Stakeholder Requirements and Acceptance of an AI-Assisted Classroom Safety Monitoring System: A Pilot Study in a Private School in Cebu City, Philippines

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DOI: https://doi.org/10.47772/IJRISS.2026.101100205

Received: 09 November 2026; Accepted: 14 November 2026; Published: 24 November 2026

ABSTRACT

When bullying occurs while a teacher is out of the classroom, school staff may learn about it only if someone reports it. This pilot study examined what a private school in Cebu City, Philippines, would need to use an AI-assisted classroom safety monitoring system and how administrators and learners viewed its use. Three external information technology specialists assessed the prototype's technical viability after a guided demonstration using staged incidents. Five administrators witnessed same demonstration and rated usefulness and ease of use of the system. Twenty-three teachers assessed their own ability to respond to violence-related incidents. The 104 learners in Grades 7 to 12 answered questions about classroom safety and rated the proposed system after hearing how staff would handle alerts. The specialists judged the prototype highly viable, giving their strongest ratings to reliability and stability. The prototype's ability to respond to verbal commands received lower ratings for detection. Teachers felt they could get help from the right staff member when an incident required immediate attention. They were less confident in their initial responses that they could access older reports or identify that a new report was added to a previous concern. The system is highly acceptable, according to the administrators' ratings. In their written comments, they suggested that perhaps the recordings be taken without permission. Learners agreed that the school should provide information about how the system works and establish guidelines for system use. The study identified 15 requirements based on the ratings by the four groups and written comments from the specialists and administrators. Proposed pilot includes staff viewing the attached clip for each alert, and maintaining a searchable record of the staff decision and any follow up. The school will inform learners before monitoring starts who will be able to view the recordings of the camera and when.

Keywords: School Safety, Bullying, Artificial Intelligence, Technology Acceptance, Stakeholder Requirements

INTRODUCTION

School violence and bullying affect an estimated 246 million children and adolescents each year (UNESCO, 2017). Bullied students report fear and avoidance of school (Vidourek et al., 2016) and being bullied is linked to lower achievement (Abrigo et al., 2024). The disease is severe in the Philippines. The percentage of Filipino boys who felt bullied at least a few times a month (53%) and Filipino girls (43%) is above the OECD average (around 20%) for the 2022 Programme for International Student Assessment (PISA) (OECD, 2023b). A national study of the same data revealed that bullying is a factor in the achievement gap between proficient and non-proficient Filipino learners (Abrigo et al., 2024).

Public concern intensified in June 2026, when two armed students killed three students at a public high school in Tacloban City (Gabieta, 2026). The Department of Education (DepEd) responded with a nationwide School

Safety Campaign which focused on implementing the following measures: metal detectors, bag inspections, closed-circuit television (CCTV) monitoring, and strengthening anti-bullying policies (Daguno-Bersamina, 2026). DepEd Order No. 6, s. 2026 likewise encourages CCTV use in classrooms and other school areas (Department of Education, 2026). These measures are in addition to an existing framework. The Anti-Bullying Act of 2013 (Republic of the Philippines, 2013) mandates all elementary and secondary schools to develop anti-bullying policies and to maintain anti-bullying records.

That framework is heavily reliant on victim and witness reports. Students may be reluctant to report incidents due to fear of retaliation and/or feelings of shame (UNESCO, 2017), and those spaces students deem unsafe include spaces that are not adequately supervised by adults (Vaillancourt et al., 2010). There are also some deficiencies on the staff side, as reflected in Philippine studies. Cardona et al. (2015) found that teachers' discipline techniques in an urban national high school were not sufficiently directed toward recognizing and mitigating bullying. Sanapo (2017) reported a victimization rate of 40.6% among 340 Grade 6 pupils in Western Visayas and found that very few teachers referred witnessed cases to the child protection committee. An incident that occurs while the teacher is out of the room may therefore never enter the school's records.

Computer vision has been proposed as a way to notice such incidents as they happen. Video-based models have distinguished violent from non-violent actions with reported accuracies of 95% or higher (Narynov et al., 2021; Perseghin & Foresti, 2023; Ye et al., 2020), deep learning detectors have been trained to flag visible handguns in surveillance video (Olmos et al., 2018), and lightweight audio models have detected aggressive vocalizations on low-cost hardware (Bakhshi et al., 2023). A recent systematic review found that the YOLO family of models is now the most widely used approach to classroom behavior recognition (Liu et al., 2025). These results, however, come from prepared datasets. In field tests, it has been noted that performance reduces under lighting conditions, occlusion, low resolution and camera position in real surveillance videos (Negre et al., 2024; Ullah et al., 2023); that the criteria used for evaluation vary between studies (Murugan et al., 2025); and that false alarms generated by the deployed weapon detectors can be so common that operators turn a system off (Vallez et al., 2021).

Use in a school requires detection accuracy only one of the conditions. A monitoring system should be managed by staff, records are made of minors as a result of its operation and the operation of the monitoring system changes the way learners experience the classroom. The Technology Acceptance Model (Davis, 1989) suggests that adoption is influenced by perceived usefulness and perceived ease of use, and in a school this responsibility lies with a limited number of administrators who are responsible for child protection. One of the theories on protection motivation is the theory of Rogers (1975) which states that the readiness to seek help is correlated with the assumption of having a protective response. Administrative, teaching and student perspectives on school CCTV indicate that cameras are seen as a valuable tool for safety and discipline; however, there is concern about privacy, autonomy and trust (Kunwar, 2024) and a recent study on audio-based monitoring noted that 91% of the teachers and students sampled gave privacy concerns about audio monitoring. If it is any system, it should be the Data Privacy Act of 2012 (Republic of the Philippines, 2012) and the DepEd Child Protection Policy (Department of Education, 2012) that must be followed in the Philippines.

The technical literature has progressed more than the evidence of what schools need from these systems. Published studies report model performance, but few document who would operate an AI-assisted monitoring system in a school, what its records should contain, and how it would fit the way staff already handle incidents. Philippine work has begun to treat school safety technology as an organizational matter, including a conceptual framework for public schools that draws on the Technology Acceptance Model (Cunanan et al., 2026). To the author's knowledge, however, no published study has gathered from the stakeholders of a Philippine basic education school the operating roles, incident-record requirements, and teacher response capacity that AI-assisted classroom monitoring would have to accommodate. The present pilot study addressed this gap in one private school in Cebu City. A working prototype was built and demonstrated so that respondents could assess a concrete system, and four stakeholder groups were consulted. The study sought to determine (a) the technical viability of the prototype as perceived by external IT specialists after a guided demonstration, (b) teachers'

self-reported capacity to respond to violence-related incidents, (c) the acceptability of the proposed system to school administrators, and (d) learners' perceptions of safety during unsupervised periods, of the protection they expect from the proposed system, and of its appropriate use and safeguards. The findings were then consolidated into a set of stakeholder requirements that forms the basis of a school-based implementation plan. The study contributes a requirements list that is traceable to the people who would operate, be accountable for, and be observed by such a system, together with four questionnaires that other schools can adapt.

