

Integrated Learning Facilities and Classroom Comfort in a Pesantren: A Qualitative Case Study of Teacher Experience

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Abstract

Teaching quality in Islamic boarding schools (pesantren) is often attributed to inadequate learning facilities and uncomfortable classrooms. How teachers themselves perceive and experience these conditions in the pesantren setting remains little explored qualitatively. This study examined teachers' perceptions and experiences of integrated learning facilities and classroom environmental comfort in relation to their teaching at the Darussa'adah Islamic Boarding School Foundation, Nganjuk. Using a qualitative single instrumental case study, the researcher gathered data through in-depth semi-structured interviews, participant observation, and document review from eight informants: the foundation leader, the principal, four teachers who constitute the entire teaching staff (a complete census), and two senior students for cross-verification. Analysis followed an interactive process of data condensation, data display, and conclusion drawing and verification. Trustworthiness rested on source and method triangulation, extended engagement, member checking, peer debriefing, and an audit trail. Three themes emerged. First, integrated facilities served as both a motivator and a constraint: teachers valued them when they were reliable, but their limited numbers, unequal access, and lack of maintenance often made them an obstacle. Second, teachers experienced classroom comfort, especially heat and traffic noise, as shaping their psychological well-being, vocal endurance, and instructional delivery. Third, teachers reported teaching best only when reliable facilities and a comfortable room occurred together. The study offers a context-bound account in which teacher well-being links the physical teaching environment to instructional quality, and it has practical value for prioritizing maintenance and classroom comfort in pesantren.

Keywords: teaching performance; learning facilities; classroom environmental comfort; indoor environmental quality; teacher well-being

Introduction

Islamic boarding schools (pesantren) hold a distinctive position in Indonesia's education landscape. Long treated as traditional centers of religious instruction, they now sit formally within the national education system. Law No. 18 of 2019 on Pesantren establishes that pesantren carry three functions: education, da'wah (religious propagation), and community empowerment, and that the educational function operates as part of national education (Undang-Undang No. 18 Tahun 2019, Arts. 1, 5, and 15). The same law recognizes pesantren education at the primary, secondary, and tertiary levels and grants graduates of the non-formal track recognition equivalent to formal education upon passing the prescribed examinations (Arts. 17 and 23).¹ This recognition has coincided with rapid growth: the Ministry of Religious Affairs recorded roughly 29,000 pesantren before the law and more than 42,000 by 2025 (Kementerian Agama RI, 2025).² Scholarship now distinguishes pesantren along a continuum from salaf (traditional) to khalaf (modern) and integrated forms, with a clear move toward integrative models that combine religious and general curricula.³ The national agenda for pesantren quality accordingly stresses management modernization, teacher capacity, curriculum innovation, and learning infrastructure.⁴

Within this reform agenda, the relationship between learning facilities, classroom comfort, and teacher performance becomes important. Studies in Islamic boarding schools show that institutional leadership and the work environment together shape teacher performance, so instructional quality depends not only on individual competence but also on the conditions in which teachers work.⁵ Work on child-friendly pesantren adds

¹ Kementerian Agama Republik Indonesia, "Statistik Pondok Pesantren," *Education Management Information System (EMIS)*, October 9, 2025, <https://emis.kemenag.go.id/pontren/statistik/pontren>.

² Indonesia, "Statistik Pondok Pesantren."

³ A Riski, A Chande, and Adiantoni, "Pesantren in the Changing Indonesian Context: History and Current Developments," *Qudus International Journal of Islamic Studies* 8, no. 1 (2020): 65–106, <https://doi.org/10.21043/qijis.v8i1.5629>; R A Fitriani, D Murdowo, and W Liritantri, "The Characteristics of Pesantren in the Development of Islamic Education in West Sumatra," *Ulumuna* 24, no. 1 (2020): 132–54, <https://doi.org/10.20414/ujis.v24i1.382>; M Misdah et al., "Imam Zarkasyi's Modernization of Pesantren in Indonesia: A Case Study of Darussalam Gontor," *Qudus International Journal of Islamic Studies* 8, no. 1 (2020): 161–200, <https://doi.org/10.21043/qijis.v8i1.5760>.

⁴ E Nurtawab and D Wahyudi, "Restructuring Traditional Islamic Education in Indonesia: Challenges for Pesantren Institution," *Studia Islamika* 29, no. 1 (2022), <https://doi.org/10.36712/sdi.v29i1.17414>.

⁵ A Habibi et al., "Islamic Boarding School Leadership and Work Environment on Teacher Performance," *Nazhruna: Jurnal Pendidikan Islam* 6, no. 3 (2023): 420–35, <https://doi.org/10.31538/nzh.v6i3.4065>; A Qodir, "Teacher Performance in State Madrasah Aliyah: Classroom Management, Work Motivation, and Assessment," *Jurnal Ilmiah Peuradeun* 14, no. 2 (2026): 867–90, <https://doi.org/10.26811/peuradeun.v14i2.2617>.

that an adequate learning environment must be safe and comfortable, and that real improvement requires attention to curriculum, management, and infrastructure simultaneously rather than sequentially.⁶ Research on indoor environmental quality further links the physical conditions of the workplace to the comfort, satisfaction, and productivity of the people who work.⁷ Across these literatures, the material and environmental conditions of teaching are not peripheral to teacher performance in pesantren; they are integral to it.

