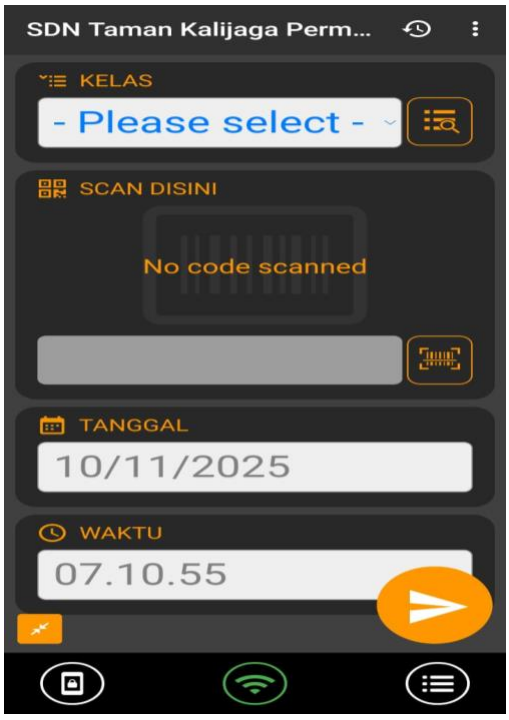

Figure 1. Display of the Digital Presence Application at SDN Taman Kalijaga Permai

Source: Field Documentation, 2025

The documentation above illustrates the interface of the QR Code–based attendance application used at SDN Taman Kalijaga Permai. This image serves as field evidence showing how teachers manage student presence through a digital system. The recorded data automatically synchronize with the school's cloud database, ensuring real-time accessibility and transparency.

3.2 Student Engagement and Behavioral Discipline

The implementation of the digital attendance system has generated positive behavioral changes among students. Observation results show that students queue in an orderly manner to scan their QR cards before entering the classroom. The activity instills discipline and encourages punctuality. Interviews with several students revealed that they felt more responsible for arriving on time because their attendance was recorded automatically. Teachers confirmed that late arrivals decreased noticeably after the first two weeks of implementation.

Table 2. Student Engagement Indicators from Field Data

Data Source	Findings	Description
Observation	Student punctuality	90% of students arrive before 07.15 a.m. after system implementation
Interview (Student)	Motivation	Students feel proud and excited to scan their attendance cards
Documentation	Attendance records	Data can be reviewed by teachers and parents through the system

Source: Observation, Interview, and Documentation (2025)

The table above summarizes how students respond positively to the new attendance method. The process promotes routine discipline, time awareness, and student accountability toward school regulations.

Figure 2. Students Scanning QR Code Attendance Cards at the School Gate

Source: Field Documentation, SDN Taman Kalijaga Permai (2025)

The documentation above shows students at SDN Taman Kalijaga Permai queuing to scan their QR Code attendance cards before entering class. This photo serves as observational evidence of behavioral discipline and engagement among students. It represents a shift from manual to digital attendance practices that encourage responsibility, punctuality, and orderly conduct as part of their daily routine.

3.3 Teacher and Administrative Adaptation

Interviews with teachers and school staff revealed that, initially, there were minor challenges in adapting to the new system, particularly concerning internet stability and familiarity with the application. However, after one to two weeks of use, teachers and administrative staff adapted smoothly. The school operator reported that data management became easier, and weekly attendance reports were automatically generated from the system without manual input.

Table 3. Summary of Teacher and Administrative Adaptation Results

Information Source	Key Findings	Description of Result
Informant Insights (Teachers and Staff)	Adaptation Process	Teachers and administrative staff achieved operational proficiency within two weeks after initial system use through peer mentoring and practice.
Classroom Monitoring	Technical Adjustment	Minor technical issues such as temporary internet instability were observed, but synchronization and data storage remained consistent and reliable.
System Records and School Archives	Administrative Output	The digital presence system automatically generated weekly attendance summaries, reducing manual workload and improving reporting accuracy.