METHODOLOGY

Research Design and Setting

The research design was descriptive research and orientation was requirements analysis. No treatment was applied in the experiment and there were no comparison groups. Prototype was finished prior to data collection and did not change during respondents' evaluation. The accuracy of its detection under normal classroom conditions was not tested nor is it claimed.

This study was carried out in the school year 2026-2027 in a private school located in Cebu City, Philippines. The school complies with Republic Act No. 10627; however, the anti-bullying procedures are largely based on the report of the complainant (victim or witness) and the school does not have a monitoring system in the classroom. The classrooms have fixed seats, are well-lit, have internet access, and are small. One classroom was chosen for the demonstration with the help of School administration.

The Prototype

The prototype was running on a Windows laptop, using an Intel Core i3-1115G4 processor and 8 GB of memory. A Tapo C200 1920x1080 15 fps network camera provided video, while a USB microphone provided audio. It uses Python for the software, OpenCV, PyTorch, Ultralytics YOLO, SpeechBrain, Flask, SQLite, and FFmpeg libraries. Two pretrained YOLOv8 nano models screened the video. This choice is in line with the wide use of YOLO models for classroom behavior recognition (Liu et al., 2025) and with the recommendation to use smaller models on devices with limited capability (Ullah et al., 2023). The first, a fight detection model, outputs the classes violence and non-violence (Musawer14, n.d.). The second, a weapon detection model, outputs pistol and knife (Hadi959, n.d.). Both are distributed as weight files on the Hugging Face model hub, and the repository addresses are given in the reference list. It used the same files without local retraining and the files' SHA-256 hashes were equal to the published weights files' hashes. The input size of both models was set to 640 pixels and the set confidence threshold was 0.40, meaning that a detection below 0.40 did not trigger an alert. The weapon model publisher does not provide training, test or license documentation. Pushing, hitting, grabbing and kicking are not differentiated in either model and neither were modeled on local footage in this study. The screening of the sound was carried out by using an English speech-emotion model and a loudness threshold. The prototype was not able to transcribe speech and there was no saving of microphone audio, which is in line with Republic of the Philippines (2012) Data Protection Act (RA 10173). During the development testing on the reference laptop, the processor usage ranged from 55% to 60%, approximately 2 frames per second were screened, and each vision model was ~63 to 172 milliseconds per frame.

The flow from input to human review as shown in figure 1. The vision and audio signals are sent to event rules which determine which events to create, and which group repeated signals. A local alert is triggered on the browser dashboard for each event, recorded in a local database and associated with a short video clip that starts up to 10 seconds prior to the event. Then, an authorized user opens the alert, views the clip, and records one of three outcomes: the alert should be followed up through school procedures; no safety concern was identified; or it was not possible to determine from the information presented (Figure 2). Once saved review cannot be edited and all actions performed on an alert are recorded on an audit trail along with the account and the time.