Efforts to raise pesantren quality still meet persistent constraints. Research on quality assurance in pesantren has grown into an identifiable field,⁸ While constraints such as limited human resources, uneven access to technology, resistance to change, and infrastructure gaps remain widely reported across the sector, questions of teacher deployment and infrastructure budgeting therefore sit at the heart of any discussion of teacher performance. The Pesantren Law itself addresses part of this by institutionalizing state support: central and regional governments must assist with pesantren funding, and the government must establish and manage a pesantren endowment fund (dana abadi Pesantren) drawn from the national education endowment (Undang-Undang No. 18 Tahun 2019, Arts. 48–49).⁹

In many pesantren, a gap has opened between existing infrastructure and the demands of contemporary learning. These institutions are now expected to combine religious and general education, formal and non-formal learning, and technology-supported curricula, not only to deliver classical religious instruction.¹⁰ The transition remains uneven. The problem is often not the absence of facilities but a mismatch between their condition and current needs, including classroom size, ventilation, library quality,

⁶ M Abidin, “Pesantren Education in Indonesia: Efforts to Create Child-Friendly Pesantren,” *Ulumuna* 26, no. 2 (2022): 447–71, <https://doi.org/10.20414/ujis.v26i2.558>.

⁷ D I Younis and A S Hasan, “Occupants’ Indoor Environmental Quality Satisfaction Factors as Measures of School Teachers’ Well-Being,” *Building and Environment* 119 (2017): 99–109, <https://doi.org/10.1016/j.buildenv.2017.03.045>; S Thapa, G K Panda, and P Das, “Impact of Indoor Environmental Quality on Job Satisfaction and Self-Reported Productivity of University Employees,” *Building and Environment* 181 (2020): 107102, <https://doi.org/10.1016/j.buildenv.2020.107102>.

⁸ S Al-Hakim et al., “Quality Assurance in Pesantren: Modernization, Adaptability, and Integration into Indonesia’s Education System,” *Jurnal Pendidikan Islam* 11, no. 1 (2025): 101–14, <https://doi.org/10.15575/jpi.v11i1.43951>.

⁹ Indonesia, “Undang-Undang Republik Indonesia Nomor 18 Tahun 2019 Tentang Pesantren,” Lembaran Negara Republik Indonesia Tahun 2019 Nomor 191 (2019).

¹⁰ Riski, Chande, and Adriantoni, “Pesantren in the Changing Indonesian Context: History and Current Developments”; Misdah et al., “Imam Zarkasyi’s Modernization of Pesantren in Indonesia: A Case Study of Darussalam Gontor.”

maintenance, and the facilities' capacity to support varied learning.¹¹ Evidence from pesantren that have modernized their infrastructure suggests that more integrated facilities can raise student engagement and achievement without displacing pesantren identity.¹² Classroom comfort is central here because indoor environmental quality, including thermal conditions, air quality, lighting, acoustics, and spatial arrangement, affects concentration, motivation, learning quality, and teacher effectiveness and well-being.

Yayasan Pondok Pesantren Darussa'adah, Nganjuk, was selected as the research site based on preliminary observations that set it apart from other pesantren in the region. Initial site visits in July and August 2025 identified several concrete conditions.

First, the foundation has invested in a small set of learning-support resources, namely two portable LCD projectors, a science laboratory with basic equipment, and a small library. These are neither sufficient in number nor evenly available. No classroom has a permanently installed projector; the two portable units are shared across all eight classrooms, which frequently causes scheduling conflicts and delayed lessons. The science laboratory is physically present, but its equipment appeared dusty and unused, with no maintenance log or inventory update in the preceding six months. The library held about 200 textbooks, most of which were published before 2015, and teachers had no access to digital or internet-based reference resources.

Second, four of the eight classrooms face the main road and are exposed to traffic noise throughout the day. Five of the eight classrooms lack ceiling fans, and ventilation relies on small windows that do not fully open. Lighting varied, with two classrooms relying on a single fluorescent tube. Approximate afternoon readings in classrooms without fans indicated temperatures of about 32-34 °C; these were indicative observations rather than instrument-controlled measurements, and the observation procedure is

¹¹ H W Brink et al., "Classrooms' Indoor Environmental Conditions Affecting the Academic Achievement of Students and Teachers in Higher Education: A Systematic Literature Review," *Indoor Air* 31 (2021): 405–25, <https://doi.org/10.1111/ina.12745>.

¹² Misdah et al., "Imam Zarkasyi's Modernization of Pesantren in Indonesia: A Case Study of Darussalam Gontor"; Fitriani, Murdowo, and Liritantri, "The Characteristics of Pesantren in the Development of Islamic Education in West Sumatra"; Moh. Dannur, Ikram Shaliadi, and Zainullah, "Pastoral Datafication and Wasathiyah in Practice: Digital Behaviour Governance as Religious Moderation in an Indonesian Pesantren," *Al-Insyiroh: Jurnal Studi Keislaman* 12, no. 2 SE-Articles (n.d.): 174–89, <https://doi.org/10.35309/2mc64w25>; Husniyatus Salamah Zainiyati and Khoirun Niam, "Educational Leadership Transformation in Traditional Settings: Policy Adaptation and Distributed Authority in Indonesian Pesantren Educational Leadership Transformation in Traditional Settings: Policy Adaptation and Distributed Authority in Indonesian Pesantren," *Leadership and Policy in Schools* 00, no. 00 (2026): 1–19, <https://doi.org/10.1080/15700763.2025.2608041>.

described in the Methods section. Such conditions matter because infrastructural gaps can slow the learning process, while thermal and acoustic discomfort can reduce concentration, vocal endurance, and teaching performance.¹³

Third, Darussa'adah is analytically useful because it is a long-established pesantren, founded in 1985, that is now moving from a largely Salafi model toward an integrated curriculum. This phase makes it well-suited to examining how teachers manage the gap between institutional aspirations and existing infrastructure. Its location in Nganjuk, East Java, a region with many pesantren, underscores its relevance, since the institution has received little research attention despite conditions common to many transitioning pesantren.

The study's theoretical framework connects three strands, integrated learning facilities, classroom environmental comfort, and teacher teaching performance, to the institutional life of pesantren. Educational infrastructure works as an enabling condition for teaching and learning. Its influence depends on planning, arrangement, use, and sustained management, not on availability alone, and it reaches teachers' own workplace comfort and well-being.¹⁴ The lens fits pesantren, where learning spans formal lessons, religious study, dormitory life, habituation, and character formation, rather than a single classroom-bound process.¹⁵ The pesantren context also exposes a limit of general infrastructure theory, since dormitories and communal religious spaces carry moral, disciplinary, and symbolic functions that standard facility models do not fully capture.