Source: Classroom Monitoring, Informant Insights, and System Records (Field Data, 2025)

The table above shows that teacher readiness and administrative cooperation are crucial for successful system integration. Digital transformation in schools requires not only infrastructure but also training and technical guidance.

The adaptation process also reflects the school's commitment to administrative modernization. Teachers acknowledged that digital reports enhanced transparency and accountability, while administrators found it easier to compile attendance summaries and identify patterns of absenteeism.

Discussion

Administrative Efficiency through Digital Presence Implementation

The findings of this study clearly demonstrate that the application of a QR Code–based digital presence system significantly enhances administrative efficiency in SDN Taman Kalijaga Permai. The reduction of attendance recording time from fifteen to four minutes indicates a tangible improvement in workflow optimization and teacher productivity. This efficiency aligns with the initial objective of the research, namely to analyze the effectiveness of digital presence in improving school administration. The results are consistent with previous findings by Buchori et al. (2024), who emphasized the need for automation to reduce redundant manual tasks in school operations. However, this study extends those findings by demonstrating how efficiency translates not only into time savings but also into more equitable classroom management. The system allows teachers to redirect their focus toward pedagogy instead of administrative burdens, showing that digital transformation must prioritize human-centered functionality. From a broader administrative perspective, such efficiency contributes to the creation of transparent educational governance. When attendance data are processed in real-time, schools can monitor trends and make data-informed decisions. Therefore, the implications go beyond classroom-level efficiency, highlighting how technology supports accountability in public education.

The interpretation of these findings suggests that digital attendance systems embody the principle of *data reliability* within educational administration. Teachers' testimonies reflect that the

automation of attendance minimizes discrepancies and ensures that all records are verifiable in the database. This finding strengthens earlier observations by Ertmer & Ottenbreit (2020), who argued that technological integration fosters confidence in data management among educators. Yet, unlike earlier studies that mainly focused on the system design, the present research provides an interpretive understanding of how efficiency reshapes daily teaching culture. The reliability of data not only simplifies administrative verification but also prevents manipulation or negligence in attendance reporting. Such an impact resonates with the concept of *integrity-based digital education*, where transparency becomes part of the pedagogical ecosystem. These interpretations highlight that digital presence systems are not simply technological tools but also ethical instruments reinforcing trust between teachers, students, and administrators.

Another critical dimension emerging from this study concerns the sustainability of digital administration in schools. Although the implementation has proven successful in improving efficiency, it depends heavily on infrastructure readiness and human adaptation. Interview data revealed that temporary internet instability occasionally disrupted synchronization, underscoring the importance of consistent technical support. This situation reflects similar challenges found by Handayani (2025), who observed that rural schools often face digital inequality that slows system adoption. In the context of SDN Taman Kalijaga Permai, the school's proactive approach in providing technical guidance mitigated potential obstacles. Such adaptability illustrates that efficiency is not a static achievement but an evolving process requiring collaboration between policy, technology, and training. Therefore, the study supports a more dynamic model of administrative efficiency one that balances technical reliability with contextual responsiveness.

From an analytical standpoint, this improvement in efficiency also implies a cultural transformation in how schools perceive administrative work. Traditionally, attendance has been viewed as a routine clerical activity, but digital integration redefines it as a strategic management tool. When data are available in real-time, the school leadership gains insights into attendance trends, allowing for preventive interventions. This capacity reflects the move toward *evidence-based decision-making*, where every operational process generates actionable knowledge. The transition observed in SDN Taman Kalijaga Permai thus exemplifies how local innovation aligns with national educational reform efforts advocating smart schools and digital governance. Such alignment reinforces that technological adoption in education is not merely instrumental but epistemological it changes how schools understand efficiency, transparency, and accountability.

Looking forward, the implication of this finding suggests that further research should explore how administrative efficiency through digital systems influences broader policy outcomes. If such tools can standardize real-time attendance monitoring across multiple schools, they could serve as reliable indicators of educational quality at the district or provincial level. However, scalability must consider the diversity of school contexts, including infrastructure disparities and varying levels of teacher digital literacy. Future studies could integrate mixed-method approaches to assess how administrative data analytics affect decision-making at higher policy tiers. Therefore, this research lays a foundation for systemic reform, positioning digital presence systems as both operational innovations and strategic governance instruments in Indonesian basic education.