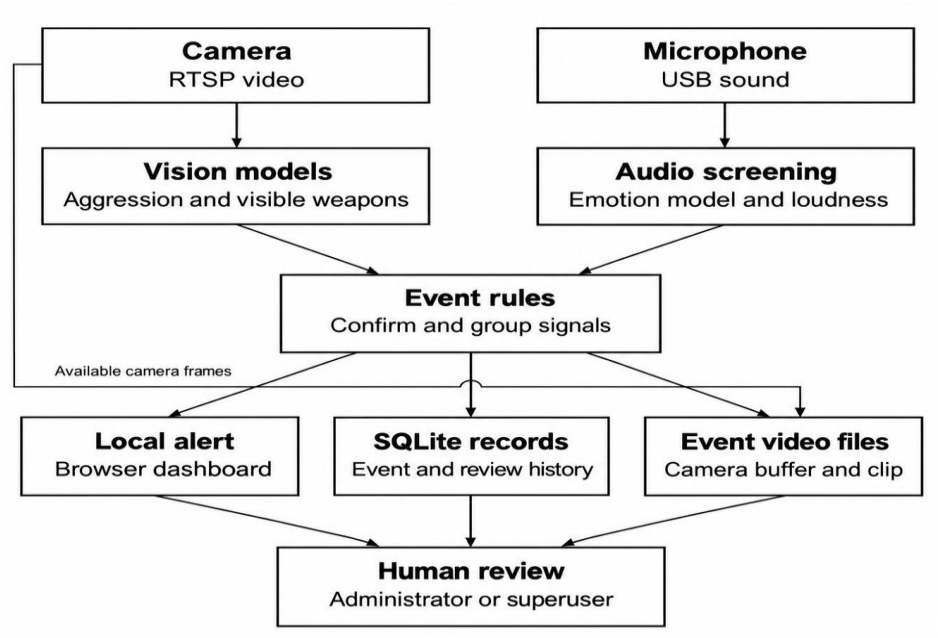


Figure 1. Flow of the Prototype from Camera and Microphone Input to Human Review

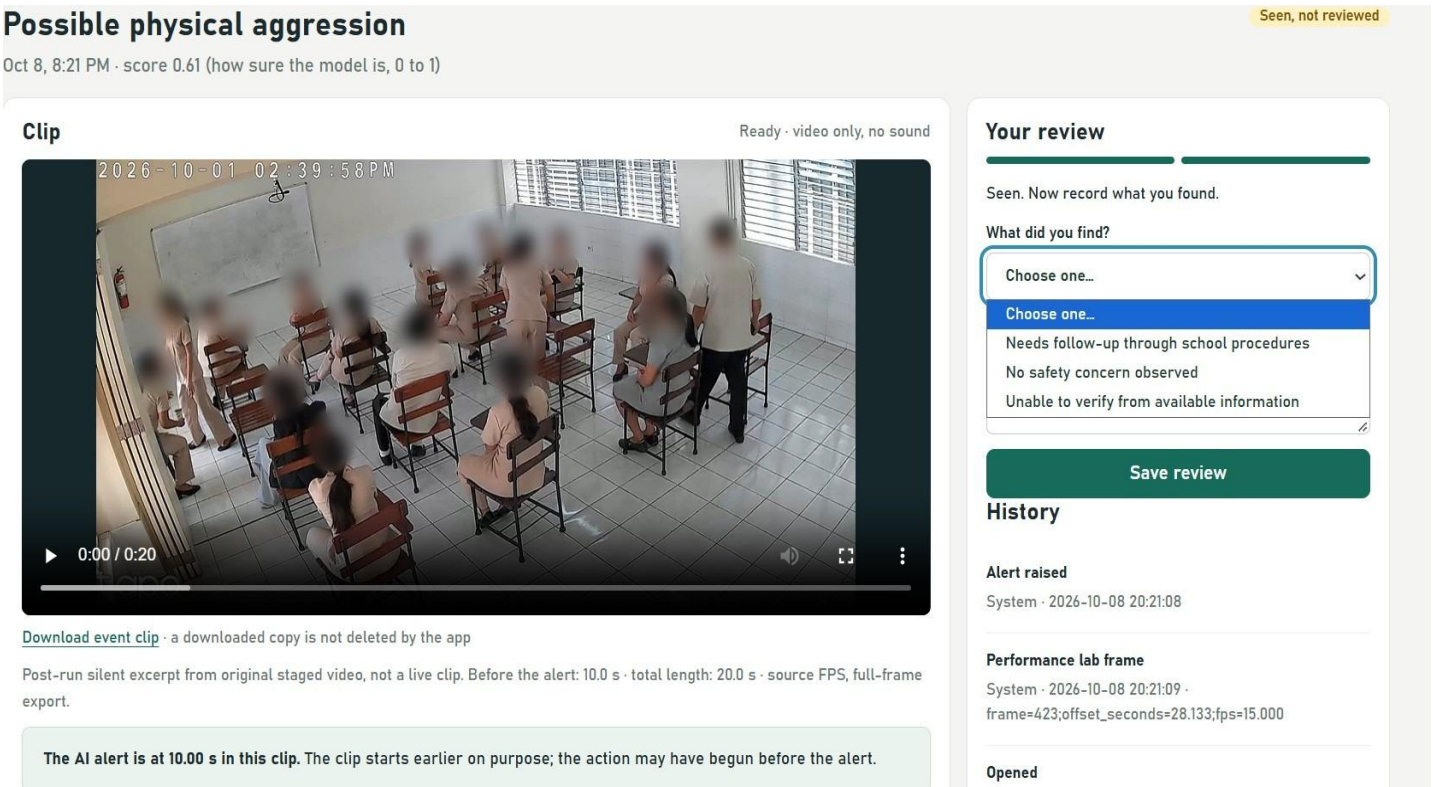


Figure 2. Alert Review Screen of the Prototype

Note. The clip shows a staged scene performed by adult volunteers. Faces are blurred.

There are two account roles in the prototype. An administrator is the one who accesses the camera and can play or download clips and can record review results. A superuser can have the same functions and also delete reviewed events after the retention period, manage accounts, settings, testing tools. Role permissions are checked by the server. No accounts at all are created for teachers or learners and the dashboard is accessible only from the laptop running the prototype. No table of learners' identities is stored in the database, but clips might contain identifiable individuals. The demonstration scenarios were enacted with the consenting adult volunteers with props in all demonstrations, and there was no learner at any point during the study.

Participants

Four groups took part, for a total of 135 respondents (Table 1). Three IT specialists were selected purposively. Each held a degree in information technology, computer science, or a related field, had at least three years of professional experience in software development, systems or data analysis, or information security, and had no affiliation with the school. The 23 teachers were selected purposively from those who held a teaching load and had served at the school for at least one full school year. The five administrators and coordinators were those identified by the school as the intended users of the proposed system. All learners in Grades 7 to 12 were invited, and 104 took part: 19 from Grade 7, 24 from Grade 8, 17 from Grade 9, 18 from Grade 10, 17 from Grade 11, and 9 from Grade 12.

Table 1. Distribution of Respondents

Group	Respondents	*n*	%
1	Information technology specialists (developers, systems analysts, network and security practitioners)	3	2.22
2	Classroom teachers	23	17.04
3	School administrators and coordinators identified as intended system users	5	3.7
4	Learners in Grades 7 to 12	104	77.04
	Total	**135**	**100**

Instruments

Four researcher-developed or adapted questionnaires were used, one for each group (Table 2). All rated items used a four-point agreement scale from 1 (*strongly disagree*) to 4 (*strongly agree*), with higher ratings indicating a more favorable assessment. The five key quality characteristics of the ISO/IEC 25010:2023 product quality model (International Organization for Standardization & International Electrotechnical Commission, 2023) were used to develop the Technical Viability Assessment Questionnaire (TVAQ). The Teacher Response Capacity Questionnaire (TRCQ) queried teachers about their experiences throughout the school year in three areas: awareness/understanding of incidents, documentation/follow-up of incidents, and timely response/coordination of incidents. The constructs of perceived usefulness and perceived ease-of-use were taken from Davis (1989) and adapted into the Administrator Technology Acceptance Questionnaire (ATAQ). The Learner Safety Perception Questionnaire (LSPQ) included first-person statements about safety during unsupervised times, protection offered by the proposed system, and appropriate use and safeguards; it did not solicit personal incidents from the learners. The TVAQ and the ATAQ also contained open-ended questions.

Table 2. Instruments, Content Validity, and Reliability

Instrument	Respondents	Rated items (open-ended)	S-CVI/Ave	Cronbach's alpha
TVAQ	IT specialists (*n* = 3)	20 (4)	0.97	0.71 (main study, *n* = 3)
TRCQ	Teachers (*n* = 23)	12 (0)	0.69	0.87 (pilot, *n* = 15)
ATAQ	Administrators (*n* = 5)	12 (2)	0.81	0.90 (main study, *n* = 5)
LSPQ	Learners (*n* = 104)	15 (0)	0.93	0.83 (pilot, *n* = 15)

Note. TVAQ = Technical Viability Assessment Questionnaire; TRCQ = Teacher Response Capacity Questionnaire; ATAQ = Administrator Technology Acceptance Questionnaire; LSPQ = Learner Safety Perception Questionnaire; S-CVI/Ave = average scale-level content validity index based on the expert review before rewording.

The panels consisted of three experts, including one for the TVAQ, who was a content expert, and two IT specialists. The experts rated the relevance of every item on a four-point scale and also judged clarity,

construct alignment, language, and suitability for the intended respondents. The item-level content validity index was the percentage of experts who gave their item a rating of 3 or 4 (Lynn, 1986; Polit & Beck, 2006). With three experts, an item is conventionally accepted only at an index of 1.00 (Lynn, 1986; Polit et al., 2007). In the TVAQ, 18 of 20 items reached 1.00 and two had 0.67. In the LSPQ, 13 of 15 items reached 1.00, one had 0.67, and one had 0.33. In the ATAQ, nine of 12 items reached 1.00, two had 0.33, and one had 0.00. In the TRCQ, seven of 12 items reached 1.00, one had 0.67, two had 0.33, and two had 0.00. The average scale-level index, computed as the mean of the item-level indices, was therefore 0.97 for the TVAQ, 0.93 for the LSPQ, 0.81 for the ATAQ, and 0.69 for the TRCQ. The last two fell below the 0.90 benchmark of Polit and Beck (2006). No item was removed. Items were reworded according to the experts' comments before the questionnaires were used: four in the TVAQ, six in the TRCQ, six in the ATAQ, and five in the LSPQ. In the TRCQ, the lowest ratings went to two documentation items that duplicated each other, and these were rewritten as two distinct statements. The three TRCQ items that later received the lowest teacher ratings (finding older records, relating a new report to an earlier concern, and keeping track of next steps) each had an index of 1.00 and were administered as originally worded. The revised TRCQ and the LSPQ were then pilot-tested with 15 teachers and 15 learners who did not take part in the main study, giving Cronbach's alpha values of 0.87 and 0.83. The TVAQ and the ATAQ alpha were determined from the responses of the main-study (alpha = 0.71 and 0.90). Coefficients based on three and five respondents are unstable, and these two are reported for completeness only. Item development and pretesting followed the guidance of Boateng et al. (2018).

