

Digitization of Employee Attendance Processes Through a Web-Based QR Code System at MA Nurul Wahid al Wahyuni

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ABSTRACT

The manual attendance process at MA Nurul Wahid al Wahyuni often causes various problems, such as late recording, inaccurate data, and potential fraud. Therefore, this study aims to design and implement a web-based employee attendance system by utilizing QR Code technology as a more efficient and accurate digital solution. The methodology used in developing this system is the Waterfall method, which consists of the stages of needs analysis, system design, implementation, testing, and maintenance. This system allows each employee to take attendance by scanning a QR Code via a mobile device, which automatically records the time and user identity into the database. The test results show that this system is able to increase the efficiency and accuracy of attendance recording, namely this system is proven to be able to speed up the attendance process and cannot be changed by ordinary users, as well as facilitate the management of attendance data by the administration department. With the implementation of this system, it is expected that the attendance process at MA Nurul Wahid al Wahyuni will become more modern, transparent, and integrated..

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1. INTRODUCTION

The development of digital technology has brought significant changes to various aspects of life, including personnel administration systems. One important system that needs attention is the employee attendance system. In many institutions, especially those that are not yet fully digitized, such as Islamic boarding schools, the attendance process is still carried out manually, either by signing a paper or conventional recording by administrative staff.

This manual process has a number of weaknesses, including susceptibility to data manipulation, inefficient reporting, and difficulties in real-time attendance recapitulation and monitoring. This is also the case at MA Nurul Wahid al Wahyuni, where the employee attendance system has not yet fully adopted digital technology. However, the effectiveness and accuracy of attendance data are important elements in supporting good institutional management.

In every aspect of life, there is always digital technology that helps us in our daily lives, making activities more efficient [8]. Along with the increasing need for transparency and efficiency, many institutions have begun to switch to digital attendance systems, one of which is using web-based QR codes. This technology allows the attendance process to be carried out quickly, accurately, and integrated with the reporting system. However, research and development of QR Code-based digital attendance systems in Islamic boarding schools or religious educational institutions is still minimal. Many studies focus on formal institutions such as companies or public schools, but not many have researched the application of this technology in the context of Islamic boarding schools. In the education sector, the use of QR Codes also plays a major role in facilitating the community, especially for schools, students, and teachers [6].

Based on these conditions, research is needed to develop and implement a QR Code-based digital attendance system that can be accessed through a web platform. This research is expected to address the need for administrative digitization at MA Nurul Wahid al Wahyuni, while also contributing to the literature on information technology in Islamic boarding schools.

2. METHOD

The research framework is a representation of the entire research process. The research framework in this study can be seen in the following figure [14]. To provide a useful system for teachers and employees, several steps are required to design an attendance system using QR codes for the Nurul Wahid al Wahyuni Besuk Probolinggo Islamic high school. The method used in this study is qualitative, because the core of this study is a system or flow that can be determined from the results of interviews and observations in the institutional environment. The following are the research steps that have been compiled into a research framework chart:

