The Proposed Integrated School Safety Framework: An Integrated Conceptual Framework Model of Safety, Surveillance, and Institutional Engagement in Philippine Public Schools

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DOI: https://doi.org/10.51584/IJRIAS.2026.11010005

Received: 04 January 2026; Accepted: 09 January 2026; Published: 20 January 2026

ABSTRACT

This paper presents a conceptual and theoretical framework for an integrated school safety system designed to address persistent safety and accountability challenges in Philippine public schools. The situation regarding students' safety in Philippine public schools has raised issues that are difficult to overlook, as they persist and remain unaddressed. Among other incidents, there have been problems with students getting in and out of the school without proper authorization, violent actions being taken, and even the attendance of students being managed inefficaciously by the administration because of poor monitoring. The manual systems currently in place struggle with errors; they're mainly reactive and mostly isolated from a wider accountability of the institutions. The present paper proposes a theoretical framework for an integrated campus access and attendance management system. The framework is based on the Sociotechnical Systems Theory, Ecological Systems Theory, Technology Acceptance Model (TAM), and Agile-SCRUM implementation principles. Combining these perspectives results in a multidimensional model that considers school safety not merely as a tech add-on but as a co-produced sociotechnical process that is at the heart of the educational ecosystem, not outside it. The paper presents an argument for transforming school safety and accountability into a holistic approach, where inclusivity, transparency, gender responsiveness, and ethical data governance serve as guiding principles. The framework is in sync with the Sustainable Development Goals (SDGs 4, 9, and 16) and national digital transformation policies. The theoretical design proposed here is a replicable and scalable model for resource-poor educational contexts, thus contributing to the discourse on technology in education, governance, and human security.

Keywords: school safety, conceptual framework, sociotechnical systems, ecological systems, technology acceptance, agile implementation, Philippine education

INTRODUCTION

The issue of very high standards for safety and accountability in schools is a global concern, but it is especially relevant in the context of Philippine public education. Both primary and secondary education in the country is characterized by a few schools with very many more students, extremely limited resources, and isolated cases of violence, all of which add up to the very high vulnerability of the situations and places where the students are. One of the main reasons that the public-school systems worldwide have still not entirely embraced the use of technology is the hesitation to replace human monitoring completely. The digital technologies used in the inseparable vast physical presence of kids and adults are not very different from the dominant tools at the disposal of the Filipino public-school systems. The latter ones, however, are still plagued with the aforementioned issues along with other factors topping including the lack of infrastructure.

The seriousness of this matter is made very clear by the theft, unauthorized intrusions, and even campus violence, such as the unfortunate stabbing of a student and teacher in Quezon City, which were the most recent high-profile incidents. Systemic failures in the protection of learners and educators are evidenced by these developments. In addition, the [5] Department of Education (DepEd) 2023 report pointed out the increasing number of safety incidents as a reason for establishing stronger institutional mechanisms.

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume XI Issue I January 2026

The Department of Science and Technology (DOST) has declared during this time of crisis that digital transformation, resilience, and the well-being of humans would be the focal points of the government's agenda. The system is thus conceived within the context of the policy environment. It is not only a technological system but also a comprehensive model that connects school safety with goals of sustainability, accountability, and inclusion. The article constructs a thorough theoretical framework based on interdisciplinary scholarship to assist its design and eventual introduction.

LITERATURE REVIEW

Safety and Security in Philippine Schools

Research pointed out that unauthorized entry and lack of monitoring are major threats to the safety of students in Philippine schools. The use of manual systems makes schools prone to errors, and the separation of attendance records from security personnel delays their response to emergencies. [1] Barrios and Cruz (2023) reveal that these obstacles to implementation are further worsened by the physical structure of public schools, which very often do not have strong perimeter security.

Global Monitoring Systems for Education Trends

Around the world, there has been a considerable movement towards automated solutions. The RFID-based systems for attendance and safety have been very successfully implemented in schools in Asia and Europe. Studies [3] Cheng et al. (2022) and [7] Zhong et al. (2023) show that these systems achieve better accountability and notably lower absenteeism. Yet, the acceptance of such technology is still a topic of dispute; it opens up intricate discussions about data privacy and surveillance ethics that need to be taken into account in the system design.