Classroom environmental comfort. The second strand draws on environmental psychology and research on indoor environmental quality. These treat temperature,

¹³ A.-M. Sadick, Z E Kpamma, and S Agyefi-Mensah, "Thermal Comfort in University Classrooms: An Experimental Study in the Tropics," *Building and Environment* 187 (2021): 107430, <https://doi.org/10.1016/j.buildenv.2020.107430>; J Yang et al., "Adaptive Thermal Comfort Model for Educational Buildings in a Hot-Humid Climate," *Building and Environment* 150 (2019): 181–94, <https://doi.org/10.1016/j.buildenv.2018.12.011>; C Visentin and N Prodi, "Noise, Screaming and Shouting: Classroom Acoustics and Teachers' Perceptions of Their Voice in South African Schools," *South African Journal of Childhood Education* 10, no. 1 (2020): a681, <https://doi.org/10.4102/sajce.v10i1.681>.

¹⁴ A Ephgrave, "The Effects of the Physical Environment Design on Teachers' Workplace Comfort: A Critical Review," *International Journal of Architectonic, Spatial, and Environmental Design* 14, no. 3 (2020): 17–30, <https://doi.org/10.18848/2325-1662/CGP/v14i03/17-30>.

¹⁵ Ghiffari Syauqy Said, Muhtadi Ridwan, and Ahmad Sholeh, "Formation of Discipline Character Through Internalization of the Value of Islamic Religious Education in the Students of the Wali Songo Ngabar Islamic Boarding School," *FONDATIA*, 2025, <https://doi.org/10.36088/fondatia.v9i2.5752>; S Sutikno, "Value-Based Management and Character Development in Islamic Boarding Schools: A Systematic Review," *Managere: Indonesian Journal of Educational Management*, 2026, <https://doi.org/10.52627/managere.v8i2.2026>.

lighting, acoustics, air quality, and spatial conditions as factors that shape how occupants experience a room, attend to tasks, communicate, and perform. Poor thermal, lighting, acoustic, and air conditions impair teaching and learning, while acceptable conditions support concentration and communication.¹⁶ Temperature and lighting interact rather than act alone, and experimental work shows joint effects on attention and working memory.¹⁷ Acoustic conditions matter as well, since teacher-student communication depends on background noise, speech clarity, and room characteristics; sustained classroom noise increases vocal effort and prompts teachers' concerns about their voices.¹⁸ These theories still have limits for pesantren. No single indoor condition suits every task; occupants respond differently depending on their emotional and social context, and the most pleasant room is not always the one that best supports cognition.

Teacher teaching performance. The third strand is usually framed through planning, implementation, and evaluation, a standards-oriented model that remains useful for pesantren.¹⁹ Mainstream performance theory alone is not enough here, because pesantren teachers are also moral exemplars and religious guides within a value-based community whose aims reach beyond cognitive achievement.²⁰

Three gaps follow from this literature, each tied to a research question. First, much evidence on facilities, workplace environment, and teacher performance comes from survey designs that establish correlations but give limited access to teachers' own meanings and their reading of how conditions shape practice. This leaves room for a fuller qualitative account of how teachers perceive the condition, adequacy, and availability of integrated learning facilities in a pesantren where formal learning, communal routines,

¹⁶ P Ricciardi and C Buratti, "Environmental Quality of University Classrooms: Subjective and Objective Evaluation of the Thermal, Acoustic, and Lighting Comfort Conditions," *Building and Environment* 127 (2017): 23–36, <https://doi.org/10.1016/j.buildenv.2017.10.030>.

¹⁷ S Pradhan, Y Jang, and H Chauhan, "Investigating Effects of Indoor Temperature and Lighting on University Students' Learning Performance Considering Sensation, Comfort, and Physiological Responses," *Building and Environment*, 2024, <https://doi.org/10.1016/j.buildenv.2024.111346>.

¹⁸ A Razali et al., "Conceptual Framework of Acoustic Comfort Design Enablers for a Classroom: A Systematic Review," *Journal of Building Engineering*, 2024, <https://doi.org/10.1016/j.job.2024.110160>; M Tabatabaei Manesh et al., "How Classroom Acoustics Influence Students and Teachers: A Systematic Literature Review," *Journal of Technology and Science Education* 11, no. 2 (2021): 245–59, <https://doi.org/10.3926/jotse.1098>; B Shilpa, B Hariharan, and G Uma, "Classroom Noise and Teachers' Voice Production," *Journal of Speech, Language, and Hearing Research* 58, no. 5 (2015): 1397–1406, https://doi.org/10.1044/2015_JSLHR-S-14-0248.

¹⁹ Qodir, "Teacher Performance in State Madrasah Aliyah: Classroom Management, Work Motivation, and Assessment."

²⁰ Habibi et al., "Islamic Boarding School Leadership and Work Environment on Teacher Performance"; Abidin, "Pesantren Education in Indonesia: Efforts to Create Child-Friendly Pesantren."

and religious formation are bound together (RQ1). Second, classroom environmental comfort has been studied qualitatively in general educational settings but rarely in pesantren classrooms as a culturally embedded condition shaped by boarding-school life and communal occupancy; the pesantren evidence is scattered and seldom centers on the teacher's own classroom experience (RQ2). Third, the two conditions are usually examined in isolation, facilities and performance in quantitative terms, or comfort among students and in general higher-education classrooms, rather than together as teachers experience them (RQ3). To our knowledge, few qualitative studies examine how integrated learning facilities and classroom comfort jointly shape teacher performance within a single pesantren undergoing transition. Hence, the contribution here is contextual and site-specific rather than an absolute claim of novelty.