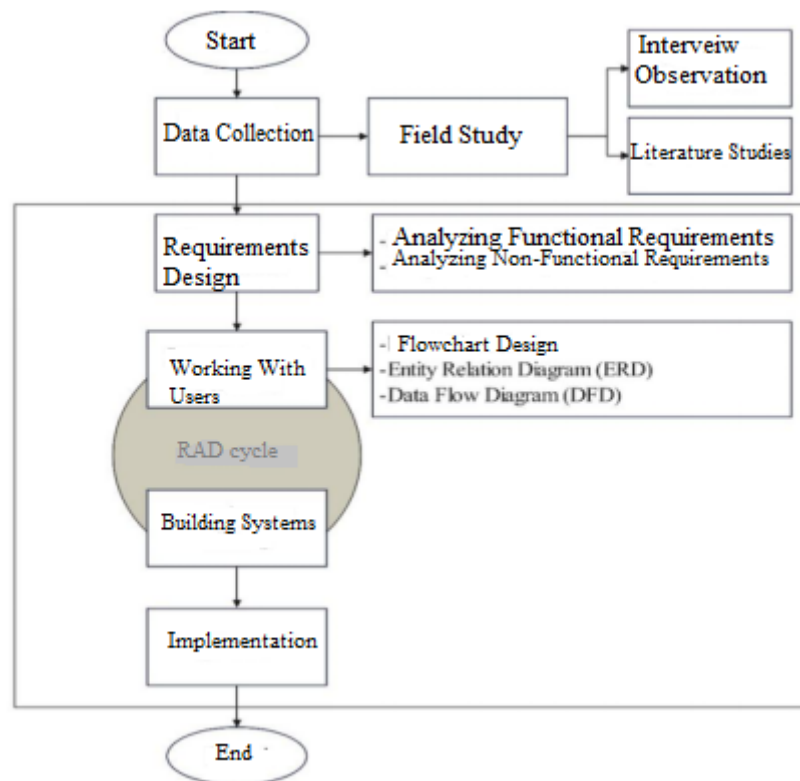


Figure 1 Research Framework

a. Research Paradigm

This study uses a quantitative paradigm, as it focuses on measuring the effectiveness of the system through numerical data, such as speed, accuracy, and user satisfaction levels. This approach is also used to measure changes before and after the implementation of the QR Code-based digital attendance system.

b. Research Approach

The approach used in this study was experimental, namely by developing and implementing a web-based QR Code attendance system, then testing it directly in the work environment at MA Nurul Wahid al Wahyuni. This study aimed to observe the impact of the system's implementation on the effectiveness and efficiency of the employee attendance process.

c. Research Stages

This research was conducted in several stages, namely:

1. Data Source

- Primary data was obtained directly from respondents (employees and administrators of MA Nurul Wahid al Wahyuni) through observation and questionnaires.
- Secondary data was obtained from manual attendance records, personnel files, and literature related to attendance information systems.

2. Data Collection Techniques
 - Direct observation of the manual attendance system that was in place before the system was developed.
 - Interviews with system administrators and users.
 - Questionnaire to measure the level of satisfaction and effectiveness of system usage after implementation.
 - Documentation in the form of system screenshots, flowcharts, and usage reports
3. Data Analysis Techniques
 - Quantitative descriptive analysis is used to process questionnaire data and simple statistics (e.g., user satisfaction percentage).
 - Comparative analysis was used to compare the attendance process before and after the use of the QR Code system, including the time required and data accuracy.
4. System Design Model

The use of QR codes is already quite widespread. Many countries around the world, especially Japan, have implemented QR code technology in their industries. Meanwhile, in Indonesia, QR codes have been implemented in several companies [16]. A QR Code is a type of two-dimensional barcode developed by Denso Wave, a division of Denso Corporation, a Japanese company, which was published in 1994 [15]. A QR Code is a two-dimensional matrix image that has the ability to store data within it. QR Codes are an evolution of barcodes. Barcodes are symbols that mark real objects, made up of patterns of black and white bars that are easily recognized by computers. An example of a QR Code can be seen in Figure 1.



Figure 2. QR Code

Rapid Application Development (RAD) is a defined life cycle strategy that offers faster development and higher quality results than those achieved with traditional cycles. RAD is a combination of various techniques built using prototyping techniques and application link development technologies to accelerate system or application development. Regarding the definition of the RAD concept, development using the RAD method can be done relatively earlier and faster. The following are the steps taken in system design. The RAD method is shown in Figure 2 below.



Figure 3 RAD Model Design Process

3. RESULTS AND DISCUSSION

This research resulted in a web-based employee attendance system that utilizes QR Code technology as a medium for inputting attendance data. This system was developed using the PHP programming language and MySQL database. System testing was conducted at MA Nurul Wahid al Wahyuni, involving all staff and teachers as the main respondents.

3.1 System Implementation

The system was successfully implemented in the form of a web-based application with a login page as shown in Figure 4.



Figure 4 Login page display

The resulting system is web-based and has key features, which can be seen in the following:

- Multi-Level Login: The system supports different access rights for administrators and employees.
- QR Code Creation and Scanning: Each employee has a unique QR Code that is used for attendance.
- Automatic Attendance: Employees only need to scan their QR Code to automatically record their attendance.

