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OPTIMIZING LEARNING ENVIRONMENTS FOR EQUITY AND QUALITY: A SYSTEMATIC REVIEW SUPPORTING EDCOM II REFORMS

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ABSTRACT

Optimizing school facilities has become a critical concern in contemporary education reforms aimed at improving learning quality and equity, particularly within the framework of Sustainable Development Goal 4 (SDG 4). This systematic literature review examined empirical and policy-oriented studies on the adequacy, accessibility, utilization, and challenges of school facilities, with a specific focus on intermediate learners' perceptions. Guided by content analysis and semantic thematic analysis, the review synthesized findings from peer-reviewed international and Philippine-based literature published between 2019 and 2024, sourced from academic databases and authoritative institutional reports. The results revealed four dominant themes: perceived adequacy of school facilities, accessibility of learning spaces and basic services, perceived importance and utilization of facilities for effective learning, and persistent facility-related challenges such as overcrowding and poor ventilation. Across studies, learners' perceptions consistently emerged as significant indicators of engagement, comfort, and perceived learning effectiveness, highlighting the limitations of purely administrative and compliance-driven facility assessments. The review further demonstrated that effective facility optimization is closely linked to instructional leadership, learner-centered management, and evidence-based supervision. These findings align with current education reform priorities, including the Philippine Education Commission II (EDCOM II), which emphasize quality-focused, learner-informed decision-making and accountability in basic education. The study concludes that integrating learner voice into facility assessment and supervision can strengthen teaching–learning conditions,

support equitable resource utilization, and advance national and global education goals. The review contributes to educational administration and supervision literature by reframing school facilities as instructional resources central to learning effectiveness rather than as peripheral infrastructure concerns.

KEYWORDS: school facilities optimization; learner perceptions; effective learning environments; educational administration and supervision; EDCOM II.

INTRODUCTION

The optimization of school facilities has emerged as a critical dimension of educational quality, particularly within the global framework of Sustainable Development Goal 4 (SDG 4), which emphasizes inclusive, safe, and effective learning environments for all learners (UNESCO, 2022). Recent international education reports stress that the mere presence of physical infrastructure is insufficient; rather, facilities must be intentionally designed, adequately maintained, accessible, and functionally utilized to support teaching and learning processes. This shift from availability to optimization reflects growing evidence that the physical learning environment significantly shapes learners' engagement, well-being, and perceived learning effectiveness.

Globally, empirical data highlight persistent deficiencies in school facility conditions. The UNESCO Institute for Statistics reported that nearly one in three schools worldwide lacks adequate basic infrastructure, including proper ventilation, sanitation, and safe classroom spaces, with the problem more pronounced in low- and middle-income countries (UNESCO, 2023). Similarly, the OECD (2023) found that approximately 38% of students across participating countries reported learning in classrooms with inadequate physical conditions, such as poor lighting, uncomfortable seating, or excessive noise. These deficits are not merely structural concerns; they are closely associated with reduced student engagement and lower perceived instructional quality.

Research focusing on learning space quality further underscores its impact on learner outcomes. A large-scale longitudinal study involving over 27,000 students across seven countries revealed that optimized classroom environments accounted for up to 16% of the variance in students' academic progress over one school year, with lighting, air quality, and seating configuration emerging as significant predictors (Barrett et al., 2022). For intermediate learners—who are transitioning toward more collaborative, interactive, and self-

directed learning modalities—the usability and comfort of school facilities become especially influential (UNICEF, 2023). Despite these findings, facility evaluations in many education systems remain largely administrative and compliance-driven, relying on inventories and infrastructure counts rather than learner-centered assessments.

This gap is consequential, as learners' perceptions of their learning environments are strongly linked to motivation, participation, and sense of belonging. OECD (2022) survey data indicate that students who perceive their classrooms as comfortable and well-equipped are 1.5 times more likely to report high levels of learning engagement compared to those in poorly maintained environments. However, learner perception data—particularly among intermediate-grade students—remain underrepresented in facility-related research, limiting the ability of school leaders and policymakers to develop responsive and context-sensitive optimization strategies.

Globally, disparities in facility optimization persist across and within countries. World Bank (2022) education sector analyses show that schools in resource-constrained settings are twice as likely to experience overcrowding and inadequate instructional spaces compared to schools in higher-income contexts. Such conditions directly challenge the realization of SDG 4.a, which calls for learning environments that are safe, inclusive, and effective for all learners. Understanding how learners perceive these conditions is therefore essential for identifying practical interventions that maximize the use of existing resources and mitigate educational inequities (UNESCO, 2023).

