

Management of Teacher Discipline Development Through a Web-Based QR Code Attendance System with WhatsApp E-Notifications at SMK (Vocational School) Nahdlatul Ulama (NU) Kaplongan Indramayu

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ABSTRACT

Teacher attendance recording in SMK NU Kaplongan was still manual before using the digital attendance system for years ago. More than half of the teachers did not fill out the attendance list, creating a potential for fraud and negatively impacting learning. This study aims to analyse how teacher discipline development is managed through a web-based QR code attendance system with WhatsApp e-notifications at SMK NU Kaplongan Indramayu, and to evaluate the impact of this management on teacher discipline development through the attendance system technology. This study uses a qualitative method with an exploratory case study approach. Primary data sources for this study include 1 person—the school principal, 1 person—the curriculum manager, 1 person—the head of IT, and 5 people—teachers. The selection of informants is not random but is based on purposive criteria and specific considerations. Data collection was conducted from December 2024 to January 2025. The data collection techniques used in this study are observation, interviews, documentation, and a combination of these methods. Data analysis techniques involve categorising data, breaking it down into units, synthesising it, organising it into patterns, selecting it for discussion, and finally drawing conclusions. The results of the study show that the development of teacher attendance discipline through a web-based QR code attendance system with WhatsApp e-notifications is managed effectively, including planning, organising, implementing, and supervising. However, the impact of this system on teachers' disciplinary awareness of barcode card use at arrival and departure remains low, with arrival at 53-63% and departure at 11-13%. Monitoring teacher attendance through this system does not guarantee that teachers consistently utilise a web-based QR code attendance system with WhatsApp e-notifications.

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1. INTRODUCTION

The discipline of teachers remains a problem in learning; a low level of discipline can affect the learning activities. This is based on several factors, such as weak supervision, a lack of principal authority to enforce discipline, and minimal consequences for non-compliance, which contribute to persistent low performance, including absenteeism and poor teaching practices, even among certified teachers [1].

Teachers, in carrying out their duties and responsibilities, are required to provide good role models for students. One example of a good role model is punctuality and discipline in performing duties. Teacher discipline is a state of order and regularity in which teachers carry out their tasks without violating any rules that could harm themselves, their colleagues, or the school. Discipline plays a very important role in the implementation of learning at school and is also a challenge for both experienced and novice teachers [2]. Discipline is a behaviour in individual life characterised by values of obedience, compliance, loyalty, orderliness, and/or tidiness that are formed through a process [3]. Teachers who demonstrate discipline — such as punctuality, adherence to rules, and conscientiousness — are more likely to contribute to a productive, effective organisational environment [4].

Schools should manage teacher discipline development to ensure that teaching and learning activities run smoothly. The principal plays a central role in maintaining teacher discipline and motivation through strategic actions, namely establishing disciplinary policies and organising professional development and training [5]. The principal is responsible for shaping the discipline of teachers and students, setting expectations, serving as a role model, and enforcing rules [6]. The stages in developing teacher discipline are as follows: first, planning. The planning process is an important stage in formulating the objectives of teacher discipline development, which are aligned with the school's vision and mission and involve several parties. Second, organising involves delegating authority and dividing tasks to carry out operational work. Third, implementation: teacher discipline development is implemented by utilising available potential and resources to realise the planned objectives. Fourth, supervision: it is conducted to ensure that the stages or processes of teacher discipline development are free of errors [7].

Digital attendance monitoring systems are currently very important to implement across various institutions, including the industrial sector, companies, and education [8]. In today's rapidly evolving digital era, information and communication technology can be utilised in education, including a web-based Quick Response (QR) Code attendance system with WhatsApp e-Notification. The QR code, a type of two-dimensional matrix used for information storage, provides ease of access and efficiency through smart devices such as phones or tablets [9]. In addition, QR codes have become an important part of many aspects of life, including digital financial transactions, supply chain management, company employee attendance systems, and other uses [10],[11]. A QR code-based attendance system helps reduce paperwork, wasted time, fake signatures, and human error [12]. This system assists schools in monitoring teacher discipline in real time, both for arrival and departure times [13]. It greatly helps schools record all teacher attendance activities, which are used as evaluation material and as a basis for the principal's decision-making in assessing teacher

performance and providing guidance. This attendance system serves as an automatic reminder in real time, positively affecting the accuracy and regularity of teachers' and students' attendance [14].

