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Low-Cost QR Code-Based Attendance Monitoring System for Addressing Learners' Absenteeism and Habitual Tardiness

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ABSTRACT

Student absenteeism and habitual tardiness remain persistent concerns at Kasiglahan Village Senior High School, where conventional attendance monitoring may delay intervention and communication with parents. This action research evaluated a low-cost QR Code-Based Attendance Monitoring System with Automated Parental Notification as an intervention for these concerns. A quantitative descriptive and comparative design was employed in a Grade 11 Humanities and Social Sciences pilot section selected through purposive sampling. Attendance records from School Form 2 were compared with records generated by the digital system. The survey involved 64 respondents, comprising 27 students, 27 parents, and 10 advisers or teachers. Frequency counts, means, weighted means, and paired samples t-tests were used to analyze attendance records and user feedback. Recorded absences decreased from 51 to 12, while tardiness incidents decreased from 42 to 31. The paired samples t-test indicated a statistically significant difference in absenteeism ($p = .005$), but not in tardiness ($p = .459$). Survey findings indicated favorable perceptions of attendance monitoring, information accuracy, communication, system reliability, and user satisfaction. The system integrated Google Workspace, Google Apps Script, and IFTTT to automate attendance recording and parental notifications. The findings suggest that the intervention has potential to support attendance monitoring and school–parent communication, particularly among learners with irregular attendance. However, the pilot sample and limited implementation period restrict generalization. Further implementation across additional sections, with longer observation periods and continued system evaluation, is recommended before school-wide adoption.

Keywords: *absenteeism, habitual tardiness, QR code, attendance monitoring, parental notification, action research, school–parent communication*

INTRODUCTION

At Kasiglahan Village Senior High School, dealing with students' tardiness and absences has been a persistent issue. Although it is proactively being remediated by certain programs in school, it is often too late to act due to the nature of traditional attendance checking. In KVSHS, records and observations have shown that absenteeism and habitual tardiness among learners particularly those classified as irregular students pose significant obstacles to effective teaching and learning. Learners who frequently arrive late

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or are absent often struggle to keep up with academic requirements, resulting in poor grades, incomplete requirements, and decreased motivation. The school is trying to lessen the impact of tardy students by having them attend the second period of the class, making them miss the whole first period but making the entire class undisrupted. Traditional attendance systems such as manual calling of names and paper-based logs are still widely used in KVSHS and other schools in Rodriguez for that matter. It is identified that regular checking of attendance helps ensure that students attend classes regularly, minimizes tardiness, and supports proper student management but these systems are prone to human errors, such as misrecording of time, loss of attendance sheets, and delayed communication to parents.

With the rise of technology, so should our approach to these types of problems. The researcher approached this by developing this digital Quick Response (QR) Code-based attendance system. This system allows students to scan a QR code upon entering the school or classroom, automatically recording the time and status of their attendance, and sending the said attendance data directly to the parents either by electronic mail (e-mail) or via short-messaging-system (SMS). The recorded data is instantly stored in a database and can be accessed by the school administration, teachers, and parents. To evaluate the effectiveness of the system, a pilot test was conducted among students in the pilot section of KVSHS. This allowed the researchers to observe the system's practicality, accuracy, and impact on attendance patterns before potential full-scale implementation.

This study focuses on the implementation of a QR Code-Based Attendance Monitoring System with Automated Parental Notification in Kasiglahan Village Senior High School as an intervention to combat learner absenteeism and habitual tardiness. By comparing attendance records before and after the system's implementation and gathering user experiences, the study aims to determine whether the intervention can positively influence learners' attendance patterns and, in turn, support improved academic performance.

Research Objectives

This study aimed to implement and evaluate the effectiveness of a QR Code–Based Attendance Monitoring System with Automated Parental Notification in addressing learner absenteeism and habitual tardiness at Kasiglahan Village Senior High School. Specifically:

1. Develop and implement a QR Code–Based Attendance Monitoring System that automatically records students' attendance upon entering the school or classroom.
2. Compare the frequency of student absenteeism before and after the implementation of the QR Code–Based Attendance Monitoring System.
3. Compare the frequency of student tardiness before and after the implementation of the QR Code–Based Attendance Monitoring System.
4. Determine whether there is a significant difference in students' absenteeism and tardiness using a paired sample t-test between the pre-implementation and post-implementation attendance records.
5. Evaluate the usability and effectiveness of the system in terms of ease of monitoring attendance, accuracy of information, ease of communication between school and parents, reliability of the system, and user satisfaction.
6. Assess the potential of the system as an intervention strategy for improving attendance monitoring and strengthening school–parent communication.