NO	NO Qrcode	Qrcode	Nama	Gaji	profil	Email	Status	Aksi
1	QR12211233438		Karyawan 1	50.00		Kar1@gmail.com	Karyawan	Signan Hapus
2	QR0876088754		Karyawan 2	50.00		Kar2@gmail.com	Karyawan	Signan Hapus

Figure 5. QR Code on teacher and employee attendance sheets

QR Code Workflow in the Attendance System:

- Creating QR Codes for Teachers or Employees
 - ✓ Each student is registered in the web-based system.
 - ✓ The system automatically generates a unique QR Code containing the teacher or employee's identity data.
 - ✓ The QR Code is printed or saved on the teacher's or employee's cell phone.
- Attendance Process Using QR Codes
 - ✓ When entering the workroom, teachers or employees scan the QR Code using the camera on their device (staff/teacher's smartphone or scanner connected to the system).
 - ✓ The QR Code data is read by the system and then translated back into the teacher or employee information stored in the database.
- Data Matching with Database
 - ✓ The system checks whether the QR Code data is valid and matches the registered teacher or employee data.
 - ✓ If valid, the system records the time (date and time) of the teacher or employee's attendance in the attendance database.
 - ✓ If invalid (for example, the QR Code is fake or not yet registered), attendance is rejected.

records, which are easy to falsify or lose. The system also uses automatic timestamps that cannot be manipulated, providing accurate information about employee arrival and departure times.

Table 1. Comparison of attendance using QR codes and manual attendance

Aspect	Manual System	QR Code System
Time of Absence	$\pm 2-3$ minutes/person	± 10 seconds/person
Media	Notebook	Smartphone + QR Code
Data Security	Prone to loss/manipulation	Saved automatically on the server
Attendance Summary	Manual	Automated (Excel, PDF)
Transparency	Low	Height
Data Access	Limited	Accessible by admin at any time

c. Relevance to the Development of Educational Technology

The digitization of attendance systems is in line with the trend of modernization in education. MA Nurul Wahid al Wahyuni, as an educational institution, is required to keep up with technological developments as part of more professional and transparent governance. The implementation of this system not only has an impact on efficiency, but also on the image of the institution, which is becoming more modern and adaptive to the changing times. Based on the data in Table 1, administrators can save time and energy and minimize errors.

d. Limitations and Recommendations

Some limitations found during the study include:

1. Device requirements: Employees must have a smartphone that can scan QR codes.
2. Dependence on internet connection: The system cannot be used optimally if the connection is unstable.
3. No check-out feature available yet: The system still focuses on morning attendance.

Suggestions for future development:

1. Integration with fingerprint or NFC as additional alternatives.
2. Addition of online attendance and leave request features.
3. Development of a mobile application for ease of access.
4. Automatic backup to the cloud to ensure long-term data security.

4. CONCLUSION

Based on the results of research and discussion, it can be concluded that the implementation of a web-based QR Code attendance system at Madrasah Aliyah Nurul Wahid al Wahyuni has improved the efficiency, accuracy, and transparency of managing teacher and employee attendance. In terms of efficiency, attendance time has been significantly reduced from $\pm 2-3$ minutes per person using the manual system to ± 10 seconds per person using the QR Code system. In terms of accuracy and data security, manual records, which are prone to loss or manipulation, have now been replaced by automatic storage on a more reliable server. The attendance recapitulation process has also become faster because it can be done automatically in Excel or PDF format, unlike the manual method which requires re-recording. In addition, transparency and data access have increased because administrators can monitor attendance at any time without physical media limitations. Thus, the web-based QR Code attendance system not only improves on the weaknesses of the manual system, but also provides added value in the form of ease of access, speed of process, and support for more professional school administration. With further development, this system has the potential to be adopted more widely in other educational institutions.

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REFERENCES

- [1] Abdul Karim & M Irfan Efendi (2021), PKM Upaya Peningkatan Kompetensi Guru di Masa Pandemi Covid-19 Untuk Menunjang Pembelajaran Berbasis Digital, Jurnal Trilogi, Universitas Nurul Jadid.