Data Privacy and Stakeholder Trust

An issue that repeatedly emerges with new technologies is data handling. In the Philippines, the Data Privacy Act of 2012 (RA 10173) enforces stringent protections for individuals' data. As a result, trust among stakeholders is a main factor deciding the adoption. Systems must include transparency, access based on roles, and clear user consent to be legally and ethically functioning in the Philippines.

Gender and Inclusion in School Security

Research studies that are being conducted show the aspect of school safety in terms of gender. The female students and LGBTQ+ learners are the ones who mostly admit to being harassed in areas where there is no supervision. Hence, the modern security systems should be equipped with gender-sensitive analytics and emergency features for both moral obligation and system reliability to be strengthened.

METHODOLOGY

Theoretical Framework Development

The theoretical synthesis methodology is used in this paper to combine the four different viewpoints and to set up the framework. This method is not limited to the technical specification only, but rather it reevaluates the school as a complex adaptive system.

Sociotechnical Systems Theory

After the pioneering study of [6] Trist and Emery (1951), this view sees the school as a co-evolving sociotechnical sphere. In this perspective, technical stalemates (hardware, software) and social bonds (student-teacher interactions, administrative culture) will have to adapt together. It is aimed at being a substantial intervention with a safety enhancement aspect while acknowledging the cultural and relational specifics of the school setting in the Philippines.

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume XI Issue I January 2026

Ecological Systems Theory

[2] Bronfenbrenner's (1979) ecological systems model is applied to locate students in layers of contexts: the microsystem (school), the mesosystem (home-school interaction), and the ecosystem (policy environment). It is expected to strengthen the relations of the mesosystem by making it possible for the community to react more quickly to the safety risk through improved communication between parents and schools.

Technology Acceptance Model (TAM)

To deal with the human aspect in system adoption, the framework integrates [4] Davis's (1989) Technology Acceptance Model. This model classifies perceived usefulness and perceived ease of use as the main determiners of technology acceptance. Perceived usefulness comes in the form of enhanced safety in schools and less paperwork for the administration, whereas perceived ease of use comes via user-friendly reporting dashboards and non-intrusive monitoring.

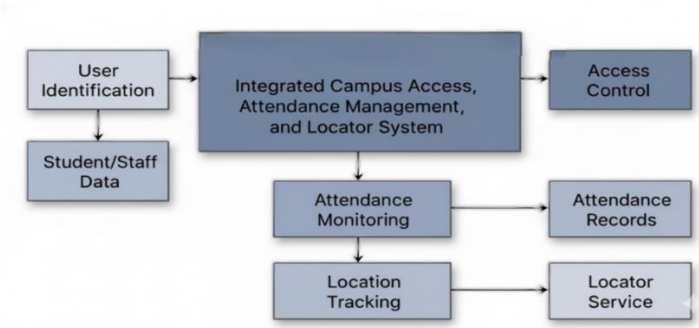
Agile-SCRUM Implementation Principles

Finally, the methodology integrates Agile-SCRUM principles to guide the deployment process. Agile methodologies emphasize iterative development, stakeholder participation, and responsiveness to feedback. Applying SCRUM principles ensures that it remains adaptable, user-centered, and aligned with evolving school needs, rather than being a rigid, top-down imposition.

RESULTS

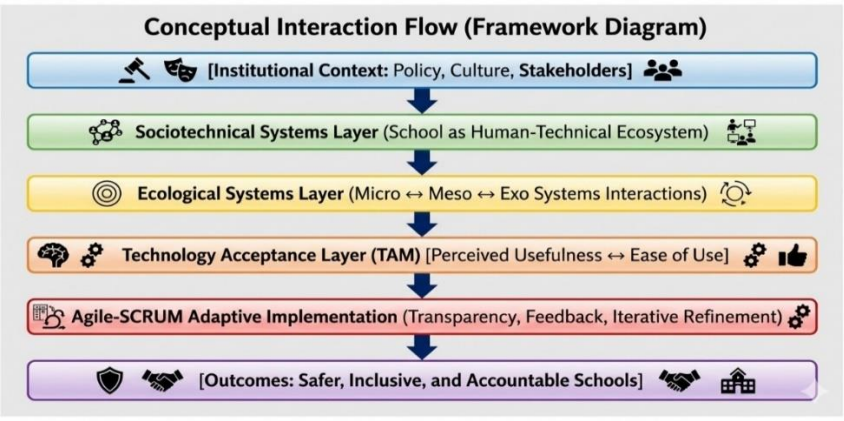
The System Architecture and Framework

The result of this theoretical synthesis is a multi-layered conceptual model and a corresponding system architecture designed to operationalize the theory.