The implementation of a digital attendance system aligns with Foucault's Panopticon concept, which explains the relationship between the observed and the observer, the controller and the controlled, the rehabilitator and the rehabilitated within a space of power [15]. The main impact of the Panopticon concept is to create an effect of compliance, even fear [16]. This is because every movement or action of a person is continuously controlled and monitored. Self-discipline and adherence to norms will be internalised through supervision by controllers, both directly and indirectly [17].

Foucault's panopticon theory of surveillance and power is widely applied to explain how digital monitoring systems shape teacher compliance. The core of this idea is that constant, unseen, and unsupervised surveillance leads teachers to internalise compliance, expectations, and self-regulation. Forms of applying the Panopticon concept can include CCTV, regulations, codes of ethics, and even a digital attendance system.

SMK Nahdlatul Ulama Kaplongan Indramayu is a school under the Darul Maarif Foundation, a private school with 1,264 students and 73 teachers in the 2024-2025 academic year (data obtained from the Administration Office of SMK NU Kaplongan for the 2024-2025 academic year). With a large number of teachers, the school strives to improve teacher discipline through technology. This effort involves implementing a policy to monitor teacher attendance discipline using a Fingerprint-based SMS Gateway attendance system, which was in place from 2015 to 2023. Then, in 2023, the school updated its teacher attendance monitoring system to a digital system, which is still in use. This system simplifies the monitoring of teacher attendance discipline using information technology integrated with the WhatsApp social media platform. The procedure for this attendance system is that teachers scan a QR code on a card held by each teacher. QR code scanners are available in the school's main lobby. Subsequently, teacher attendance data is sent in real time via WhatsApp notifications to the principal, the vice principal for curriculum, and the concerned teacher. Periodically, the principal or the vice principal for curriculum evaluates the teacher attendance reports.

However, based on initial observations regarding the implementation of the digital attendance system at SMK NU Kaplongan, assisted by the school attendance operator, it was found that many teachers were not scanning their barcode cards upon arrival or departure. This was due to various reasons, such as negligence in scanning the card or reluctance to do so because the scanning point was located only in the main lobby, while teachers' workspaces were spread across multiple locations. Furthermore, not all teachers taught during the first lesson at 7:00 AM; some had teaching schedules starting at 8:30 AM, resulting in inconsistent arrival times. Based on preliminary observations, several issues have arisen regarding the implementation of the digital attendance monitoring system, including teachers not scanning the barcode due to a single scanning point and many teachers having schedules outside of 7 AM. This has resulted in inaccurate attendance records and biased monitoring objectives.

The implementation of web-based QR code attendance systems has been conducted by many researchers, such as Rahman & Ainol Yaqin and Sarah & Ardiansyah, both of whom applied monitoring and recording of teacher attendance through a web-based QR code system [18], [19]. However, only Rahman and Ainol Yaqin used notifications via the Telegram social media platform. Additionally, Zaenudin conducted previous research on the managerial capabilities of school principals in fostering teacher discipline without the use of digital information technology [7]. This study focuses on reinforcing teacher attendance discipline through a web-based QR code on WhatsApp. Managing teacher attendance and discipline through digital monitoring and recording requires the school to implement effective systems to foster self-compliance without requiring direct supervision.

The increasingly sophisticated presence of information and communication technology should be utilised in various aspects of life, including education. Its presence is very beneficial in the educational process at schools, such as a web-based QR code attendance application with WhatsApp e-notifications, which greatly assists stakeholders in fostering teacher attendance discipline. The reliability of this technology enables the recording and real-time reporting of teacher attendance data, with WhatsApp notifications that allow the principal and other stakeholders to monitor and make decisions to foster teacher discipline. The purpose of this study is to examine the management of teacher discipline fostering through a digital attendance system at SMK NU Kaplongan Indramayu. Moreover, what is the impact of teacher discipline management through a digital attendance system at SMK NU Kaplongan Indramayu?

2. METHOD

This study uses a qualitative method. The qualitative research method is used to explore and understand the meanings a group or an individual attaches to social or humanitarian issues [20]. The research approach used in this study is a case study. The case study approach involves the researcher closely examining an event, case, activity, or set of activities carried out by a group of individuals. Additionally, the researcher follows a series of specific procedures to collect detailed data and information [20]. The type of case study used is exploratory. An exploratory case study is research designed to obtain information, data, and details about something that has not yet been revealed. Additionally, researchers can gather diverse information from data sources before developing research questions and hypotheses [21].

