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Research Article

Effect of Quick Response (QR) Code Identification (ID) Card on the Students' Attendance Monitoring at Jesus F. Magsaysay Technical Vocational High School

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ABSTRACT

This quasi-experimental study investigated the effectiveness of Quick Response (QR) Code identification cards in monitoring student attendance at Jesus F. Magsaysay Technical Vocational High School during the 2022–2023 academic year. A total of 200 participants, including students, teachers, and administrators, provided data through surveys and interviews. Findings revealed that the QR Code ID system significantly enhanced attendance monitoring, with 78% of respondents reporting improved accuracy and 85% describing the system as easy to use. Statistical analysis showed a significant increase in attendance rates ($t(99)=10.07$, $p<.05$), indicating that the technology positively influenced student attendance behavior. Additionally, 70% of participants observed better punctuality and consistency among students. Although minor technical issues and unclear usage guidelines were identified, these challenges did not outweigh the system's overall benefits. The results affirm the effectiveness of QR Code technology in improving attendance tracking and promoting student responsibility. Broader adoption, coupled with ongoing system updates and user training, is recommended to further enhance performance and support the advancement of digital attendance management in educational institutions.

Keywords*: QR Code ID cards, Educational technology, Student punctuality*

Background

Globally, student attendance is recognized as a vital factor influencing academic achievement and institutional effectiveness. Research across different educational systems indicates that consistent attendance positively correlates with learning outcomes, engagement, and graduation rates (Balfanz & Byrnes, 2019; Gottfried & Hutt, 2021). In contrast, chronic absenteeism continues to hinder student

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performance worldwide, particularly in developing nations where socioeconomic and technological barriers persist (OECD, 2022; UNESCO, 2023).

However, persistent chronic absenteeism becomes a national issue maintaining regular attendance remains a challenge. Illness, emergencies, lack of motivation, and transportation difficulties frequently affect attendance patterns. Recently, the use of **Quick Response (QR)** codes in education has drawn growing attention for improving administrative efficiency, particularly in attendance monitoring. Studies indicate that QR code systems enhance accuracy, reduce administrative workload, and encourage student engagement (Conklin & Lahiri, 2021; Wang & Huang, 2022). Other researchers have noted both benefits and challenges, including issues of user adaptation, technical reliability, and privacy concerns (Ricci & Flores, 2019; Perez & Bradshaw, 2023; Birla & Sharma, 2023).

Grounded in these insights, in the Philippines, issues with manual systems being prone to errors and delays, a lack of reliable technology and infrastructure, and the underlying socio-economic factors that lead to student absenteeism. The present study investigates the effectiveness of **QR Code Identification (ID) cards** for student attendance monitoring in the Castillejos District. Specifically, it examines the system's benefits and limitations in terms of accuracy, efficiency, and user experience. The findings aim to inform educational policy, streamline administrative processes, and guide future implementations of technology-driven attendance systems.

Studies show that QR code attendance systems improve accuracy, efficiency, and student engagement compared to manual methods. Researchers found that these systems reduce human error, save time, and ease teachers' administrative work (Birla & Sharma, 2023; Conklin & Lahiri, 2023; Nasution et al., 2023). They also promote punctuality and accountability among students, leading to better participation and learning outcomes (Jeyaraj & Shetty, 2023; Wang & Huang, 2023). While users generally view the system as convenient and reliable, minor technical issues may occur, highlighting the need for continuous support, training, and maintenance to ensure effective implementation (Perez & Bradshaw, 2023; Ricci & Flores, 2023).

The findings of the study will benefit the students, teachers, school administrator, and future researcher/s. The study helps school administrators modernize attendance systems by showing how QR code technology reduces human error, saves administrative time, and enhances data reliability. These insights can guide policy formulation and foster a culture of efficiency, innovation, and transparency in institutional management. Teachers gain from a more efficient and automated attendance process, allowing them to focus more on teaching and student interaction.

The system promotes punctuality, accountability, and transparency in attendance reporting, fostering a sense of responsibility. This study provides evidence-based guidance for policymakers promoting digital transformation in education. Future investigations may expand on this framework to examine broader applications of educational technologies in promoting organizational efficiency and innovation.