Procedure

All three IT Specialists were given the same specification sheet, along with the same diagrams of the system flow, access rights and database. A guided demonstration then demonstrated the detection examples and the ordinary comparison inputs and alerts, event records, clips, acknowledgement, human review, access restrictions, operating guides and the persistence of records after a restart. The specialists observed, asked questions and rated independently of each other. They didn't check the source code, or the database, and didn't conduct security tests. Administrators were given a neutral description and the same guided demonstration prior to completing the ATAQ. Teachers completed the TRCQ before seeing any demonstration, so that their ratings described current practice. Learners answered the LSPQ in English. They haven't seen or used the prototype. Before the items on the proposed system, a short description of the alert and staff review process was read to them. They were informed that the system might not capture incidents or might alarm for false reasons, that staff will look at all alerts and that they should report concerns to a teacher or another adult.

Data Analysis

Means and SD for each item and dimension were summarized for ratings. Dimension means were interpreted with equal-width ranges: 1.00 to 1.74 (strongly disagree), 1.75 to 2.49 (disagree), 2.50 to 3.24 (agree), and 3.25 to 4.00 (strongly agree). For technical viability these ranges were labeled not viable, less viable, viable, and highly viable, and for acceptability they were labeled not acceptable, less acceptable, acceptable, and highly acceptable. The five dimension means were equally weighted to compute overall TVAQ mean. Throughout this article, technical viability refers to the specialists' judgment of what they observed in the demonstration and read in the documentation. It is a subjective rating based on demonstrations, and is not an independent assessment of accuracy of detection, software quality, or security. The results are presented separately for each group as there were differences in size, role and questionnaire completed by each group. There were no inferential tests. Written answers from IT specialists and the administrators were read verbatim, coded and themed for each question. Only requirements were retained if they could be linked to a rating or to a theme in at least one group.

Ethical Considerations

The study conformed to ethical principles in order to ensure that the rights, privacy and welfare of all the respondents, especially the learners, who were minors and are entitled to special protection under Republic Act No 7610 (Republic of the Philippines 1992) were protected.

Ethical Approval and Coordination. Prior to a data collection, a formal request was made to the school administration regarding the conduct of the study along with the research instruments, and was approved. Copies were provided to the grade-level coordinators, who assisted with scheduling. The research proposal and instruments had been reviewed by the dissertation panel of the researcher's university and revised as per the recommendation of the panel.

Informed Consent and Voluntary Participation. Adult respondents were informed about the purpose of the study, what participation entailed, data to be collected, and their right to refuse to participate and each signed an informed consent form. Learners took part only with the written consent of a parent or guardian. The study was narrated to the learners in English and they had the option to refuse.

Confidentiality. The responses were anonymous and were kept in a computer account secured by a password, different from the prototype's own login, following RA 10173 (Republic of the Philippines, 2012).

Protection of Learners. In the questionnaire learners were not required to share any incident that might be considered personal. No learner was photographed, recorded or monitored at any time and no learners were shown the prototype. In the demonstration scenes, only the consenting adult volunteers and props were involved and no functional weapon was used.

RESULTS AND DISCUSSION

The results of each group of respondents will be presented in this section. The ratings are then read for each table, and compared with other studies. Figure 3 gives an overview of the dimension means of the four groups against the interpretation thresholds.