Impact on Student Discipline and Engagement

The second major finding of this study concerns the significant behavioral improvement observed among students after the digital presence system was introduced. Observation and documentation revealed that students lined up independently each morning to scan their QR codes, indicating increased self-regulation and time awareness. This behavioral change supports the research hypothesis that digital tools can enhance discipline by embedding accountability into daily

routines. The data also align with Kozma's (2023) argument that technology can positively influence student motivation when integrated into meaningful contexts. Unlike prior studies that assessed engagement only through survey data, this research provides ethnographic evidence drawn from real classroom observations. Students' visible enthusiasm and punctuality show that technological engagement can coexist with character education. Hence, digital attendance becomes more than an administrative reform it evolves into a behavioral learning tool that nurtures discipline and responsibility.

From an interpretive lens, this outcome demonstrates that behavioral consistency arises when students internalize technology as part of their learning identity. The habitual scanning of QR codes creates an implicit cognitive association between punctuality and responsibility. This aligns with findings by Annurrahma et al. (2023), who found that routine digital engagement encourages students to maintain positive school habits. However, the current study advances this understanding by contextualizing it within a collective behavioral pattern observed at the elementary level. Discipline here is not enforced externally through strict supervision but cultivated internally through structured routines. Such internalization represents a subtle pedagogical success, where technology reinforces moral and behavioral development without explicit instruction. The broader implication is that digital presence systems can be designed to support value-based education, merging efficiency with ethical growth.

Furthermore, this research reveals a reinforcing relationship between digital attendance and parental involvement. Real-time notifications allow parents to monitor their children's punctuality, fostering a collaborative accountability structure between home and school. This mechanism corresponds to Saputra et al. (2023), who emphasized that parental participation significantly improves attendance consistency. The field data from SDN Taman Kalijaga Permai validate this theory through observed communication between teachers and parents regarding student presence. This synergy not only strengthens behavioral outcomes but also enriches the school's social capital. It shows that the effectiveness of digital presence depends not only on technology but also on the relational ecosystem surrounding it. By bridging institutional and familial accountability, the system transforms attendance into a shared responsibility across the educational community.

Another critical aspect emerging from the analysis is the psychological impact of digital transparency on student motivation. The visibility of one's attendance status instills a sense of recognition and consequence that motivates regular participation. This finding echoes the motivational principles described by Means et al. (2020), who linked performance visibility to sustained engagement. However, this study expands the discussion by situating motivation within a social framework where peer behavior reinforces punctuality norms. Students reminded one another to scan their cards, illustrating the rise of peer-based discipline facilitated by technology. Such social learning indicates that digital presence systems can indirectly nurture cooperative values. Consequently, digital attendance operates not merely as a monitoring mechanism but as a catalyst for community-driven discipline.

The long-term implications of these behavioral transformations merit further exploration. Future research could investigate whether early exposure to digital accountability fosters durable habits in secondary education. Additionally, comparative studies between schools with and without digital systems could clarify the sustained impact of such interventions. Understanding these dynamics will help policymakers design holistic digital education models that integrate moral, behavioral, and cognitive objectives. By transforming attendance from a bureaucratic procedure into an ethical learning process, this study contributes to reimagining how educational technology can humanize discipline. The evidence from SDN Taman Kalijaga Permai underscores that when technology and

values intersect, digitalization becomes not only efficient but also formative in shaping student character.

Teacher Adaptation and Institutional Readiness

The success of digital presence implementation in SDN Taman Kalijaga Permai largely depends on the readiness and adaptability of teachers. Interview data revealed that although some teachers initially faced technical difficulties, consistent practice and peer collaboration facilitated smooth adaptation within two weeks. This finding answers the initial research question on how human factors influence the system's effectiveness. It corroborates the conclusions of Ridwan et al. (2023), who emphasized that teacher digital competence directly affects the success of school technology programs. However, this study provides deeper insight by analyzing the socio-organizational context supporting teacher adaptation. The school's leadership played a pivotal role in ensuring motivation, training, and infrastructure support, which collectively shaped a conducive environment for change. Such systemic coordination underscores that technological transformation in schools is as much about leadership as it is about software.