The general objective is to explore teachers' perceptions and experiences of integrated learning facilities and classroom environmental comfort in relation to their teaching at Yayasan Pondok Pesantren Darussa'adah, Nganjuk. Three research questions guide the inquiry: (RQ1) how teachers perceive the condition and availability of integrated learning facilities; (RQ2) how they experience and describe classroom environmental comfort; and (RQ3) how these factors together shape their teaching performance within the foundation's institutional culture.

Research Method

This study operates within an interpretivist paradigm, in which social reality is understood through participants' situated accounts rather than through context-free measurement. It uses a qualitative single instrumental case study.²¹ One bounded system, Yayasan Pondok Pesantren Darussa'adah, Nganjuk, is examined in depth to illuminate a wider problem: how teachers experience integrated learning facilities and classroom comfort in relation to their teaching. The case is bounded by site (one foundation), participants (its teaching and leadership personnel and senior students), and time (fieldwork in Juni 2025 and Desember 2025). An instrumental case design is well-suited to research questions that are explanatory and context-dependent, since a bounded, in-depth design can capture how and why teachers read material and how environmental conditions shape their practice.

²¹ R E Stake, *The Art of Case Study Research* (Sage, 1995).

The site was selected purposively as an information-rich case of a transitioning pesantren: a foundation established in 1985, now moving from a largely Salafi model toward an integrated religious and general curriculum, operating eight classrooms with a small teaching staff, in a region (Nganjuk, East Java) with many pesantren but limited prior research. The Introduction describes the site's conditions in more detail.

Participants were obtained through complete (total-population) sampling together with purposive key-informant selection. For the teaching staff, the study used a census rather than a sample: all four teachers who deliver daily classroom instruction took part, representing the entire teaching population (two teaching religious subjects and two teaching general subjects) across the site's levels and subjects. Because the teaching staff was fully enumerated, data saturation does not apply to this group. With no further teachers available, saturation cannot be separated from population exhaustion, so sample sufficiency rests on the completeness of the census and on the information power of a narrow, well-specified aim and cross-role triangulation.²² The foundation leader and the principal were included as key institutional informants, and two senior students were selected to allow cross-verification of teacher and leadership accounts. The final set comprised eight informants, summarised in Table 1.

Table 1.
Participant characteristics

Pseudonym	Role	Subject area	Sex	Age band	Years of service/association
FL-01	Foundation Leader	Foundation leadership	Male	50–59	18 years
P-01	School Principal	School leadership	Male	40–49	12 years
T-A	Teacher	Religious subjects	Female	30–39	8 years
T-B	Teacher	Religious subjects	Male	30–39	7 years
T-C	Teacher	Islamic Studies / Qur'anic Studies	Female	30–39	6 years
T-D	Teacher	General subjects	Male	40–49	11 years
S-A	Senior student	—	Female	17–18	3 years
S-B	Senior student	—	Male	17–18	3 years

The lead researcher is a lecturer at Universitas Pangeran Diponegoro Nganjuk with prior professional ties to several pesantren in the region. This partial insider position eased

²² K Malterud, V D Siersma, and A D Guassora, "Sample Size in Qualitative Interview Studies: Guided by Information Power," *Qualitative Health Research* 26, no. 13 (2016): 1753–60.

access and contextual understanding but carried a risk of familiarity bias. To keep the positionality visible and to limit its effects, the researcher kept a reflexive journal throughout fieldwork, held regular debriefings with two colleagues unconnected to the site, and actively sought evidence that could challenge emerging interpretations.

Interviews. All eight informants were interviewed using role-specific semi-structured interview guides developed from the study's three theoretical strands: integrated learning facilities, classroom environmental comfort, and teacher teaching performance. Each construct was addressed through a dedicated cluster of questions, while probes were used flexibly to clarify participants' experiences and obtain context-specific examples. Interviews were conducted primarily in Indonesian, with Javanese used when informants preferred to express experiences or meanings in their local language. With participants' consent, all interviews were audio-recorded and lasted approximately 45–75 minutes. The recordings were transcribed verbatim, with relevant Javanese expressions retained and, where necessary, translated into Indonesian during transcription and analysis. The interview guides were developed through two iterative rounds of refinement and subjected to content validation by three experts with backgrounds in Islamic education management and qualitative research methodology. The experts reviewed each question for its relevance to the intended construct, clarity, appropriateness for the target informants, and potential for eliciting sufficiently rich qualitative data. Their feedback was used to revise ambiguous wording, remove overlapping questions, and improve the alignment between questions and the three theoretical constructs. Because the validation was conducted as a qualitative expert review rather than a quantitative instrument validation procedure, no Lawshe content validity ratio (CVR) was calculated.

Participant observation. Each of the eight classrooms was visited at least three times, with observations distributed across morning and afternoon sessions to capture variation in teaching practices and classroom conditions throughout the school day. Observations focused on both how teaching practices were enacted and the physical conditions in which teaching and learning took place. Field observations were documented systematically using structured field notes guided by an observation protocol covering two main domains: (a) facility availability and use, including access to projectors, laboratory facilities, printed learning materials, and digital resources; and (b)

classroom environmental conditions, including perceived thermal comfort, audible traffic or external noise, ventilation, and lighting adequacy. Environmental conditions were documented through qualitative, researcher-rated observations rather than calibrated environmental measurements. No standardized environmental measurement instruments were used; therefore, observations of temperature or thermal conditions should be interpreted as indicative, non-instrumented estimates rather than precise measurements. Where approximate temperature ranges were noted in the field notes, they were treated as contextual observations to support the interpretation of classroom comfort rather than as quantitative environmental data. Repeated observations across sessions were used to identify recurring conditions and reduce reliance on a single classroom visit.

Document review. Lesson plans, facility inventories, maintenance records, and the school map were examined to corroborate the interview and observation data on facility condition, use, and upkeep.