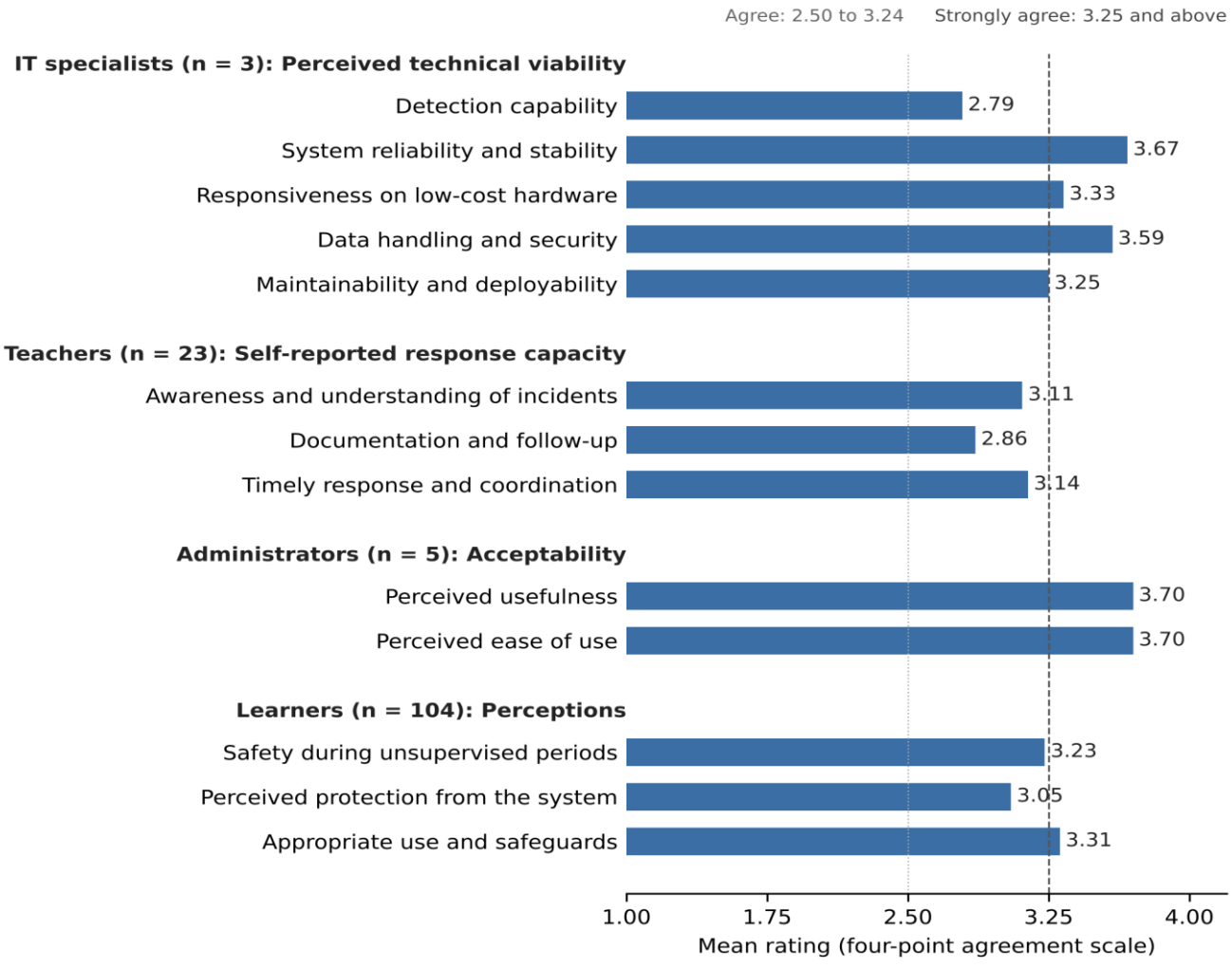


Figure 3. Dimension Means for the Four Respondent Groups

Perceived Technical Viability of the Prototype

Table 3 presents the ratings that the three IT specialists gave to the five dimensions of technical viability after the guided demonstration.

Table 3. Perceived Technical Viability of the Prototype as Rated by IT Specialists (n = 3)

Dimension	***M***	***SD***	**Interpretation**
Detection capability	2.79	0.72	Viable
System reliability and stability	3.67	0.15	Highly viable
Responsiveness on low-cost hardware	3.33	0.58	Highly viable
Data handling and security	3.59	0.72	Highly viable
Maintainability and deployability	3.25	0.72	Highly viable
Overall	**3.33**	**0.58**	**Highly viable**

The IT specialists rated the prototype highly viable overall (M = 3.33, SD = 0.58). System reliability and stability received the highest rating (M = 3.67), followed by data handling and security (M = 3.59), responsiveness on low-cost hardware (M = 3.33), and maintainability and deployability (M = 3.25). Detection capability was the lowest dimension and the only one rated viable instead of highly viable (M = 2.79). The components that store, protect, and present alerts were thus rated above the component that produces them.

The low ratings were concentrated in three items. The alert behavior for the vocal-cue examples was rated not viable (M = 1.33, SD = 0.58), the lowest item in the questionnaire, whereas the physical-aggression examples were rated highly viable (M = 3.50) and the visible-weapon examples viable (M = 3.00, SD = 1.00). The clip's responsiveness when an alert was acknowledged was found to be less viable (M = 2.00, SD The troubleshooting guide was likewise (= 1.73), and so was the troubleshooting guide (= 1.73).M = 2.33, SD = 0.58). It was noted that four items were rated as “excellent” by all three specialists: stability of the dashboard in the demonstration, keeping the acknowledged alerts in view until they are reviewed, opening a clip from its alert record, and navigating between alert records.

The lower detection rate is similar to results found in the literature on surveillance models. The published weights for the vision models were used with these models, and they were not trained from local footage, so caution is needed when using them for new camera positions, lighting, and scenes (Negre et al., 2024; Ullah et al., 2023). The aggression model evaluates the violence of each frame individually, which may trigger an alarm for rapid ordinary movements, and some ordinary actions like hugging or playing may be confused with acts of violence (Negre et al., 2024). A problem with visible weapons is also a problem. A handgun can be less than 3% of a CCTV image, which is small number of pixels for a detector to operate on, said Salazar González et al. (2020). The audio output was anticipated for other reasons. The model was trained on English emotional speech, whereas classroom speech in Cebu mixes Cebuano, Filipino, and English. Retta et al. (2023) found that speech emotion models trained and tested on Amharic averaged 82.53% accuracy, while models trained on English and tested on Amharic reached only 61.43% to 65.87%. Filipino emotion corpora exist, but they were built from acted or broadcast audio and cover Filipino, not Cebuano (Corpus & Villanueva, 2024; Cu et al., 2013).

The high ratings for the other dimensions agree with earlier prototype evaluations. Cornelio (2022) found that 10 IT experts rated a camera-based alert prototype as excellent in terms of reliability (average rating out of 5 points is 4.73). Smaller models are better for devices with less capability as they require less power at lower cost (Ullah et al., 2023), and lightweight models have proven to be useful for time-sensitive violence detection (Vijeikis et al., 2022). In the realm of security, Republic Act No. 10173 mandates that organizations implement reasonable and appropriate organizational, physical, and technical measures to ensure the security of personal information (Republic of the Philippines, 2012), and Li et al. (2023) demonstrated that privacy-enhancing capabilities like face masking and automatic deletion of recordings could be incorporated into a camera-based system using low-cost hardware. However, security tends to receive the greatest scrutiny. Security was the lowest rated characteristic for a campus vehicle monitoring system, according to Navalta (2022);

maintainability was the second lowest characteristic in Cornelio's (2022) expert ratings. The low rating is also of concern as Philippine teachers have been discovered to seek technical assistance from their colleagues or the ICT coordinator of the school, and seldom from outsiders (Dela Rosa, 2016).

There are two implications for design. Firstly, the school version of the system should be based on camera detection and not include the audio detector until a model appropriate to local speech has been tested. Second, there should be a permanent element in the system to review all the alerts, which is human. It is still hard to watch an entire video stream without human intervention (Omarov et al., 2022) and surveillance systems need human supervision (Olmos et al., 2018). Taking a middle ground between the two is reviewing short clips only when an alert is issued. The reviewer noted that Vallez et al. (2021) found that almost all alarms that come from a deployed handgun detector are false alarms, so the alarm should not be the trigger for a school response.

Teachers' Self-Reported Response Capacity

Table 4 presents the teachers' ratings of their own capacity to respond to violence-related incidents in the three dimensions of the TRCQ.

Table 4. Teachers' Self-Reported Response Capacity (n = 23)

Dimension	***M***	***SD***	**Interpretation**
Awareness and understanding of incidents	3.11	0.74	Agree
Documentation and follow-up	2.86	0.82	Agree
Timely response and coordination	3.14	0.76	Agree
Overall	**3.04**	**0.77**	**Agree**

Teachers agreed that they had the capacity to respond to violence-related incidents (M = 3.04, SD = 0.77), and all three dimensions fell in the agree range. Timely response and coordination was rated highest (M = 3.14), followed by awareness and understanding of incidents (M = 3.11) and documentation and follow-up (M = 2.86). The highest item in the questionnaire was being able to get help from the appropriate staff when something needs immediate attention (M = 3.48, SD = 0.59). The two lowest were finding older records when following up a related problem (M = 2.61, SD = 0.89) and identifying when a new report relates to an earlier concern (M = 2.65, SD = 0.98). Keeping track of next steps (M = 2.91) and receiving enough information to understand the main facts of an incident (M = 2.87) were also rated below the other items.