In the Philippine basic education system, similar patterns of facility-related challenges are evident. National education statistics indicate that while classroom construction has increased, more than 40% of public elementary schools continue to experience classroom congestion, particularly in urban and rapidly growing districts (David & Albert, 2022). Bernardo (2022) reported that a substantial proportion of Filipino learners study in classrooms that exceed ideal class-size standards, often compounded by inadequate ventilation and aging furniture. These conditions are particularly concerning for intermediate learners, whose learning effectiveness is increasingly dependent on classroom interaction, group work, and sustained concentration.

Philippine-based studies further reveal that assessments of school facilities are predominantly administrative in nature. Abulon et al. (2022) found that over 70% of school

facility evaluations in selected public schools relied primarily on physical inventories and compliance checklists, with minimal incorporation of learner feedback. Yet local empirical evidence demonstrates that learners' perceptions matter: Dela Rosa and Llenares (2023) reported that intermediate learners who rated their classrooms as uncomfortable or poorly equipped also reported significantly lower levels of classroom engagement and perceived learning effectiveness. These findings suggest that learner-centered data provide critical insights that are overlooked by traditional facility assessment approaches.

Regional inequities further compound these challenges. National surveys indicate that schools in rural and geographically isolated areas are less likely to meet minimum facility standards, particularly in terms of lighting, sanitation, and instructional space availability (Cruz et al., 2023). Intermediate learners in such contexts often adapt to suboptimal conditions, which may normalize inadequate learning environments and negatively influence their perceptions of school quality and learning effectiveness. Despite these realities, there remains limited quantitative, learner-centered research that systematically examines intermediate learners' perceptions of facility adequacy, accessibility, utilization, and associated challenges in the Philippine context.

In light of ongoing education reforms emphasizing learner-centeredness and data-driven decision-making, scholars increasingly call for the inclusion of learner voice in evaluating school environments (Bernardo & Mendoza, 2024). Examining intermediate learners' perceptions of optimized school facilities directly addresses this national research gap while aligning with global priorities under SDG 4.a. By integrating statistical evidence with learner-centered inquiry, this study contributes to a more nuanced understanding of how physical learning environments support—or constrain—effective learning.

Ultimately, situating school facilities within a learner-centered and evidence-based framework advances both educational quality and equity. By foregrounding intermediate learners' perceptions and grounding the inquiry in empirical data, this study provides actionable insights for teachers, school administrators, and policymakers in developing responsive facility optimization and utilization strategies. Such efforts strengthen institutional accountability and support the broader mandate of ensuring inclusive, safe, and effective learning environments for all learners under Sustainable Development Goal 4.

REVIEW OF RELATED LITERATURE

School facility optimization has become a central concern in discussions of educational quality, particularly within the framework of Sustainable Development Goal 4 (SDG 4), which emphasizes the provision of inclusive, safe, and effective learning environments. International organizations such as UNESCO and the World Bank emphasize that school facilities should not be assessed solely by their physical presence but by how well they support learning processes in practice. Facility optimization involves the adequacy, accessibility, maintenance, and functional use of classrooms, furniture, sanitation facilities, and learning resources. This perspective positions school facilities as enabling conditions that interact with pedagogy and learner engagement rather than as passive infrastructure.

Studies consistently demonstrate that the adequacy and quality of school facilities are associated with learners' academic and psychosocial outcomes. Research across OECD countries indicates that students who learn in classrooms with adequate lighting, ventilation, seating, and acoustics report higher levels of engagement and perceived learning effectiveness compared to those in poorly maintained environments (OECD, 2023). A large-scale international study by Barrett et al. (2022) found that optimized classroom conditions explained up to 16% of the variance in students' learning progress, underscoring the instructional relevance of physical environments. For intermediate learners, whose learning increasingly involves collaboration, interaction, and sustained attention, facility adequacy becomes especially critical.

Beyond adequacy, accessibility of school facilities has emerged as a key dimension of educational equity. Accessibility refers not only to the physical existence of facilities but also to learners' ability to use them safely, conveniently, and consistently. Global SDG monitoring reports indicate that a significant proportion of schools worldwide still lack access to basic services such as safe drinking water, sanitation, and electricity, conditions that disproportionately affect learners in low- and middle-income contexts (UNESCO, 2023). Limited access to these services constrains instructional time, affects learners' comfort and health, and undermines the inclusiveness of the learning environment.