Translation and language management. Interviews were conducted and transcribed in Indonesian, with Javanese used when preferred by participants, and all analysis was performed on the original-language transcripts to preserve the contextual meaning of participants' accounts. Interview excerpts presented in English were translated from the original transcripts by the lead researcher. To minimize translation drift, a bilingual checker independently compared the English translations with the original-language transcripts, focusing on semantic equivalence, contextual meaning, and culturally specific expressions. Any discrepancies were discussed and reconciled before the excerpts were included in the manuscript. No formal back-translation procedure was undertaken.

Analysis followed the interactive model of Miles, Huberman, and Saldaña.²³ data condensation, data display, and conclusion drawing and verification run as concurrent flows. Coding moved through two cycles.²⁴ A first cycle of descriptive and in-vivo coding was applied line by line to the original-language transcripts and field notes. A second cycle of pattern coding grouped the first-cycle codes into categories and then into the three themes. Coding was manual. Analytic memos recorded how codes developed and changed, and matrices and networks served as displays for comparing accounts across roles and data types. To keep the analytic language consistent, coding is situated within

²³ Matthew B. Miles, A. Michael Huberman, and Johnny Saldana, *Qualitative Data Analysis: A Methods Sourcebook* (Washington: SAGE Publications, 2014).

²⁴ J Saldaña, *The Coding Manual for Qualitative Researchers*, 4th ed. (SAGE, 2021).

the Miles-Huberman-Saldana framework rather than as a separate thematic analysis procedure. Table 2 shows an excerpt of the coding scheme.

Table 2.
Illustrative excerpt of the coding scheme

Raw datum (illustrative)	First-cycle code	Category	Theme
"There are only two projectors. If another teacher is using it, I have to go back to the lecture method." (Teacher B)	Shared and limited equipment forces a reversion to the lecture method	Facility unreliability and access constraints	Facilities as motivator and constraint
"My classroom faces the street... I have to raise my voice. After two hours... my voice is gone, and my head aches. It is also hot. There is no fan." (Teacher D)	Noise and heat lead to vocal strain, fatigue, and headache	Environmental discomfort and instructional stamina	Classroom comfort and teacher well-being
"In the morning, when the classroom is still cool, and the LCD is working, I feel enthusiastic... But when it is already hot, and the equipment is broken, I just want to finish quickly." (Teacher C)	Comfort and working tools together drive engagement; their absence drives withdrawal.	Interaction of facilities and comfort	Facilities and comfort as joint conditions

Coding and thematic analysis. Coding was not undertaken by a single analyst. The transcripts were reviewed by the lead researcher and two colleagues with experience in qualitative research who were external to the field site. The two colleagues independently reviewed the transcripts, the evolving coding scheme, and the candidate themes to assess the consistency and plausibility of the emerging interpretations. Differences in coding, category boundaries, or thematic interpretation were discussed among the researchers until consensus was reached. The coding scheme was refined iteratively during this process, with particular attention to maintaining alignment between the empirical accounts and the study's three theoretical strands. This collaborative process was used to strengthen analytical credibility and reduce the risk that interpretations would be shaped solely by a single researcher's perspective. No inter-coder reliability coefficient was calculated, as the purpose of the coding process was interpretive consensus rather than statistical estimation of coder agreement.

Trustworthiness was addressed in terms of credibility, transferability, dependability, and confirmability.²⁵ Credibility rested on source and method triangulation (comparing teachers, principal, foundation leader, and students, and comparing interviews, observation, and documents), four weeks of extended engagement, member checking in

²⁵ Yvonna Lincoln and Egon G Guba, *Naturalistic Inquiry* (Beverly Hills, CA: Sage publications, 1985).

which preliminary findings were returned to the four teacher participants (which produced minor refinements in theme wording), and peer debriefing. Transferability rests on a thick description of the site and context. Dependability and confirmability rest on an audit trail that retains the raw data, field notes, the reflexive journal, successive versions of the coding scheme, analytic memos, data-display matrices, and member-checking records, so that an external reader can trace how conclusions came from the data.

Results

Analysis of the interview, observation, and document data yielded three themes, each addressing one research question: facilities as both motivator and constraint (RQ1); classroom comfort and teachers' psychological well-being (RQ2); and facilities and comfort as joint conditions for teaching (RQ3). Across the three, participants described facilities and comfort not as separate technical variables but as connected conditions that, in their accounts, shaped their motivation, instructional strategies, emotional state, and perceived teaching effectiveness. Findings remain close to participants' perspectives and are reported as informants' perceptions rather than measured effects.

Integrated Facilities as Both Motivator and Constraint (RQ1)

Teachers described the foundation's facilities as valuable when they worked and unreliable in practice. On the enabling side, working tools, mainly the LCD projectors and the science laboratory, made lesson delivery more engaging and visual. On the constraining side, the small number of units, irregular maintenance, unequal access across classes, and the lack of digital or internet-based resources often turned facility provision into an obstacle. Teacher B's account captures the tension:

"There are only two projectors. If another teacher is using it, I have to go back to the lecture method. Sometimes when I want to use it, the bulb is dead. The remote is also often missing. I've prepared the material, but the tool can't be used." (Teacher B, interview, August 2025)

Teacher C said much the same about the laboratory:

"The laboratory is there, but many of the tools are dusty. When I wanted to do a photosynthesis experiment, the microscope was broken. There is no technician who checks the equipment." (Teacher C, interview, August 2025)

Observation and documentation support these accounts. Laboratory equipment appeared dusty and underused, and school records showed no maintenance schedule over the preceding six months. A senior student confirmed the pattern:

"We rarely go to the lab. The teacher said the tools are not complete." (Student A, interview, August 2025)

Read together, these data form a disconfirming case against the assumption that the provision of facilities directly translates into teaching benefits. The projectors and the laboratory were present yet unusable, with dead bulbs, a missing remote, a broken microscope, and no upkeep, so provision without reliability produced no gain and, at times, open frustration. What teachers valued was reliability and sustained use, not availability by itself. On this reading, the maintenance deficit is not a separate finding but the constraint that defines the harder edge of this theme.