Teachers were less certain that they learn of incidents that happen while they are out of the room (M = 3.04) than of incidents that happen in their presence (M = 3.30). This difference agrees with the finding of Vaillancourt et al. (2010) that students feel least safe in the places at school with the least adult supervision, and it supports the original rationale for monitoring, which is to bring unsupervised periods to the attention of an adult. These ratings are self-reports of perceived capacity, and in view of the content validity results for the TRCQ they are treated as exploratory.

In this light, the teacher data indicate the school's weakness is in what happens after the first response. The teachers were sure that they would be able to get support as quickly as possible, which could be due to the size of the school. They were least confident in their ability to find previous records, follow-up on a new report with a previous concern, and follow-up on a concern. All three experts rated the three items as relevant, although the first draft questionnaire was not very well valided in content. The functions they described are those which Republic Act No. 10627 is based on, as the law mandates to keep records and statistics of bullying in schools (Republic of the Philippines, 2013). It is not a problem with lack of knowledge of the law. Pinera et al (2022) stated that the teachers and students in secondary schools in Northeastern Cagayan were highly aware of the types of bullying it encompasses and recommended its implementation to be strengthened.

This trend is similar to what has been seen internationally. Needs included clear procedures, database to record bullying events, and time dedicated to dealing with bullying reports, from staff in Australian primary schools

(Gizzarelli et al., 2025). This suggests that the actions taken by the school after they receive a report is important, as Rigby (2020) showed that bullying either stopped or was reduced in 67% of the cases where the student had reported the bullying and the school had intervened. A comparative study of regional policies also revealed that most jurisdictions in the Southeast Asian region do not have up-to-date, detailed data on school safety incidents (Adlit et al., 2026). In terms of system design, this implies that the case record may be more important to the school than the detector; this is something that the pilot can test. An archived record that can be searched, contains the teaching objective's review results, and provides a link to previous reports also provides a next step and a person responsible, which describes the items teachers rated lowest.

Acceptability to School Administrators

Table 5 presents the administrators' ratings of the proposed system on the two constructs of the Technology Acceptance Model.

Table 5. Acceptability of the Proposed System to School Administrators (n = 5)

Dimension	***M***	***SD***	**Interpretation**
Perceived usefulness	3.7	0.5	Highly acceptable
Perceived ease of use	3.7	0.5	Highly acceptable
Overall	**3.7**	**0.5**	**Highly acceptable**

The five administrators rated the proposed system highly acceptable (M = 3.70, SD = 0.50). Perceived usefulness and perceived ease of use obtained the same mean (M = 3.70), and all 12 items had means between 3.60 and 3.80. The highest usefulness items concerned timely alerts, noticing concerns that might otherwise be missed, and overall support for the school's response to safety concerns. The highest ease-of-use items concerned learning the basic tasks, the clarity of on-screen labels, and opening a clip.

According to Davis (1989), perceived usefulness is the extent to which a person thinks that using a system would improve his or her job performance, while perceived ease of use is believed to be the ease of use of a system without exertion. The results of both ratings were positive, but both were reported by only five of the respondents and resulted from expectations of one guided session. This is similar to other studies that have been conducted. Most administrators, teachers and students interviewed in six schools in Nepal expressed their view that the CCTVs were essential for safety, discipline, and Navalta (2022) found that overall the end users were found to be 97.50% accepting the campus vehicle monitoring system after trial run in the schools. High acceptance following demonstration is thus not uncommon and should not be interpreted to mean that the system is effective.

Learners' Perceptions

Table 6 presents the learners' ratings. Learners rated a description of the proposed system and had not seen the prototype.

Learners agreed overall with the statements presented to them (M = 3.20, SD = 0.79). Appropriate use and safeguards was the highest dimension and the only one in the strongly agree range (M = 3.31). Its highest item was that learners should be informed about how the system works and how it may be used (M = 3.42, SD = 0.63), and learners also strongly agreed that there should be clear rules on when the system may be used in a classroom (M = 3.32), on how alerts are used (M = 3.30), and on how recorded information is protected (M = 3.30).

Table 6. Learners' Perceptions of Safety and of the Described System (n = 104)

Dimension	***M***	***SD***	**Interpretation**
Safety during unsupervised periods	3.23	0.82	Agree

Perceived protection from the proposed system	3.05	0.83	Agree
Appropriate use and safeguards	3.31	0.72	Strongly agree
Overall	**3.2**	**0.79**	**Agree**

Safety during unsupervised periods followed (M = 3.23). Learners strongly agreed that they feel safe when a teacher is temporarily out of the room (M = 3.46) and that staff should act when a learner reports a concern (M = 3.49). They agreed less strongly that classmates behave safely toward one another when the teacher is away (M = 3.03, SD = 0.95) and that they feel comfortable reporting a safety concern to school staff (M = 3.02, SD = 0.91). Perceived protection from the proposed system was the lowest dimension (M = 3.05). Within it, learners agreed most that an administrator checking an alert could bring earlier attention to a possible bullying situation (M = 3.18) and least that the system would help administrators notice a concern sooner (M = 2.95) or that it would affect how safe they feel (M = 2.94).

With conditions, the learners hence supported the system. They were most similar in their agreement with being informed, and least similar in their agreement with feeling safer because the system was implemented. This ordering is in line with previous studies. Students reported that cameras were useful, but that they were uncomfortable when they were constantly monitored, five of the eight students who participated were concerned about privacy, and that they should be involved in the decision-making process regarding CCTVs (Kunwar, 2024). The overwhelming majority of educators (91%) and students (93%) in the study on audio-based monitoring expressed privacy concerns. Philippine law points the same way, since Republic Act No. 10173 protects personal information, which includes footage of learners (Republic of the Philippines, 2012), and Republic Act No. 7610 establishes the special protection owed to them as children (Republic of the Philippines, 1992).

The results also qualify the assumption that monitoring improves the sense of safety. Learners already reported feeling safe in the classroom when the teacher is away, as students generally do in PISA 2022 (OECD, 2023a). Yet about three in every four Filipino students in the same assessment had experienced bullying at least once in the previous 12 months (Abrigo et al., 2024), so a general sense of safety can coexist with frequent incidents. The items that learners rated lowest in the safety dimension were comfort in reporting a concern and trust in classmates' behavior. From the standpoint of Protection Motivation Theory, what learners need is confidence that a protective response is available (Rogers, 1975). A reporting path to trusted adults that every learner knows is thus a requirement in its own right, and the system should be presented to learners as a supplement to reporting.

Themes from the Open-Ended Responses

Themes were summarised in Table 7 from the written responses of the IT specialists and the administrators.