Literature Review

Student Absenteeism, Tardiness, and Academic Performance

In the Philippine setting, consistent findings from research have indicated that absenteeism and tardiness have been found to have a negative impact on academic performance. Anecio et al. (2019) revealed that high instances of absenteeism among Grade 12 students negatively impacted their

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performance in quizzes, group activities, projects, and exams, indicating that absenteeism from school creates learning gaps that directly affect academic performance. Kearney (2022) stressed that regular school attendance is a reliable predictor of academic success, while high instances of absenteeism are often associated with learning gaps, poor academic performance, and a high likelihood of school dropout. Research has indicated that students who are frequently absent or tardy miss valuable learning time, making it difficult for them to keep pace with academic activities (Pérez-Marco et al., 2024). These observations are in line with the overall concerns in the Philippines, where long-term absenteeism has been associated with low proficiency and learning outcomes, as reflected in the country's PISA performance, which indicated high instances of long-term absence and corresponding declines in mathematics achievement.

Behavioral Causes of Absenteeism

It is important to understand the causes of absenteeism and tardiness in order to design interventions. Research studies done in the Philippines show different socio educational factors that contribute to attendance problems. In the study done on absenteeism and cutting classes among senior high school students, the study shows that attitudinal and environmental factors contribute to students' absence from class, showing that behavioral and environmental factors must also be considered in designing attendance interventions. Collectively, these studies indicate that attendance tracking systems must also include supportive components that take into consideration the reasons for learners' absenteeism and tardiness.

QR Code-Based Attendance Monitoring Systems

There is a growing body of research in the Philippines on technology assisted attendance systems that demonstrate the feasibility and effectiveness of digital solutions. Pantilon (2025) investigated the use of QR Code identification cards for attendance monitoring in a Philippine high school and found significant improvements in monitoring accuracy and student punctuality, with the majority of respondents describing the system as easy to use. Furthermore, recent studies have also explored the use of QR code technology as an innovative solution for attendance monitoring. QR code-based systems allow students to scan unique codes using mobile devices, automatically recording attendance in a centralized database. Pantilon (2025) found that the use of QR code identification significantly improved attendance monitoring efficiency and reduced instances of tardiness. Similarly, Alba et al. (2026) reported that QR code-based attendance systems enhanced data accuracy and minimized manual errors compared to traditional methods. These systems are particularly effective in school environments where large numbers of students need to be monitored quickly and efficiently.

Importance of Attendance Monitoring Systems in Schools

Effective attendance monitoring systems play a critical role in identifying students at risk of absenteeism and tardiness. Traditional manual attendance methods are prone to errors, delays, and inefficiencies, which limit their usefulness in addressing attendance-related concerns (Rivera & Lagarteja, 2020). Automated attendance systems allow schools to track attendance data accurately and in real time, enabling teachers and administrators to intervene promptly. Research suggests that digital attendance monitoring improves record accuracy, reduces administrative workload, and strengthens accountability among students (Gupta et al., 2025).

RFID Attendance Systems and Their High Cost

Studies on Radio-Frequency Identification (RFID) attendance systems have shown the technical advantages and financial costs involved in implementing these systems in learning institutions. The use of RFID technology in attendance systems allows for automated attendance tracking through scanning student-held identification tags, thus eliminating all the problems associated with manual attendance

systems, including the time-consuming process of conducting roll calls and the possibility of human error (Ishaq & Bibi, 2023). Nevertheless, these systems are associated with high financial costs. For instance, estimates by industry players indicate that implementing RFID attendance systems in a school setting, involving the use of multiple readers, tags, and other supporting infrastructure, can cost several thousand to tens of thousands of US dollars, depending on the complexity and functionality of the system, thus making the system very expensive for implementation in learning institutions with limited financial budgets (Cykeo News, 2025; RFID Journal, 2010). Moreover, more advanced systems involving the use of long-range or active RFID cards with GPS functionality are associated with much higher initial setup costs compared to other systems, such as passive RFID systems (MyGPSTools, 2023). Although the real-time data capture capabilities and accuracy of RFID systems are advantages, the cost implications of implementing such systems on a large scale are a familiar obstacle in educational institutions, which are looking for more cost-effective solutions to upgrade attendance monitoring systems.