Methods

The study employed a quasi-experimental design with a pretest-posttest approach. Two groups were compared: one using the QR Code ID system and one using traditional attendance methods. This design helped assess the impact of the QR Code system on student attendance rates.

Instruments

To assess the effect of the Quick Response (QR) Code Identification (ID) card on students' attendance monitoring, survey questionnaires were utilized and administered to 200 Junior High School students at Jesus F. Magsaysay Technical Vocational High School.

Participants Location

The research involved stratified sampling, specifically systematic sampling, to select learners from Jesus F. Magsaysay Technical Vocational High School, particularly those from Grades 7 to 10 in the District of Castillejos, for the quantitative research.

Data Collection

The respondents of this study were 200 Junior High School students from the District of Castillejos, mainly from Jesus F. Magsaysay Technical Vocational High School. The process covered all phases: preparatory, pretest, intervention, posttest, and data handling. The questionnaires were personally distributed by the researcher to ensure clarity of instructions and to address any questions from the participants.

Data Analysis

The QR Code ID cards streamlined attendance tracking by allowing quick scans and reducing manual errors. Analyzing the attendance data provided insights into attendance patterns, student behavior, class variations, and adherence to policies. The researcher used several statistical treatments to process the data: Frequency distribution was used to describe the distribution of respondents according to categories or groups. Percentage was used to show the relative proportion of subcategories based on the total, multiplied by 100. Weighted mean determined the average of responses based on their relative weights. An Independent Sample t-Test was used to assess whether the QR system caused a measurable difference in attendance between the two groups. Standard deviation showed how spread out or consistent the data were, helping to understand variability and verify statistical tests such as the t-test.

Result and Discussion

This study assessed the impact of QR code ID cards on attendance monitoring at Jesus f. Magsaysay Technical Vocational High School in the Castillejos District. It focused on the effects of the QR system, its advantages and disadvantages, and students' perceptions.

Table I. Pretest-Posttest Results

Group	Before Intervention (Attendance Rate)	After Intervention (Attendance Rate)
Experimental Group	85%	92%
Control Group	84%	86%

Pretest-Posttest Results The increase from 85% to 92% attendance reflects the findings of Wang and Huang (2023), who noted improved punctuality with QR-based systems. Jeyaraj and Shetty (2020) observed that while QR codes significantly improved student engagement, they did not have a notable effect on academic performance. Ricci and Flores (2019) reported increased accuracy in attendance tracking but also highlighted challenges related to the implementation of the QR code system in a university setting.

Table II: T-test results for attendance improvement between the experimental and control groups

Group	**Pretest Mean (%)**	**Posttest Mean (%)**	**Mean Difference (%)**
Experimental	85	92	7
Control	84	86	2
t-test result	—	—	**t(198) = 7.07, p = .000**

The independent samples *t*-test showed a significant improvement in attendance for the experimental group, $t(198) = 7.07$, $p < .001$, confirming the positive impact of the QR Code ID card system on student attendance. Similarly, Ricci and Flores (2023) explored university case studies and concluded that QR code systems promote accountability and transparency in attendance monitoring. Their research suggests that positive attitudes toward the technology grow with familiarity and proper technical support, underscoring the importance of orientation and maintenance in sustaining the system's success.

Table III: T-test results (Dependent t-test) result for the experimental group

Measure	Mean (%)	SD	t(df), p
Pretest	84.4	5.4	—
Posttest	91.45	4.63	—
Paired t-test result	**—**	**—**	**t(99) = 10.07, p = .000**

The paired-sample *t*-test showed a significant increase in attendance after implementing the QR Code ID card system, $t(99) = 10.07$, $p < .001$, indicating a positive effect on students' attendance

Table IV. Effect of QR Code ID Card system the Treatment

Group	Test Period	Mean (%)	SD	Interpretation
Experimental	Pretest	84.4	5.4	Attendance before implementation was moderate with slight variability.
Experimental	Posttest	91.45	4.63	Attendance improved notably with more consistency after implementation.
Control	Pretest	83.72	5.26	Attendance rates were similar to the experimental group before intervention.
Control	Posttest	85.33	4.41	Minimal improvement and slightly reduced variability.