Classroom Comfort and Teachers' Psychological Well-Being (RQ2)

Teachers described classroom comfort as closely tied to their psychological state and to the quality of classroom interaction. In their accounts, ventilation, temperature, lighting, seating, and noise affected physical comfort as well as patience, concentration, vocal endurance, mood, and the ability to sustain engagement over long sessions. Teacher D made this plain:

"My classroom faces the street. In the afternoon, it is noisy with motorcycles and trucks. I have to raise my voice. After two hours of this, my voice is gone, and my head aches. It is also hot. There is no fan. Teaching becomes heavy." (Teacher D, interview, August 2025)

The principal acknowledged the problem and the trade-off it created:

"Four classrooms face the main road. We tried closing the windows, but it became stuffy and hot. We have asked the foundation for fans, but only three classrooms have received them so far." (Principal, interview, August 2025)

A senior student gave the student-side view:

"When it is hot and noisy, the teacher gets annoyed. The students also have trouble focusing." (Student A, interview, August 2025)

Observation matched these accounts. During afternoon sessions, the researcher observed indicative temperatures of about 32 to 34 °C in classrooms without fans (see Methods for how these conditions were recorded), audibly high noise in rooms facing the main road during peak traffic, and poor cooling and lighting in several rooms. In participants' experience, environmental discomfort was not merely a background condition but an active factor that shaped the emotional rhythm of teaching and teachers' stamina.

Facilities And Comfort as Joint Conditions for Teaching (RQ3)

Participants described the two conditions as reinforcing one another rather than adding up separately. In their accounts, teaching was at its best not when facilities alone were available, or classrooms alone were comfortable, but when both were available at once. Teacher C conveyed this:

"In the morning, when the classroom is still cool and the LCD is working, I feel enthusiastic. The students are also responsive. We can watch videos, have discussions, and the lesson flows well. But when it is already hot, and the equipment is broken, I want to finish quickly. Everything feels like a struggle." (Teacher C, interview, August 2025)

Teacher B voiced a similar view:

"Teaching is already tiring. If the environment supports me enough light, not too hot, tools that work, I can be more creative. But if everything is not supportive, I just do what I can." (Teacher B, interview, August 2025)

The principal described the pattern at the institutional level:

"When facilities are good, and classrooms are comfortable, teachers are more settled. They prepare their lessons, and the students are active as well. It is like a positive cycle. But when conditions are poor, teachers become stressed, and I can see their morale declining." (Principal, interview, August 2025)

Observation was consistent with these accounts. In classrooms with working fans, adequate lighting, and a projector available, students appeared more engaged, and teachers used more varied strategies, such as group discussion and visual presentations. In poorly conditioned rooms, teaching was mostly lecture-based. Within the pesantren setting, this interdependence carried added weight, since teachers worked in conditions that combined formal instruction with wider moral and institutional responsibilities. Taken together, participants' accounts positioned reliable facilities and a comfortable room as the practical base of effective teaching, with their absence or inconsistency perceived to weaken motivation, narrow instructional variety, and lower the quality of delivery.

Discussion

This study set out to understand how teachers at Yayasan Pondok Pesantren Darussa'adah experience integrated learning facilities and classroom comfort while teaching. The three findings are discussed below, not to confirm that they echo prior work, but to explain why the patterns arise in this pesantren and what they imply for the framing theories. Because the evidence comes from a single transitioning pesantren with eight

informants, the interpretations are context-bound propositions rather than generalizable effects.

Facilities As Motivator and Constraint: Why Provision Reverses into Constraint (RQ1)

Educational infrastructure theory already holds that facilities enable teaching only through planning, arrangement, use, and sustained management, not through availability alone.²⁶ The Darussa'adah case does more than confirm this. It isolates which condition is binding and shows that its failure not only neutralizes a facility but also reverses its value. The mechanism is maintenance. A projector with a dead bulb or a missing remote, and a laboratory with a broken microscope, are not absent resources. They are present ones that the teacher has already built a lesson around, and they then fail at the point of delivery, which forces a reversion to lecture and produces frustration rather than a neutral fallback. A well-resourced school absorbs such failure through a spare unit. A pesantren with two shared projectors and no technician has no slack, so reliability becomes the point on which the whole enabling function turns.

This extends the theory with a boundary condition: below a maintenance-and-redundancy threshold, facility provision is not weakly positive but a net negative for instruction. The point also qualifies how infrastructure is read in pesantren scholarship. Quality assurance in pesantren has grown into an identifiable research field,²⁷ and case studies of modernized pesantren report gains in engagement and achievement.²⁸ At Darussa'adah, however, investment without upkeep produced the very constraint it was meant to remove. The disconfirming case is therefore not an anomaly to explain away but

²⁶ Younis and Hasan, "Occupants' Indoor Environmental Quality Satisfaction Factors as Measures of School Teachers' Well-Being"; E Siswanto and Dian Hidayati, "Management Indicators of Good Infrastructure Facilities To Improve School Quality" 1 (2020): 69–81, <https://doi.org/10.12928/ijemi.v1i1.1516>; Mohammad Zaini, Bahrul Munip, and Hatta Hatta, "Integrating Tradition and Modernity: Infrastructure Transformation at Al-Ustmani Islamic Boarding School in East Java," *FIKROTUNA: Jurnal Pendidikan Dan Manajemen Islam* 14, no. 2 SE-Articles (December 27, 2024): 203–16, <https://doi.org/10.32806/jf.v14i2.618>.

²⁷ Al-Hakim et al., "Quality Assurance in Pesantren: Modernization, Adaptability, and Integration into Indonesia's Education System."