Automated Parental Notification and School–Home Communication

Parental involvement is a key factor in addressing student absenteeism and tardiness. Studies indicate that timely communication between schools and parents positively influences student attendance behavior (Cepada & Grepon, 2020). Automated parental notification systems using email or SMS have been shown to increase parental awareness and prompt immediate corrective action when students are late or absent (Rivera & Lagarteja, 2020). Virtudazo and Duran (2025) emphasized that consistent school-initiated communication strengthens parental involvement, which in turn contributes to improved attendance and academic performance.

Another is the student attendance monitoring system implemented in Horacio Dela Costa Elementary School, which combines the use of QR codes and SMS notifications to ensure greater accuracy and real-time updates for parents or guardians on the arrival and departure times of the students. These studies show that systems based on QR codes can improve the efficiency of attendance monitoring, minimize errors, and improve communication between schools and parents, which are directly applicable to your QR Code-Based Attendance Monitoring System with Automated Parental Notification. Moreover, smaller-scale implementations, such as the Android-based QR technology system with SMS notification implemented in an elementary school in the Philippines, illustrate that technology-based interventions are appropriate responses to the attendance problems that have been observed in Philippine schools.

Integration of Cloud-Based Platforms in Attendance Systems

The integration of cloud-based platforms such as Google Workspace has further enhanced the effectiveness of attendance monitoring systems. Google Sheets provides a centralized and accessible database for attendance records, while Google Apps Script enables automation of notifications and timestamp recording. Hasibuan et al. (2023) reported high user acceptance of cloud-based QR code attendance systems due to their reliability, ease of use, and accessibility. These technologies allow schools to implement low-cost yet scalable attendance solutions, making them suitable for pilot testing and future expansion.

Synthesis of Related Literature

The literature review emphasizes the negative impact of absenteeism and tardiness on the academic performance of students. The studies have consistently supported the use of automated attendance monitoring systems, especially those that employ QR codes and automated parental notifications, as effective tools in promoting good attendance behavior. However, there is a lack of local studies that specifically examine the use of automated attendance monitoring systems using Google Workspace, Google Appscript, and IFTTT android application. It is also worth mentioning that there is a paywall for most of the readily available digital attendance monitoring tools that function the same. This serves as a justification

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for the current study, which seeks to determine the effectiveness of a QR Code-Based Attendance Monitoring System with Automated Parental Notification in addressing absenteeism and tardiness in Kasiglahan Village Senior High School without having to pay for the monthly subscription of the said applications and data bases.

METHODS

Research Design

This action research employed a quantitative research approach using a questionnaire to evaluate the implementation and effectiveness of the QR Code-Based Attendance Monitoring System with Automated Parental Notification in addressing learner absenteeism and habitual tardiness among irregular students in Kasiglahan Village Senior High School. The initial problem was comparatively analyzed using school form 2 (SF2) for the pre-implementation data versus the post-implementation data that can be found in the Google Sheets database. The study aimed to describe the attendance behavior of irregular learners and gather the experiences of students, parents, class advisers, and guards regarding the usability and reliability of the system.

Research Locale

The study was conducted at Kasiglahan Village Senior High School (KVSHS), specifically in the pilot section Grade 11 Humanities and Social Sciences Student (HUMSS) section D. The pilot section was selected to provide a manageable sample for system testing while focusing on students who frequently exhibited tardiness or absenteeism.