Attendance improved and became more consistent after using the QR Code ID card system. The experimental group's mean rose from 84.40 ($SD = 5.40$) to 91.45 ($SD = 4.63$), showing higher and more stable attendance. Perez and Bradshaw (2023) acknowledged that technical glitches, such as connectivity issues or scanning errors, occasionally disrupted the process. Birla and Sharma (2023).

Table V. Comparison between schools with no intervention and with the QR code ID card system intervention:

Aspect	Schools with No Intervention	Schools with Intervention (QR Code ID Card System)	Percentage of Respondents	Number of Respondents (Out of 200)
Improvement in Record Accuracy	Not Applicable	Considerable improvements observed	78%	156
User-Friendliness of the System	Not Applicable	Rated as user-friendly	85%	170
Enhancement in Student Punctuality	No significant change	Improvement noted	70%	140
Attendance Consistency	No significant change	Improvement observed	70%	140

Schools with No Intervention: Represents the situation before the QR code ID card system was implemented.

Schools with Intervention: Represents the situation after the QR code ID card system was implemented.

Percentage of Respondents: Shows the percentage of respondents who observed each improvement.

Number of Respondents: Represents the actual number of respondents out of 200 who observed the improvement.

This table clearly shows the impact of the QR code ID card system on record accuracy, user-friendliness, student punctuality, and attendance consistency.

Table VI. Students' Perceptions

Perception	Percentage	Details
Positive Perceptions	65%	Convenience and reliability noted.
Neutral Perceptions	25%	Similar to traditional methods.
Negative Perceptions	10%	Issues with technical difficulties or preference for traditional methods.

Among students, the QR code ID card system has garnered a range of perceptions. A notable 65% of students viewed the system positively, appreciating its convenience and reliability in tracking attendance. In contrast, 25% of students had a neutral view, observing that the QR code system was similar to traditional methods in terms of effectiveness. Meanwhile, 10% of students expressed negative perceptions, citing issues such as technical difficulties or a preference for the familiar traditional methods of attendance tracking.

Table VII. Impact of QR Code ID Card System

Aspect	Result	Percentage of Respondents	Number of Respondents (Out of 200)
Accuracy Improvement	Significant improvements in tracking accuracy	65%	130
Punctuality and Regularity	Enhanced punctuality and regularity	70%	140
Efficiency	Found the system more efficient than traditional methods	60%	120

The QR code ID card system has been widely recognized for its impact on various aspects of attendance tracking. Notably, 65% of students observed significant improvements in tracking accuracy, highlighting the system's effectiveness in reducing errors compared to previous methods. Additionally, 70% of respondents reported enhanced punctuality and regularity, indicating that the system has positively influenced students' timeliness and consistency in attending classes. Moreover, 60% of respondents found the QR code system to be more efficient than traditional methods, underscoring its ability to streamline attendance processes and reduce administrative burdens.

Table VIII. Survey Questionnaire Result

	Survey Question	Options	Percentage of Respondents	Number of Respondents (Out of 200)
1	**How has the implementation of QR code ID cards improved the accuracy of attendance tracking?**	Significantly improved	65%	130
		Moderately improved	20%	40
		Slightly improved	10%	20
		No noticeable improvement	3%	6
		Not applicable	2%	4
		Significantly improved attendance	70%	140

	Survey Question	Options	Percentage of Respondents	Number of Respondents (Out of 200)
2	**Has the QR code ID card system influenced students' punctuality and regularity in attending classes?**	Moderately improved attendance	15%	30
		Slightly improved attendance	8%	16
		No noticeable improvement	5%	10
		Not applicable	2%	4
3	**How user-friendly do you find the QR code ID card system for recording attendance?**	Very user-friendly	50%	100
		Moderately user-friendly	35%	70
		Slightly user-friendly	10%	20
		Not very user-friendly	3%	6
		Not applicable	2%	4
4	**Have you experienced any technical issues while using the QR code ID card system?**	Yes, frequently	5%	10
		Yes, occasionally	15%	30
		No, rarely	50%	100
		No, never	25%	50
		Not applicable	5%	10
5	**Has the QR code ID card system positively influenced student responsibility and accountability?**	Yes, significantly	60%	120
		Yes, to some extent	30%	60
		No noticeable influence	7%	14
		Not applicable	3%	6
6	**Have you noticed an improvement in attendance record accuracy?**	Yes, significantly improved	65%	130
		Moderately improved	20%	40
		Slightly improved	10%	20
		No noticeable improvement	3%	6
		Not applicable	2%	4
7	**How would you rate the efficiency of the QR code ID card system?**	Much more efficient	60%	120
		Somewhat more efficient	25%	50
		About the same	10%	20
		Less efficient	3%	6
		Not applicable	2%	4
8	**Has the QR code ID card system encouraged consistent class attendance?**	Yes, significantly	65%	130
		Yes, to some extent	20%	40
		No noticeable effect	10%	20
		Not applicable	5%	10
9	**How user-friendly do you find the QR code ID card system for recording attendance?**	Very user-friendly	50%	100
		Moderately user-friendly	35%	70
		Slightly user-friendly	10%	20
		Not very user-friendly	3%	6
		Not applicable	2%	4
		Technical issues	15%	30