The interpretation of these findings reveals that adaptability is a process of cultural learning rather than mere technical adjustment. Teachers gradually developed confidence in managing digital data, which changed their perception of administrative work. This evolution corresponds with Fullan's (2013) framework of pedagogical change, where technology adoption triggers professional reflection and innovation. In this study, teachers reported that digital attendance encouraged them to think critically about efficiency and accountability. This reflection extended beyond attendance, influencing lesson preparation and classroom management strategies. Therefore, the adoption of digital presence acts as a catalyst for broader pedagogical transformation. Such outcomes emphasize that digital readiness should be conceptualized not only as a skill set but as a mindset characterized by openness, reflection, and continuous improvement.

From an institutional perspective, readiness also involves the alignment of policies and infrastructure. The administrative operator at SDN Taman Kalijaga Permai confirmed that stable internet connectivity and centralized cloud storage were key enablers of successful implementation. This observation aligns with Kiran Kumar et al. (2020), who identified infrastructure adequacy as a determinant of system reliability. However, unlike prior studies focusing solely on hardware capacity, this research highlights the synergy between infrastructure and human adaptation. The coexistence of digital tools and human agency reflects a sociotechnical balance essential for sustainable innovation. The implication is that institutional readiness must be measured not just by resource availability but by the collaborative capacity to integrate those resources effectively. Schools that nurture such synergy can sustain digital transformations even with limited funding or technical expertise.

The findings also suggest that teacher adaptation contributes to institutional resilience. When teachers become proficient in digital systems, they act as local mentors for their peers, creating an internal support network. This peer-led training model ensures continuity of knowledge transfer even when formal training is limited. It aligns with Chen & Kumar's (2021) view that sustainable innovation in education requires community-based learning among practitioners. The case of SDN Taman Kalijaga Permai illustrates how institutional trust and shared learning culture mitigate resistance to change. Teachers who initially hesitated to use digital tools gradually became advocates, symbolizing a shift from compliance to ownership. Such transformation indicates that technological adoption succeeds when driven by collective empowerment rather than external enforcement.

In the broader context, these findings imply that future research should explore scalable models of teacher adaptation and institutional readiness across diverse educational settings. Comparative

studies between urban and rural schools could reveal how contextual constraints shape the trajectory of digital transformation. Moreover, longitudinal research is needed to examine how teacher adaptation influences long-term school innovation capacity. The present study contributes to this discourse by showing that adaptation is not a linear process but a dynamic interaction between policy, practice, and culture. Ultimately, institutional readiness emerges not only from digital infrastructure but from shared commitment and collective learning. By grounding adaptation in collaboration and reflection, schools like SDN Taman Kalijaga Permai exemplify how digital presence systems can evolve into sustainable frameworks for educational modernization.

4. CONCLUSION

This study concludes that the implementation of a QR Code–based digital presence system at SDN Taman Kalijaga Permai effectively enhances administrative efficiency and student discipline. Attendance recording becomes faster, more accurate, and easier to monitor in real time, allowing teachers to focus on learning activities rather than administrative tasks. Students also show increased punctuality and accountability, reflecting a positive behavioral shift aligned with the study's main objective.

The findings demonstrate that digital attendance systems support school governance through transparency, time efficiency, and improved collaboration between teachers, parents, and administrators. Theoretically, this study strengthens the concept that technological innovation in education must integrate both operational and ethical dimensions to sustain long-term effectiveness.

Future research should examine the long-term behavioral and academic effects of digital presence systems across different school contexts and infrastructure conditions. Schools are encouraged to provide continuous training and ensure digital readiness so that technology becomes not just a tool, but a catalyst for improving educational quality and integrity.

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