This research was conducted at SMK NU Kaplongan, West Java, Indonesia. This research took place from December 18, 2024, to January 25, 2025. The reason for choosing SMK NU Kaplongan as the research site is that it is a private school with 73 teachers. To improve these teachers' performance, the school has implemented a policy of recording and monitoring attendance through a digital absenteeism system to support mentoring and supervision.

This research utilises two data sources: primary and secondary. A data source is the subject from which data can be obtained. The words or actions of observed and interviewed subjects constitute the primary data source [22]. The primary data source used by the researcher consists of words obtained from informal sources or interviews. The primary data

sources for this study are: 1 person—the school principal; 1 person—the curriculum manager; 1 person—the head of IT; and 5 people—teachers. The selection of informants is not random but is based on purposive criteria and specific considerations. Data collection from informants was conducted after obtaining the school principal's permission via official correspondence.

The data collection techniques used in this study are observation, interviews, documentation, and triangulation. Data collection can be carried out in various ways, including the setting, source, and technique. From the perspective of the setting, data can be collected in a natural setting. From the perspective of the data source, both primary and secondary sources can be used. From the perspective of the method or data collection technique, it can be conducted through observation, interviews, documents, or a combination of these [23].

The observation was conducted by directly observing and recording the arrival of teachers at the start and end of their shifts, including both those who tapped their QR cards and those who did not, during a specific period.

The type of interview used in this study is a guided free interview. This interview type provides both the interviewer and the interviewee with freedom while still adhering to a previously prepared interview instrument. The semi-structured interview is conducted by presenting a series of questions in a flowing manner while still following the interview instrument [22]. Interviews were conducted with several sources, including the principal, to uncover the managerial policies regarding teacher discipline development. Interviews were also conducted with the vice-principal for curriculum and the coordinator of teaching and learning activities at the school to understand the procedures for implementing teacher development at the initial stage. Furthermore, interviews were conducted with the IT team responsible for developing and implementing the digital attendance system to gather information on its operational procedures and how it assists in fostering teacher attendance discipline.

Documentation is a widely used method of data collection in both qualitative and quantitative research. This method involves systematically collecting data from existing documents, such as reports, letters, books, archives, policy documents, and digital records. It is an important technique for providing historical context, understanding policy or organisational processes, and complementing other data sources [24]. The data collection technique through documentation involved requesting attendance reporting documents from the IT team, capturing screenshots of WhatsApp notifications from several informants, and taking photos of QR code card-tapping activities. The collected data was then compiled and processed.

Triangulation works by cross-checking information from different methods to identify convergence (agreement), complementarity (different but supportive insights), or divergence (contradictory findings). This process helps minimise biases and limitations inherent in any single method, providing a more comprehensive and trustworthy understanding of the research phenomenon [25].

After data are obtained from interviews, observation notes, and documentation, they are analysed. The data analysis technique used in this study involves organising data from

interviews, field observations, and documentation into categories, then breaking them down into units. After that, synthesis is carried out, followed by data arrangement into patterns. These patterns are then selected for discussion, and finally, conclusions are drawn so that they can be understood by the researcher and other readers [23].

3. RESULTS AND DISCUSSION

SMK NU Kaplongan is a private school in Indramayu with 1,264 students and 73 teachers. The school and foundation strive to maintain the quality and service of education. One of the efforts undertaken is to foster teacher discipline through information technology to ensure the quality of education and learning is well maintained. The information technology implemented is a digital attendance system. The digital attendance system at SMK NU Kaplongan has been in place for approximately 2 years. A series of managerial actions has also been carried out, including Planning, Organising, implementing, monitoring, and evaluating.

3.1. Result

The school carried out the planning stage by first evaluating the previously implemented attendance program, the fingerprint attendance system. "We held a meeting with the vice principals and the IT team to evaluate and follow up. The IT team explained the obstacles of the fingerprint attendance system based on SMS Gateway," said the vice principal in charge of curriculum. Ultimately, the school decided to adopt a new system that is more efficient and effective, as the old one was costly. "For now, we aim to reduce costs. We used to use the fingerprint attendance system based on SMS, but since its service was quite expensive, we switched to WhatsApp notifications," explained the IT team leader.