	Survey Question	Options	Percentage of Respondents	Number of Respondents (Out of 200)
10	**What challenges have you encountered while using the QR code ID card system?**	Difficulty in scanning QR codes	10%	20
		Lack of instructions or training	5%	10
		No significant challenges	60%	120
		Not applicable	10%	20

1. Improvement in Attendance Accuracy

A large majority of respondents reported that the QR Code ID system significantly enhanced attendance accuracy. Approximately two-thirds indicated a marked improvement, while only a small fraction noted minimal or no change. This trend demonstrates a clear positive shift, implying that the system reduced human errors associated with manual attendance checking.

The quantitative results correspond with the statistical analysis showing a significant increase in attendance rates ($t(99) = 10.07$, $p < .05$), confirming that the observed improvements were not due to chance. This means the QR Code system had a statistically significant effect on attendance accuracy and reliability.

2. Punctuality and Regularity in Attendance

Respondents largely agreed that the QR Code system positively influenced punctuality and regularity in class attendance. The dominance of responses indicating "significant improvement" supports the conclusion that automated scanning reinforced timeliness among students. The significant mean difference between pre- and post-implementation attendance rates further validates this behavioral improvement. These findings suggest that the QR-based system did not merely serve as a recording tool but also functioned as a behavioral intervention that encouraged accountability.

3. System Efficiency and User-Friendliness

More than half of the respondents found the system very user-friendly, and nearly all reported it as more efficient than manual methods. The descriptive trend reveals high acceptability and ease of use, contributing to smoother integration in the school's daily operations.

Statistical analysis supports this observation, showing a consistent mean rating within the "efficient to highly efficient" range, indicating strong user satisfaction. This implies that the success of the QR Code ID card system is largely attributed to its operational simplicity and accessibility, reducing the learning curve for both students and teachers.

4. Technical Issues and Challenges Encountered

Although the system performed effectively overall, a small number of respondents reported technical challenges, such as scanning difficulties or inadequate training. However, half of the participants stated that they rarely experienced such issues, while a quarter reported never encountering them. This distribution reflects high system reliability. The minor occurrence of challenges, when compared to the dominant positive responses, suggests that the system's benefits far outweigh its limitations. Addressing these small issues through periodic maintenance and user orientation could further enhance its long-term functionality.

Conclusion

The QR Code ID system significantly improved attendance rates and punctuality, suggesting its viability as a modern attendance monitoring solution. Regular technical maintenance and user orientation are essential for sustained success.

Schools are encouraged to adopt the QR Code ID card system to enhance attendance monitoring. Regular maintenance, user training, and technical support are recommended to

sustain efficiency and address minor technical issues.

Another is Explore Integration with Other School Management Systems to further enhance the efficiency and utility of the QR code ID system, it is recommended to explore integrating the system with other school management software. This could include linking attendance data to student performance tracking, parental notifications, and administrative reporting tools, providing a more comprehensive view of student engagement.

Findings suggest that the QR Code ID card system was effectively implemented, enhanced attendance monitoring accuracy and efficiency, and promoted accountability, with manageable technical and maintenance concerns.

Thus, this study is limited to those learners who doesn't have any access in using cellular phones and to those users who has low battery issues.

Future researchers should focus on the long-term effects of the QR code ID system on student attendance, behavior, and academic performance.

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