²⁸ Misdah et al., "Imam Zarkasyi's Modernization of Pesantren in Indonesia: A Case Study of Darussalam Gontor"; Ayu Anindya Rasyad, Nurul Ulfatin, and Agus Timan, "Penataan Dan Pemanfaatan Sarana Prasarana Pembelajaran Pendidikan Formal Dan Nonformal," *Jurnal Pembelajaran, Bimbingan, Dan Pengelolaan Pendidikan* 3, no. 5 SE-Articles (April 11, 2023): 412–22, <https://doi.org/10.17977/um065v3i52023p412-422>.

the clearest evidence for the theme: the value of a facility lies in its sustained use, not its presence.

Comfort and the Teacher as the Affected Party (RQ2)

Indoor environmental quality research links thermal and acoustic conditions to attention, communication, and performance,²⁹ Yet it has concentrated on the student. Younis and Hasan,³⁰ Surveying 32 schools in Manitoba, the report makes the point directly: school IEQ studies focus on students rather than teachers, and even then, they reduce well-being to satisfaction with factors such as thermal comfort and lighting, overlooking its psychological, social, and physical dimensions.

The Darussa'adah accounts speak to this neglected side. Heat, traffic noise, and poor ventilation acted first on the teacher, producing vocal strain and headache from projecting over traffic, reduced patience, and a heaviness that drained stamina across a two-hour session. The acoustic evidence gives this subjective account an objective counterpart. Shilpa et al.,³¹ who recorded the voices of 40 teachers before and after a working day, found that classroom noise coincided with measurable changes in teachers' voice production. At the same time, Visentin and Prodi report that poor classroom acoustics shape foundation-phase teachers' perceptions of their own voices.³² The pathway does not end at fatigue: Mogas-Recalde et al., studying 90 teachers, link vocal problems to burnout, with most of those who showed burnout symptoms also scoring high for vocal difficulty.³³ Read against this work, the study's contribution is to trace, in teachers' own terms, the path that IEQ research has under-specified: the classroom environment reaches

²⁹ H W Brink et al., "Understanding How Indoor Environmental Classroom Conditions Influence Academic Performance in Higher Education," *Facilities*, 2023, <https://doi.org/10.1108/F-12-2022-0164>; Ricciardi and Buratti, "Environmental Quality of University Classrooms: Subjective and Objective Evaluation of the Thermal, Acoustic, and Lighting Comfort Conditions"; Pradhan, Jang, and Chauhan, "Investigating Effects of Indoor Temperature and Lighting on University Students' Learning Performance Considering Sensation, Comfort, and Physiological Responses."

³⁰ Younis and Hasan, "Occupants' Indoor Environmental Quality Satisfaction Factors as Measures of School Teachers' Well-Being."

³¹ Shilpa, Hariharan, and Uma, "Classroom Noise and Teachers' Voice Production."

³² Visentin and Prodi, "Noise, Screaming and Shouting: Classroom Acoustics and Teachers' Perceptions of Their Voice in South African Schools."

³³ J Mogas-Recalde, R Palau, and M Márquez, "Vocal Problems and Burnout Syndrome in Nonuniversity Teachers in Galicia, Spain," *Folia Phoniatrica et Logopaedica* 76, no. 1 (2024): 68–76, <https://doi.org/10.1159/000531982>.

instructional quality through the teacher's well-being and vocal load, not only through student attention, and that path runs through both teachers and students.³⁴

The setting sharpens the point, since the evidence base is drawn mostly from temperate, mechanically conditioned rooms. At the same time, Darussa'adah is a naturally ventilated, fan-only tropical classroom of the kind that tropical thermal-comfort work identifies as hardest to keep comfortable.³⁵ The broader workplace literature points in the same direction: even among university staff, indoor environmental quality shapes job satisfaction and self-reported productivity, and research there has likewise understudied the people who work in the building rather than the students.³⁶ The principal's account, closing windows to cut noise only to trap heat, adds a trade-off that single-factor comfort work rarely foregrounds. In resource-limited rooms, the comfort dimensions are coupled, so improving one can worsen another.

Performance Gated by a Joint Condition, Not A Sum (RQ3)

Standards-oriented models frame teacher performance in terms of planning, implementation, and evaluation, and locate it largely within the teacher's competence.³⁷ The third finding qualifies where that competence can be enacted. Teachers reported using their full repertoire, such as video, discussion, and visual presentations, only when a working projector and a tolerable climate were maintained simultaneously. When either failed, delivery fell back to lecture regardless of preparation.

The relation is therefore conjunctive, not additive: facility reliability and classroom comfort act as joint enabling conditions for the implementation phase, and competence below their joint threshold cannot express itself in varied instruction. This extends prior work that links the institutional environment to teacher performance in Islamic boarding

³⁴ Tabatabaei Manesh et al., "How Classroom Acoustics Influence Students and Teachers: A Systematic Literature Review."

³⁵ Sadick, Kpamma, and Agyefi-Mensah, "Thermal Comfort in University Classrooms: An Experimental Study in the Tropics"; Yang et al., "Adaptive Thermal Comfort Model for Educational Buildings in a Hot-Humid Climate."

³⁶ Abdul-Manan Sadick, Z Kpamma, and S Agyefi-Mensah, "Impact of Indoor Environmental Quality on Job Satisfaction and Self-Reported Productivity of University Employees in a Tropical African Climate," *Building and Environment*, 2020, <https://doi.org/10.1016/j.buildenv.2020.107102>; Thapa, Panda, and Das, "Impact of Indoor Environmental Quality on Job Satisfaction and Self-Reported Productivity of University Employees."

³⁷ M Pedaste et al., "Teacher Professional Standards to Support Teacher Quality and Learning in Estonia," *European Journal of Education*, 2019, <https://doi.org/10.1111/ejed.12346>; Qodir, "Teacher Performance in State Madrasah Aliyah: Classroom Management, Work Motivation, and Assessment."

schools.³⁸ Habibi et al. analyzed leadership and the working environment as influences on teacher performance, separately and together, and sought the dominant factor; the present study specifies the form that such influence takes at the classroom level: a joint condition with a threshold rather than a loose positive association.³⁹ The dependency is sharper in a pesantren than the finding alone implies, because teachers there carry moral, religious, and communal roles beyond cognitive instruction.⁴⁰ The affective cost of poor conditions, therefore, spills past the lesson into the exemplary role the institution expects them to hold, which may be why the principal read poor conditions as eroding not only lessons but morale.