The workflow for implementing teacher discipline development through a digital attendance system is below:

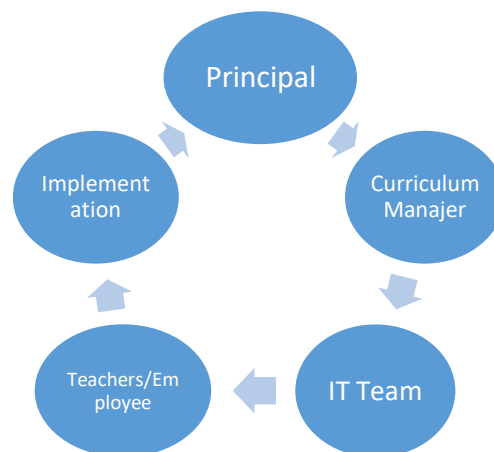


Figure 1. The workflow for implementing teacher discipline development

Figure 1 shows that the policy for implementing teacher discipline development is carried out by the principal, who is responsible for and controls the program. This policy is then executed by the curriculum manager, who serves as the coordinator. The IT team

received instructions to design and develop a digital attendance system; this team is at the forefront of its development and implementation. Teachers, as the subjects of this policy, scan a QR code card upon entering and leaving. This implementation stage involves recording attendance, reporting, supervision, guidance, and evaluation.

Stakeholder involvement is greatly needed to run this system. Therefore, the principal assigned several people to implement this system, among them Mrs. Neah, Mr. Heri, and Mr. Rizal. Mrs. Neah, in addition to being the Vice Principal for Curriculum, who is responsible for the implementation of teaching and learning activities, is also responsible for fostering teacher discipline in the initial stage. “My main task is to discipline the running of teaching and learning activities so that they are orderly, smooth, and in accordance with what the principal has assigned to me. Besides that, there is an additional task to assist in developing teacher discipline. For example, if a teacher is undisciplined, we guide them, call them in, and motivate them to understand why such indiscipline occurred. What does that mean? We call the teacher so that what? There is openness between the teacher and me. What is the reason?” said the Vice Principal for curriculum. In addition, Mr. Heri is responsible for IT and the development of the digital attendance system, with team members assisting. “I was assigned by the principal as the head of the task force. The task force is an integrated attendance system for teachers and student safety. It means teachers’ arrivals are monitored, teachers’ teaching is monitored,” stated the head of the IT team. Finally, Mr. Rizal serves as the head of administration and is responsible for the initial stage of fostering discipline among educational staff. Citations of other works should be made to avoid plagiarism.

The implementation of teacher discipline development is carried out by two methods: without the aid of information technology and with the aid of information technology. Discipline development without the aid of technology takes place during the meeting to allocate teachers’ teaching hours at the start of the new academic year and in development meetings led by the Chair of the Foundation’s Governing Board, as shown in the image below:



Figure 2. Guidance Meeting for Teaching and Educational Staff

In Figure 2, a guidance meeting is shown, attended by all educational and administrative staff of the institutions under the auspices of the Darul Maarif Indramayu Foundation. At the event, the chairman of the foundation’s supervisory board provided

evaluations, guidance, and instructions regarding programs and the performance of the educational and administrative personnel. This activity is conducted once a year. As Mrs. Meli stated, “if guidance is delivered directly, it is given during meetings — meetings at the start of the academic year and guidance meetings with the Foundation.”

Meanwhile, teacher discipline monitoring is aided by technology through the implementation of the digital attendance system. This system helps the principal and related parties monitor teacher attendance for both start and end of teaching hours via real-time notifications on the social media platform WhatsApp. As the IT team leader explained, “Regarding its implementation, the QR Code attendance is used to monitor teachers’ arrival and departure and is reported to supervisors in real time. In addition to supervisors, the QR Code attendance reports are shared only with stakeholders. For example, a teacher will have two reports. First, a report to the curriculum coordinator. Second, to the principal. For staff or administrative personnel, their reports go to the administrative personnel head and the principal. So the principal here receives two reports at once: teacher attendance and staff attendance.”