Figure 1. *Kasiglahan Village Senior High School Vicinity Map*

Sampling Technique

The study employed purposive sampling technique. It was conducted in three phases, pre-implementation, system implementation, and post-implementation. During the pre-implementation phase, attendance records of the pilot section were gathered for two months to establish baseline data on the frequency of late arrivals and absences. This is done by collecting SF2 for October 2025 and November 2025. School form 2 contains attendance record of the learners enrolled in a public high school. In the implementation phase, the QR Code-Based Attendance Monitoring System with Automated Parental Notification was introduced. Students were given unique QR code programmed from the pre-registered

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data from Google Sheets. It contains the details such as their name, student number, parents' email address, and mobile number.

Students scanned their assigned QR codes upon arrival, allowing the system to automatically record attendance and send notifications to parents in cases of tardiness or absence. The class adviser and teacher supervised the process to ensure proper and consistent system usage. In the post-implementation phase, attendance data were collected for the same two-month period, and survey questionnaires were administered to students, parents, and class advisers/teachers to obtain feedback on the system's usability and effectiveness.

Research Instrument

The QR Code-Based Attendance Monitoring Tool is the primary instrument for this study. It was developed using Google Workspace utilizing automation by Appscript. It connects all google software and application into one continuous flow in a chain-like reaction using Java script programming language. School form 2 was also utilized as a comparison tool for pre-implementation. The study used a researcher-made survey questionnaire based on the Statement of the Problem (SOP) to evaluate the implementation of the QR Code-Based Attendance Monitoring System with Automated Parental Notification. The instrument was designed and expertly validated to gather data on the experiences of leaners, parents, class advisers, and guards in using the system. The questionnaire consisted of closed-ended items using a five-point Likert scale to assess ease of monitoring attendance, accuracy of information, ease of communication, and reliability of the system.

Integration of Google Workspace, Apps Script, and IFTTT

The researcher integrated several free online applications to streamline the QR attendance system using Google Workspace, Google Apps Script, and IFTTT (If This Then That). Google Workspace enables the storage of attendance data in cloud-based Google Sheets, which can be accessed online in real-time by teachers, school guards, and administrators. Google Apps Script enables the automation of the scanning process of QR codes, including the recording of arrival times and sending notifications for late or absent students. For instance, upon scanning a QR code, Google Apps Script can automatically record the arrival time and send an email notification to parents. IFTTT takes the automation process a step further by integrating Google Workspace with mobile notifications, which enable the sending of SMS or message notifications to parents.

Statistical Treatment of Data

Attendance records from October 2025 and November 2025 were used as a base line. This was compared to the attendance record for when the system was implemented from December 2025 to February 2026. Pre- and post-implementation attendance data were analyzed using descriptive statistics particularly central tendency (frequency counts and mean) to measure the level of absenteeism and tardiness. A paired sample t-test was used to determine whether there was a significant difference in attendance before and after system implementation using IBM SPSS software.

Data gathered from the survey questionnaire were analyzed using descriptive statistics. Responses to the Likert-scale items were summarized using frequency counts and weighted means to describe the experiences of students, parents, and class advisers/teachers in terms of ease of monitoring attendance, accuracy of information, ease of communication, and reliability of the system. The results were used to evaluate and interpret the overall effectiveness of the QR Code-Based Attendance Monitoring System based on the respondents' perceptions.

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RESULTS

Research Participants

The survey involved 64 respondents, as shown in Table 1.

Table 1. *Summary of Research Participants*

Participants	Number of Respondents
Students	27
Parents	27
Advisers/Teachers	10
Total	**64**

Attendance Before and After Implementation

School Form 2 was used as a basis for the baseline of the students in the pilot section's attendance and tardiness record. SF-2 from the month of October and November, which came from their adviser, shows the results below for the total number of absences and lates.

Table 2. *Recorded Absences and Tardiness Before and After Implementation*

Period	Frequency of Absences	Frequency of Tardiness
Pre-implementation	51	42
Post-implementation	12	31
Total	**63**	**73**

Note. Each of the students was given a unique QR code and student ID number.

Recorded absences decreased from 51 to 12, while tardiness decreased from 42 to 31. These are descriptive comparisons; statistical significance is assessed in Table 3.