- [2] Abdul Karim (2022), Upaya Meningkatkan Kemampuan Digitalisasi Kelompok PKK Desa Jabungsisir dengan Sistem Informasi Ulem-Ulem Berbasis Android, Jurnal Guyub, Universitas Nurul Jadid.
- [3] Abdul Karim, M Jais Romli, Habibur Rahman, Muhammad Fajar Hariyadi, Moh. Jupri Efendi, Moch. GilangRomadhon, (2024), PKM Pendampingan Pemanfaatan Teknologi Digital dalam Pengelolaan dan Penyimpanan Data, Jurnal Sinar, Kraksaan Probolinggo.
- [4] Annisa Nur Amalia, A. Jalaludin Sayuti, Yulia Pebrianti, Lidia Desiana, (2022), Analisis Efektivitas Penyediaan Fasilitas Pendukung QR code untuk Menjelaskan Sejarah Benda di Museum & Zoo Tanjungpandan, Belitung, Polsri.
- [5] Edson Putra, Christian Haerani, Ryan Sidomulyo, Veren Rondonuwu, Christina Golung, Adam Stenly (2024), Digitalisasi Museum Berbasis Web Dengan AR Dan QR Code (Studi Kasus Pada Museum Sulawesi Utara), Teknik Elektro Dan Komputer Triac, Universitas Trunjoyo Madura.
- [6] Haffas Zikri Ariyandi, Anik Nur Handayani, (2022), Peran Penggunaan Teknologi QR Code untuk Meningkatkan Keterhubungan dan Efisiensi Masyarakat Menuju Era Transformasi Society 5.0, Inovasi Teknik dan Edukasi Teknologi, Universitas Negeri Malang.
- [7] Hendra Gunawan, ST, M.Eng, (2015) Pemanfaatan Teknologi QR Code Dalam Pengembangan Sistem Pendaftaran Calon Mahasiswa Baru di Universitas Islam Riau, Teknologi Terapan Politeknik Negeri Indramayu.
- [8] Leonardus W. Wasono Mihardjo, (2020), Webinar Accelerating Digital Transformation During The Pandemic. <https://graduate.binus.ac.id>.
- [9] Putra, A. R. (2019). Implementasi QR Code dalam sistem absensi berbasis web pada CV. Cahaya Nusantara. Jurnal Teknologi dan Sistem Informasi, 7(2)
- [10] Rachmat Suryadithia, Faktor-Faktor yang Mempengaruhi Penggunaan QR Code pada Era Digitalisasi dengan Metode Usability, Paradigma, Universitas Bina Sarana Informatika Bogor.
- [11] Rahmawati, N. (2021). Pengembangan sistem informasi absensi mahasiswa menggunakan QR code berbasis web pada Universitas X (Skripsi). Universitas Negeri Yogyakarta.
- [12] Yetti Yuniati1, Anisa Ulya Darajat, Ubaidah, Baiqodar, (2024) Pemanfaatan QR-Code untuk Akses Informasi Digital Koleksi Museum Ruwa Jurai Lampung, Abdimas Mandiri, Universitas Indo Global Mandiri.
- [13] Yusuf, M., & Wulandari, D. (2020). Digitalisasi proses absensi karyawan menggunakan QR code dan web-based application di PT. XYZ. Jurnal Sistem Informasi dan Informatika, 3(1).
- [14] Syahirul Alim, P. P. (2020). Sistem pakar diagnosa penyakit tanaman kakao menggunakan metode certainty factor pada kelompok tani pt olam indonesia (cocoa) cabang lampung. *AuthorGuideline_JDMSI*, 26-31.
- [15] Ching-yin law, Simon so. QR Codes in Education, Journal of Educationan Technology Development and Exchange, 3(1), 85-100.
- [16] M.Pasca Nugraha, Rinaldi Munir. Pengembangan Aplikasi QR Code Generator dan QR Code Reader dari Data Berbentuk Image, Konferensi Nasional Informatika, Bandung 2011, 148-149.