The process for reporting teacher attendance through the digital attendance system is as follows: teachers come to school according to the scheduled time, carrying their QR code cards, then tap the card on the QR code reader device; after a few seconds, the attendance information is sent via e-Notification to the teacher concerned, the Vice Principal for Curriculum, and the Principal. “The system works like this: the teacher arrives and shows the attendance card, which is scanned directly at the attendance point. Then the system will immediately generate a report for the teacher or staff member on their attendance; the report is sent directly to the Vice Principal for Curriculum or TU and to the principal. So when someone checks in, the report goes to them in real time,” the IT team leader explained. Below is documentation of the attendance system process:



Figure 3. The Teacher Taps QR Card

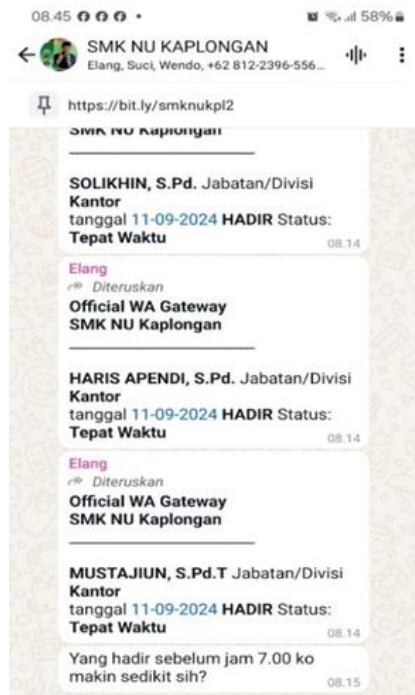


Figure 4. Report of WhatsApp e-Notifications Received by the Principal

Figure 3 shows teachers tapping a QR code card every morning from 06:00–07:30 AM to check in and tapping again from 15:00–17:00 to check out. Meanwhile, Figure 4 shows an e-notification report received by the principal, detailing each teacher’s real-time check-ins in the morning and afternoon. In addition to the principal receiving attendance notifications, each teacher also receives a similar notification immediately after tapping their card, as shown below:



Figure 5. WhatsApp Attendance Notification Received by Teacher

Based on the principals', vice-principals for curriculum, and other relevant parties' monitoring of teachers' attendance, including arrival and departure times, efforts were made to supervise and mentor teachers who did not use the card reader for attendance or who were

absent without explanation. The principal's efforts included reprimanding teachers who did not use the card reader via WhatsApp groups, as shown in Figure 3.

The principal reprimanded teachers who forgot or failed to tap their cards at the start of the day or at dismissal. This was influenced by several reasons, such as some teachers having afternoon teaching schedules in periods 3, 4, 5, and so on, so when these teachers tapped their cards, they received a "late" notification, as Mr. Abdurrahman stated, "Actually, I can teach an afternoon class at period 1, so when I scan my barcode for attendance, I get a "Late" notification." In addition, many teachers did not tap their cards at dismissal for various reasons, such as being lazy to tap because the card reader was located in only one place, or forgetting because their teaching hours ended before dismissal time, or because the vehicle parking location was closer than the barcode reader, making them reluctant to tap their cards, as Mrs. Meli stated, "When leaving, sometimes I do not tap. Because the parking location is closer than the attendance card tapping location." This is reinforced by the compiled recapitulation data regarding teacher discipline in tapping cards in January 2024, as follows:

Table 1. Recapitulation of teachers using the barcode card tap

Week	Tap Card Check-in (%)	Tap Card Check-out (%)
1	63	11
2	63	12,5
3	53	13

Table 1 shows that teachers' discipline in scanning the barcode card in January 2024 remained low. This is evident from the 63% in the first and second weeks: out of 40 teachers who were supposed to be present and record 40 classes, they tapped in only when they arrived in the morning. In the third week, it declined further to 53%. Likewise, at the end of the school day, the teachers' discipline in tapping the barcode card was even lower, at only 11%–13%.

3.2 Discussion

The implementation of managerial supervision of teachers' attendance discipline through the digital attendance system at SMK NU Indramayu has been running well, covering planning, organising, execution, and monitoring. The teacher attendance recording system, which uses a web-based QR code and WhatsApp e-notifications, greatly facilitates leaders and related parties in monitoring teachers' attendance at school. This aligns with the studies by Rahman and Ainol Yaqin, and Syarah and Ardiansyah. Nonetheless, those earlier studies did not undertake follow-up measures such as supervisory coaching by leadership. In addition, the system can increase efficiency and ease of access for recording attendance data [9]. QR code-based technology is a solution that can be implemented in schools, especially to streamline routine activities such as teacher and student attendance monitoring [26]. The school's efforts to develop teachers' discipline are carried out through various activities, such as meetings to allocate teaching assignments at the start of the new academic year and development activities organised by the foundation.