Table 3. *Paired Samples t-Test Results*

Paired difference	Mean	SD	t	df	p	Decision
Absences (pre–post)	1.593	2.664	3.106	26	.005	Reject H_0
Tardiness (pre–post)	.407	2.818	.751	26	.459	Fail to reject H_0

A paired samples t-test was conducted using IBM SPSS to determine whether there was a significant difference in students' attendance records before and after the implementation of the QR Code–Based Attendance Monitoring with Automated Parental Notification System.

The reported paired samples t-test indicated a significant difference in absenteeism, $t(26) = 3.106$, $p = .005$, but no significant difference in tardiness, $t(26) = .751$, $p = .459$.

Attendance System User Experience

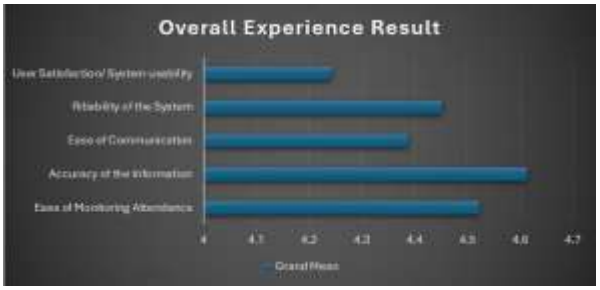

Figure 2. *Overall Survey Results for System Implementation*

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Respondents reported favorable perceptions of the system across the five evaluated dimensions.

DISCUSSION

The result is in line with the study of Alba et al. (2026) and Rivera and Lagarteja (2020), who concluded that the QR code-based attendance system with SMS or parental notification functions can improve attendance monitoring and reduce absenteeism. Pantilon (2025) and Gupta et al. (2025) also concluded that automated attendance systems can improve accuracy, reduce attendance fraud, and promote punctuality among students.

This positive response to the system is in line with the findings of Hasibuan et al. (2023) and Gupta et al. (2025), who found that the QR code-based attendance system is friendly and reliable for daily school activities. Similarly, Pantilon (2025) found that the QR code identification system has improved the efficiency and accuracy of attendance monitoring, which has resulted in better acceptance by students and teachers.

The findings suggest that automated attendance monitoring and parental notification may support improved attendance practices. The observed decrease in tardiness should not be interpreted as statistically significant.

Limitations

The pilot study involved one section and a limited observation period. The pre–post design does not establish causality, and the survey reflects user perceptions. The system also depends on internet connectivity.

CONCLUSION

The QR Code-Based Attendance Monitoring System enhanced the efficiency of student attendance monitoring as compared to the conventional SF2 manual system in the pilot section at Kasiglahan Village Senior High School. Although the reduction in student tardiness following the implementation of the system was not statistically significant, the observed reduction in absenteeism was statistically significant. The system was found to be accurate, reliable, and easy to use, requiring less effort and providing timely information about student attendance as reflected by the results summary.

The automated notification system helped in improving communication between the school and parents of the pilot section leading to increased awareness and accountability for student attendance. This also helps the adviser quickly identify students who exhibit habitual absenteeism and tardiness. As a pilot study with a small sample size, the system proved to be promising as an intervention strategy for improving student attendance which may produce stronger statistical outcomes when implemented on a larger scale.

Recommendations

The system implementation can be extended to other strand and sections or grade level to obtain stronger results. This is critical before the actual school-wide scaling. It is recommended that the attendance system be set up to send notifications only after the student has been late or absent for two consecutive days or more. This is crucial to avoid getting tagged as spam by the google workspace and SMS security protocols.

Improvements such as notification through SMS alone, offline scanning, and system integration can help make the system more accessible and sustainable. The current system is dependent on internet connection. The pilot implementation was done on midterm making the QR code not integrated to the Identification card (ID) of the learners. It is the best approach to integrate the printing of dedicated QR code of learners into the ID. Future use of this system should target irregular students as the main participants. They are most likely to benefit from this system.

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It is also recommended that the school perform periodic evaluation and monitoring of the QR Code-Based Attendance Monitoring System to ensure its long-term effectiveness and sustainability. The school can also assign a trained personnel or system administrator to maintain the Google Workspace database and automation scripts to ensure data accuracy and security. Continuous evaluation will support informed decision-making and allow the system to adapt to the evolving needs of students, teachers, and parents.

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