Theoretical Contribution

Across the three findings, one context-bounded proposition holds: in a resource-constrained pesantren, teacher instructional performance is gated by the joint presence of facility reliability and classroom comfort, with the teacher's affective and vocal state as the connecting path, so that provision of one dimension yields little while the other stays absent or below a usability threshold. This is a working proposition, not a new general theory. It is falsifiable. It would fail if teachers in comparable settings sustained varied, interactive instruction only when a single condition held, or if the provision of facilities improved instruction where no maintenance regime existed. It is also scoped: it rests on one transitioning pesantren with eight informants and is offered for testing elsewhere, not asserted as established. On this framing, the contribution is not that facilities and comfort matter, which is known, but that in this class of institution, they matter jointly and conditionally, through the teacher rather than only the learner, in a way that additive, student-centered, and competence-centered frameworks do not jointly capture.

Practical Implications

The joint-condition logic has a concrete managerial consequence. For a foundation like Darussa'adah, the sequencing of investments matters more than their total. Because either dimension alone is insufficient, buying more projectors while classrooms stay hot and noisy, or installing fans while equipment stays unmaintained, predictably wastes the

³⁸ Widiyanto Widiyanto and Fakhruddin Fakhruddin, "Model For Improving Student Learning Outcomes Based on Facilities, Infrastructure, And Teacher Performance at MA Minhajut Tholabah," *Eduvest - Journal of Universal Studies*, 2026, <https://doi.org/10.59188/eduvest.v6i1.52696>.

³⁹ Habibi et al., "Islamic Boarding School Leadership and Work Environment on Teacher Performance."

⁴⁰ Abidin, "Pesantren Education in Indonesia: Efforts to Create Child-Friendly Pesantren."

outlay. Three actions follow for foundation managers. First, set up a basic maintenance regimen with a logged inventory, a scheduled check, and a designated person responsible before buying more equipment, because reliability, rather than quantity, is the binding constraint. Second, treat the classrooms facing the main road as a single priority bundle, pairing fans or cross-ventilation with simple noise mitigation, since heat and noise are trade-offs. Third, frame these as investments in teacher capacity, not only facility upgrades, because the path to instructional quality runs through teacher stamina and well-being. These are site-level recommendations, offered as plausible actions consistent with the case rather than as validated interventions.

Limitations

Four limitations bound these claims. First, the design is a single instrumental case study of a transitioning pesantren, so its propositions are presented as hypotheses rather than generalizations. Second, the teaching staff comprised four teachers, the full population at the site, which supports a census but also means the account rests on a few voices and cannot speak to variation across larger or differently organized pesantren. Third, the environmental conditions were captured through indicative, researcher-rated observation rather than calibrated instruments, so the temperature and noise descriptions are qualitative context, not measurement. Fourth, the data are cross-sectional and self-reported, so they capture how teachers perceive their conditions within a single fieldwork window and cannot establish that comfort or facilities caused changes in performance over time.

Future Research

These limitations point to the next steps. The joint-condition proposition is testable: a multi-site comparative study across pesantren at different stages of the salaf-to-integrated transition could show whether the threshold pattern recurs or is peculiar to Darussa'adah. The teacher-as-mediator claim invites a mixed-methods design that pairs instrumented measurements of temperature, noise, and illuminance with teacher-reported stamina and observed instructional variety, thereby turning the present indicative account into a testable mediation model. A longitudinal or intervention design, for example, introducing a maintenance regime or noise mitigation and tracking instructional change, would address the causal question that the cross-sectional data cannot. Finally, because the pesantren's communal, value-based character appeared to raise the stakes of poor

conditions, future work could examine how teachers' moral and religious roles interact with the workplace environment, a relationship this study could only glimpse.

Conclusion

This qualitative case study concludes that, at Yayasan Pondok Pesantren Darussa'adah, Nganjuk, integrated learning facilities and classroom comfort are experienced by teachers as closely connected conditions of their teaching. Teachers perceived facilities as valuable only when reliable, so their limited number and lack of maintenance often made them constraints. They experienced heat, noise, and poor lighting, which shaped their stamina, patience, and instructional delivery. They described teaching as most effective only when reliable facilities and a comfortable room are available simultaneously. Bounded to one transitioning pesantren, these findings indicate that the physical teaching environment is not a backdrop but a condition of teacher performance, and that improving it means prioritizing maintenance and classroom comfort alongside investment in teacher capacity.

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Ethics Statement

This study was conducted in accordance with recognised research-ethics principles. Approval to conduct the research at the site was granted by the Yayasan Pondok Pesantren Darussa'adah, Nganjuk, under Letter No. 44/YPPDP/VI/2025. Written informed consent was obtained from all adult participants prior to data collection, and parental consent was obtained for the student participants. Participation was voluntary and participants were free to withdraw at any time; anonymity and confidentiality were protected through the use of pseudonyms and secure, password-protected data storage.

Conflict of Interest Statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Author Contributions

Juni Iswanto: Conceptualization, Methodology, Investigation, Formal analysis, Writing – original draft, Project administration. Alfin Yuli Dianto: Investigation, Data curation, Validation, Visualization, Writing – review & editing. Muklas Ary Sona: Conceptualization, Methodology, Formal analysis, Supervision, Writing – review & editing. All authors have read and agreed to the published version of the manuscript.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

During the preparation of this work, the authors used a generative AI-assisted large language model to support language editing, improve the readability and structure of the manuscript, and assist with reference formatting and consistency checks. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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