However, the impacts mentioned above contrast with the effects of implementing the digital attendance system on teachers' discipline when tapping the barcode card upon arrival at 07:00 AM and departure at 03:00 PM, which remain low, as shown in Table 1. The table shows only 63% in the first and second weeks: of the 40 teachers who were supposed to be present and record attendance for 40 classes, only 63% tapped in during the morning arrival. In the third week, it declined further to 53%. Low teacher compliance with this system is due to several factors, including limitations of QR code readers, the absence of strict sanctions, the lack of periodic evaluations, the lack of rewards for high performance, and the system's lack of alignment with teachers' varied schedules. These conditions are closely related to participative leadership and work behaviours. When participative leadership is combined with contingent rewards, organisational performance and employee satisfaction tend to improve, as employees feel both empowered and recognised for their contributions [27].

Meanwhile, the percentage of teachers who tapped out after teaching ranged from 11% to 13%. This means the implementation of the digital attendance system at SMK NU Kaplongan Indramayu is not consistent with the Panopticon concept proposed by Foucault [15], which states that the main impact of the Panopticon is to generate effects of compliance and even fear. This is because a person's every move or action will be continuously controlled and monitored [17]. Supervision of teachers' attendance carried out by the principal and related parties through this absence system does not make teachers always to swipe their cards on the barcode reader. The Panopticon, as the concept implies, involves a relationship of surveillance and power over changes in individual behaviour. This concept would be effective when individuals feel they are under continuous observation, which directly impacts their social position. However, in this study, digital attendance surveillance did not lead to compliance, as teachers did not perceive direct consequences from the system, such as formal sanctions and periodic evaluations. Surveillance occurred only administratively, not morally or socially, leading to a lack of self-discipline and adherence.

The digital attendance system has become an important component in educational institutions in the digital age, enhancing teacher productivity in providing educational services [10]. SMK NU Kaplongan Indramayu has the resources to implement a digital attendance system as an instrument for nurturing teachers' discipline, particularly in attendance. However, research shows that the implementation of this system has not yet affected teachers' awareness of its use. Therefore, to optimise the teacher development program through this attendance system, it should be supported by various factors, such as clear rewards and punishments [28], [29]. The clear rewards, such as praise, tangible incentives, and recognition, can improve discipline.

Meanwhile, proportionate punishments, such as warnings and guidance, significantly reduce negative behaviour [30], as does the addition of equipment for system development and intensive supervision from the relevant parties. However, teachers' regular attendance can affect students' behaviour in several ways [31], [32].

Regardless of the research findings, the study's limitations must be taken into account. Several primary data sources or informants were predetermined, but could not provide their information due to various factors, leaving some aspects unconfirmed.

Therefore, further research is recommended to precisely identify data sources or informants and ensure their availability for information gathering. Additionally, it is necessary to develop alternative research methods to ensure a more diverse selection of data sources or samples, thereby reflecting a variety of research outcomes.

4. CONCLUSION

In light of these findings, the management of teacher attendance discipline through a digital attendance system at SMK NU Indramayu has been implemented effectively, covering planning, organising, execution, and supervision. However, the impact of applying the web-based digital attendance system on teachers' awareness of discipline in using the barcode card at entry and exit times remains low. The digital attendance surveillance did not lead to compliance, as teachers did not perceive direct consequences from the system, such as formal sanctions and periodic evaluations. Surveillance occurred only administratively, not morally or socially, leading to a lack of self-discipline and adherence. This is inconsistent with the Panopticon concept, which holds that it would be effective when individuals feel they are under continuous observation, which directly affects their social position.

The implementation of a digital attendance system is essential for schools to facilitate the recording and monitoring of attendance discipline for teachers and staff, ensuring optimal educational services. However, implementing this attendance system requires regular supervision and evaluation to maintain teachers' discipline, particularly regarding attendance. Furthermore, research examining digital management information systems in educational institutions continues to be conducted to enrich understanding of digitalisation developments in these institutions.

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