The specialists' comments went beyond their ratings on security. Data handling and security was seen as highly viable, but they had concerns around the ability to download clips directly, reusing session tokens and ensuring that stored files are safe. The concern was raised during the demonstrating and not confirmed by the code inspection and security testing. The experts also recommended that there be a camera alert level, a detection box to be placed on the clip, an event record that includes a plain description of camera, location, and level of confidence, two camera angles per classroom, and a step-by-step guide for the user, with no technical background.

Some of these ideas are reflected in the previous research. For a rare, high consequence event, separate alert levels allow the school to more finely balance how urgent the alert should be, as mentioned by Vallez et al. (2021) as a practical solution to the false alarm issue. The request for a fuller event record is for the reviewer's workload. Huszár et al. (2023) reported that the amount of video could be a challenge to conduct real-time human analysis and a vague description of the target was mentioned as a task-related problem in CCTV work by de Bruijn et al. (2016). This was a need that was also met by the camera-based alert prototype that Cornelio (2022) created, which displayed the location of a detection only as a numeric code, and that study suggested displaying the name of the location. A record that shows what was flagged and where is intended to reduce the

effort of each review, although whether it shortens decision time was not measured in this study. Contrary to this, on camera placement, Ogawa et al. (2025) noted that the farther students are seated from the camera in the classroom, the more difficult it was to detect their presence, while Cornelio (2022) found that the position of the camera in the classroom affected its detection.

The administrators explained what they require in the school prior to adoption: alerts on mobile phone, more number of rooms, having multiple cameras visible in once, existing cameras already in the school to be compatible with the system, and improved CCTV installation. They focused on unauthorized access, hacking, the privacy of recordings and the balance between surveillance and privacy. These requests will cost and should be budgeted for. The number of images operator can follow is also restricted (de Bruijn et al., 2016) and network load increases as the number of cameras, image resolution and frame rate increase (Vijeikis et al., 2022). The concerns themselves are reiteration of the concerns related to privacy, autonomy and trust among the school stakeholders as identified by Kunwar (2024).

Table 7. Themes from the Open-Ended Responses of IT Specialists and Administrators

Group	Question	Themes
IT specialists	Parts of the system that need improvement	Technical and security enhancements; detection and alert prioritization; visual evidence shown on the clip; improved detection accuracy
Changes to hardware or setup instructions	Clearer hardware and software requirements; visual aids and beginner-level guidance; complete step-by-step setup instructions; existing setup diagram endorsed	
Information missing from the event record	Camera, location, and confidence indicators; specific description of what was detected; concise summary with suggested action	
Other concerns and recommendations	Security and data protection; camera placement and coverage with two angles; audible alert for staff	
Administrators	What the school needs before adoption	Mobile alerts; more cameras and wider coverage; multi-screen viewing; compatibility with existing cameras; improved CCTV installation
Concerns and desired safeguards	Online security; privacy of recordings; protection against hacking; physical and digital safety; balance between surveillance and privacy	

Stakeholder Requirements and Implications for Schools

The analysis of the ratings along with the themes resulted in four areas of requirement, which equated to 15 requirements (Table 8). There are seven relating to the system, two relating to user roles and access rights, three relating to the hardware and interface, and three relating to governance.

Most technical requirements were provided by the IT specialists and the requirements for the record keeping, communication and safeguards were provided by the teachers, administrators and learners themselves. There were two requirements that were raised by more than one group separately. The protection of clips and sessions has been provided by the IT specialists and administrators and the data privacy policy has been provided by the administrators and the learners. The findings in each of these groups are followed up to the requirement areas in Figure 4.

The 15 requirements highlight that monitoring with AI tools is an organizational endeavor, and not just a software acquisition. Five of them (in the areas of access rights and governance) don't depend on any detection technology whatsoever. This supports Kunwar (2024) who found that CCTV in schools should be modelled by set policies and guidelines to include students, teachers and administrators. The study then suggested a plan for school implementation in a one-school-year cycle, with four stages – preparation, orientation, one-classroom pilot, review. The plan includes camera surveillance and manual review of all alerts, different levels of alerts for weapons and aggression, case records to be searched and followed up, and two cameras in the pilot room. The two camera setup is a site-specific suggestion by the specialists and will be tested in the pilot, since a comparison between a one and two camera setting has not been performed in this setting.

Prior to the processing of any classroom footage, the plan must undergo an external security review, be accompanied by a data privacy policy in line with Republic Act No. 10173, have clear rules and guidelines on when footage is being captured and who can view the recordings, and be accompanied by orientation for staff, students and parents of the plan. Any concerns that have been confirmed during a review are made through the school's child protection procedures (Department of Education, 2012). The pilot concludes with a review of the audit trail, and re-administering the questionnaires before a decision to use it on a wider basis. From this case, there are two practical points that could be taken to schools contemplating similar systems. Stakeholders should be engaged prior to procurement due to variance in their needs by their role, and some of these needs cannot be met by a vendor. Infrastructure and leadership support have also been identified as preconditions for educational technology in Philippine schools generally (Espinosa et al., 2025), and the present findings indicate that the same applies to safety technology.

Table 8. Stakeholder Requirements Derived from the Findings

Area	Requirement	Source group
System	1. Camera-based detection with human review of every alert; audio detection left out; more advanced models tested	IT specialists
2. Separate alert levels for a possible weapon and for physical aggression	IT specialists	
3. Event record showing camera, location, confidence, and a plain description, with the detection box on the clip	IT specialists	
4. Clip recording that does not slow the reviewer's actions	IT specialists	
5. Records that keep each case with its review and can be searched and linked to earlier reports	Teachers	
6. Tracking of next steps after the first response	Teachers	
7. Alerts that reach staff away from the monitoring computer, including mobile alerts	Teachers; administrators	
User roles and access rights	8. Sign-in with separate administrator and superuser roles checked by the server, with an audit trail	IT specialists
9. Controls on clip downloading, protection of session tokens, and a security review before deployment	IT specialists; administrators	
Hardware and interface	10. Two camera angles per classroom, a multi-screen view, and compatibility with existing CCTV	IT specialists; administrators
11. Setup and troubleshooting guide with	IT specialists	

exact requirements, pictures, and steps for beginners		
12. Optional sound alert for staff when a weapon or aggression is detected	IT specialists	
Governance	13. Data privacy policy and access controls consistent with Republic Act No. 10173	Administrators; learners
14. Learners informed about the system, with written rules on when it runs, how alerts are used, and how recordings are protected	Learners	
15. Reporting path to trusted adults made known to every learner, with the system used alongside reporting	Learners	