Conceptual Interaction Flow

The framework is visualized as a cascading flow of interactions, moving from high-level institutional contexts down to practical implementation.



ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume XI Issue I January 2026

As illustrated in the conceptual framework above:

1**. Institutional Context**: The flow begins with policy, culture, and stakeholders, grounding the system in national laws (like RA 10173) and local school culture.

2. **Sociotechnical Systems Layer**: This layer defines the school as a "Human-Technical Ecosystem," ensuring that hardware does not disrupt educational processes.

3. **Ecological Systems Layer**: This mediates the interactions between the Micro, Meso, and Exo systems, facilitating data flow between the school and the home.

4. **Technology Acceptance Layer (TAM):** This acts as a filter for adoption, balancing "Perceived Usefulness" against "Ease of Use" to ensure staff and students accept the system.

5. **Agile-SCRUM Adaptive Implementation**: The final layer focuses on execution through transparency, feedback, and iterative refinement.

6. **Outcomes**: The ultimate result is defined as "Safer, Inclusive, and Accountable Schools".

System Block Diagram and Functionality

Translating the conceptual framework into technical specifications, the system architecture is defined by the following operational blocks:

The system architecture operates in the following manner:

User Identification & Data: The first layer consists of gathering together the data of students and staff that will be connected to a user identification module (most probably RFID or another similar secure ID) employed by the school.

Core: "Integrated Campus Access, Attendance Management, and Locator System" is the name of the central processing unit. The functionality of this core engine is the incorporation of the sociotechnical needs declared in the framework.

Output Modules: The central system supplies the three output processes of utmost importance:

1. Access control: Real-time physical control of and monitoring of the entry/exit points so that unauthorized access is prevented.

2. Attendance monitoring and recordkeeping: The Logging process is automated to eliminate human error in manual logs.

3. Location tracking and locator service: Delivering immediate information about student whereabouts to mitigate safety issues in areas with no supervision.

DISCUSSION

A Paradigm Shift in School Safety

The proposed framework is a bold step towards a new era in the conceptualization of school safety. It does not just cut off security as an isolated gate-and-guard series but sees it as a part of the institutional ecosystem. By integrating sociotechnical, ecological, and behavioral views, safety is a joint responsibility among all the actors - students, teachers, parents, and administrators.

Inclusivity and Ethical Governance

The model, in fact, through gender-sensitive design and ethical data practices, makes inclusivity an integral part of it. This is in alignment with the Sustainable Development Goals, wherein SDG 4 (Quality Education), SDG 9 (Industry, Innovation, and Infrastructure), and SDG 16 (Peace, Justice, and Strong Institutions) play a major role. The system, based on the literature that points out the particular vulnerabilities of female and LGBTQ+ students, not only monitors but also turns into a protector and equity promoter.

Adaptability in Resource-Constrained Settings

In the Philippine scenario, where the majority of public schools are poorly equipped, the Agile-SCRUM model's flexibility is a crucial factor. A "waterfall" deployment that is not open to changes will most likely fail because different schools have different levels of technical readiness. The Agile method's winning feature is that it adapts the technological interventions to the pace of the institutional capacity, policy needs, and cultural acceptance. The administrative inefficiencies mentioned above, pointed out by [5] DepEd (2023), are directly addressed because the system can grow or shrink according to the specific resources at a particular campus.

CONCLUSION

The theoretical framework is a powerful conceptual base for the establishment, implementation, and upscaling of the integrated school safety systems in the Philippines. By integrating sociotechnical systems thinking, ecological perspectives, technology acceptance insights, and agile implementation strategies, the framework opens the way for a comprehensive and context-sensitive approach to educational security.

The present-day manual systems prove inadequate to safeguard students against the increasing threats of violence and trespassing. The author shows that a technology-based solution, backed by concrete theory and ethical practice, can not only lock down the premises but also foster trust. The features of openness, fairness, and data ethics make a model that can easily be expanded for educational reform, not only in the Philippines but also in other countries. Future studies must center on carrying out pilot projects in a few public schools to confirm the theoretical relationships suggested here through actual testing of the model.

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