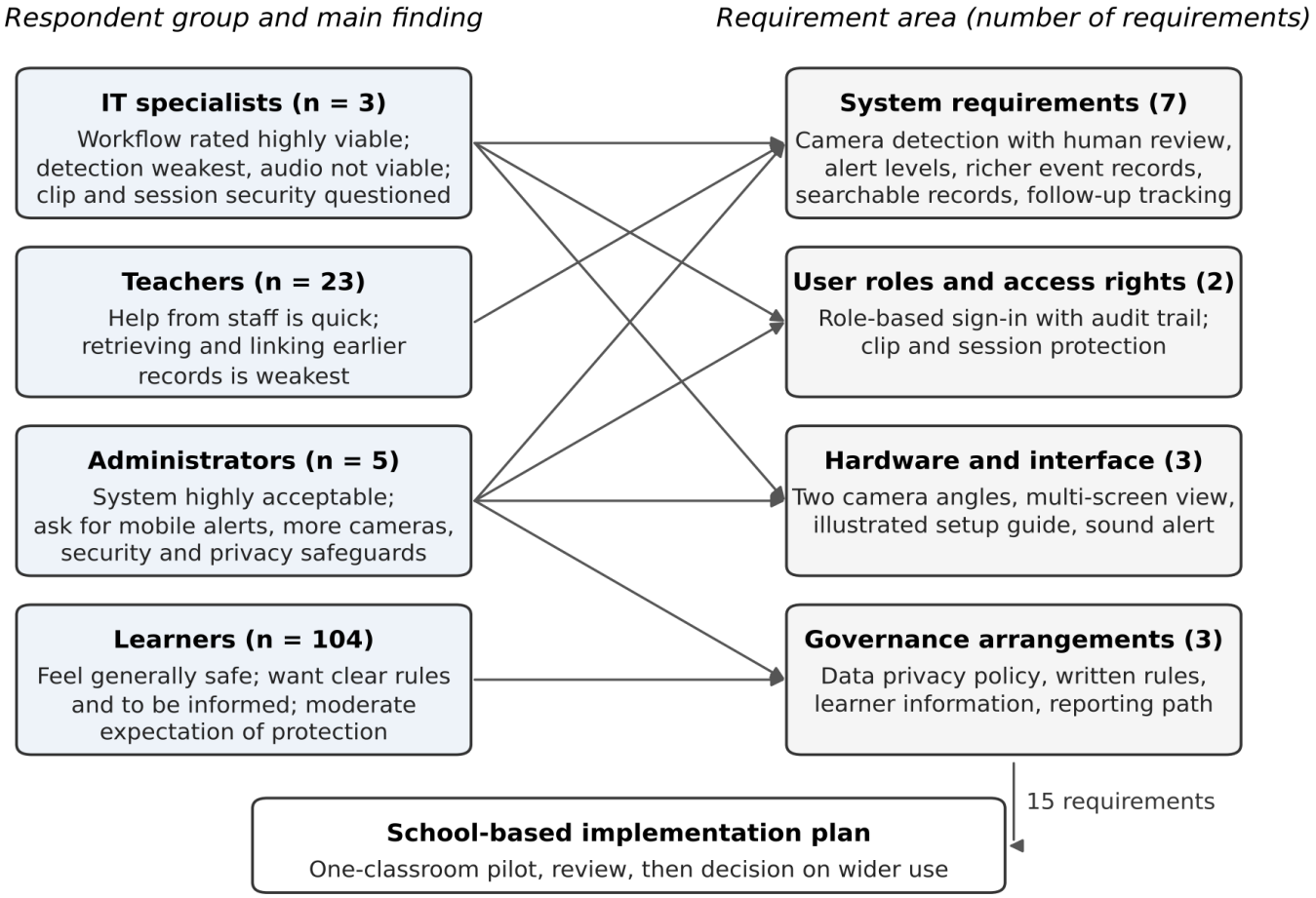


Figure 4. Links Between Respondent Group Findings and Requirement Areas

LIMITATIONS AND FUTURE RESEARCH

These findings were limited by a number of constraints. The subjects of the study were limited to one private school with small classes; the findings do not provide a statistical generalisation of such schools or other schools. The groups of IT specialist and administrator were very small,n = 3 and n Because there is only one rating each, their means are very sensitive and their reliability coefficients are not reliable. The administrator group, however, included all the planned users of the system at the school. This was a descriptive analysis and there were no significance tests conducted between the mean scores of the dimension ratings. The author designed the prototype and performed the demonstrations, this may have affected the ratings of those who saw them. The technical assessment was based on the expert's judgment from a guided demonstration of the

system's performance with simulated situations and did not carry out any accuracy benchmarking, code review or penetration testing, which meant that the viability ratings were subjective, not objective. The pretrained models have not been retrained and evaluated in local conditions and the training data of the weapon model are not documented. Learners rated a system which they have never seen, therefore ratings are based solely on expectations. The content validity indices are used to describe the items as they were originally written and the reworded items were not rated again. For the TRCQ, five of the 12 items first submitted fell below the accepted index, so the teacher findings are preliminary and should be confirmed with a re-validated instrument. Two of the LSPQ items had almost the same wording in two dimensions and one item in perceived protection had no clear direction, which could have lowered the mean score on this dimension. All ratings were self reported and may be subject to social desirability by teacher and administrator.

The models should be tested for a locally staged classroom video with precision, recall and false alarm rates, and the evaluation of the system should be conducted over a supervised pilot period followed by the same set of stakeholder questionnaires to compare expectations with results. Replication in larger classes (in public schools) would help determine if the requirements here identified are present in more crowded and congested settings. Before audio detection is reconsidered, research is required for modelling speech emotion for mixed Cebuano, Filipino and English speech.

CONCLUSIONS

This pilot study was an effort to record the requirements of four stakeholder groups of one private school in the Philippines of an AI-based classroom safety monitoring system. After a guided demonstration, external IT specialists judged the alert-and-review workflow highly viable on low-cost hardware and judged detection, particularly from audio, to be its weakest part. Teachers' self-reports, which are preliminary given the validity evidence for their questionnaire, point to difficulty in retrieving records, linking related reports, and tracking follow-up. While the proposed system was accepted by the administrators, learners who rated a description of it, also agreed it could improve, with emphasis on informing, and clear rules for its use. Conditions were attached by both administrators and learners on security and privacy. Based on these findings, there are 15 requirements for such a system: detection must be camera-based, with human review of all alerts; case records and follow-up must be enhanced; and the system should be implemented in addition to access controls, a privacy policy, written rules, and a reporting path identified by learners. The results indicate that, for those schools and policy makers who 'heard' the call to install CCTV in classrooms, governance and record keeping should receive no less attention than the detection technology.

FUNDING

This research received no external funding.

CONFLICTS OF INTEREST

Disclosure of Financial Interest: None. The author was the one who created the prototype that is evaluated in this study.

DATA AVAILABILITY STATEMENT

The data are not publicly available as the respondents include minors and due to the promise of confidentiality, the questionnaires were not completed by all respondents. The summary data are available, de-identified, and in summary form upon reasonable request from the corresponding author.

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