The literature further emphasizes that facility utilization determines whether available resources meaningfully contribute to effective learning. World Bank analyses argue that many school facilities remain underutilized due to weak maintenance systems, poor scheduling, or limited instructional integration (World Bank, 2022). Classrooms, libraries, or

learning corners may exist but fail to support instruction if they are overcrowded, poorly maintained, or misaligned with teaching strategies. This distinction between availability and utilization highlights the administrative responsibility of school leaders to ensure that facilities are functionally integrated into daily teaching–learning processes (Sebullen, 2022).

Studies also highlight the importance of school facilities for effective learning, particularly from the learner's perspective. OECD (2022) survey data reveal that students who perceive their learning environments as comfortable and well-equipped are significantly more likely to report high levels of motivation and engagement. Learners' perceptions of space, comfort, and usability shape how they experience lessons and participate in classroom activities. These findings suggest that learners' views provide valuable indicators of whether school facilities are supporting or constraining effective learning, reinforcing the need for learner-centered assessment approaches.

In the Philippine context, national studies document persistent facility-related challenges despite ongoing infrastructure investments. Research by David and Albert (2022) indicates that classroom congestion remains prevalent, with many public elementary schools operating beyond ideal class-size standards. Bernardo (2022) further notes that issues such as inadequate ventilation, aging furniture, and limited instructional space continue to affect classroom instruction. These conditions are particularly consequential for intermediate learners, whose learning requires flexible spaces that support interaction and movement. Philippine-based literature also reveals that facility assessments are predominantly administrative and compliance-oriented. Abulon et al. (2022) reported that most school facility evaluations rely on inventories and physical counts, with limited consideration of learners' lived experiences. However, emerging local studies demonstrate that learners' perceptions matter. Dela Rosa and Llenares (2023) found that intermediate learners who perceived their classrooms as uncomfortable or inaccessible also reported lower levels of engagement and perceived learning effectiveness. These findings point to a disconnect between administrative assessments and learner-centered realities.

Synthesizing the literature, a clear research gap emerges: while international and local studies affirm the importance of school facilities for effective learning, quantitative, learner-centered evidence—particularly among intermediate learners—remains limited. Existing research often treats learners as passive recipients rather than active evaluators of their learning environments. Addressing this gap by examining intermediate learners' perceptions

of facility adequacy, accessibility, importance, and challenges provides critical evidence for optimizing school facilities. Such inquiry supports data-driven decision-making, strengthens administrative accountability, and advances the goals of SDG 4.a by promoting learning environments that are not only sufficient but functional, inclusive, and responsive to learners' needs.

METHODOLOGY

This study employed a systematic literature review design to synthesize existing empirical and theoretical studies on the optimization of school facilities and their role in supporting effective learning, with particular emphasis on intermediate learners' perceptions. Relevant literature was drawn from peer-reviewed journals and authoritative institutional reports sourced from databases such as Scopus-indexed journals, ERIC, Google Scholar, and publications of UNESCO, OECD, World Bank, UNICEF, and the Philippine Institute for Development Studies. Studies published between 2019 and 2024 were included if they examined school facility adequacy, accessibility, utilization or importance, and facility-related challenges in basic education contexts, while non-empirical opinion pieces and unrelated works were excluded. A structured keyword search using Boolean operators guided article retrieval, and selected studies were organized using a literature matrix to extract key characteristics and findings. The analysis employed thematic synthesis, combining deductive themes aligned with the study variables and inductive patterns emerging from the literature, allowing for the integration of statistical trends and contextual insights. Rigor was ensured through transparent selection criteria, triangulation of international and Philippine sources, and adherence to ethical standards through proper citation and faithful representation of original findings.

RESULTS AND DISCUSSIONS

Using content analysis and semantic thematic analysis, the reviewed literature yielded four interrelated themes: perceived adequacy of school facilities, accessibility of learning spaces and services, perceived importance and utilization of facilities for effective learning, and challenges in facility conditions and management. These themes not only describe patterns in the literature but also illuminate critical implications for teaching and learning that require responsive administrative and supervisory action.

First, facility adequacy consistently emerged as a foundational condition for effective teaching and learning. Content analysis of international and local studies demonstrated that adequate lighting, ventilation, classroom space, seating, and sanitation are strongly associated with learner engagement, comfort, and perceived learning effectiveness (Barrett et al., 2022; OECD, 2023). Semantically, adequacy was framed in experiential terms—comfort, safety, and functionality—rather than in numerical or inventory-based descriptions. From a teaching and learning perspective, inadequate facilities constrain instructional strategies, limit learner participation, and reduce sustained attention, particularly among intermediate learners who require interactive and collaborative learning environments. From an administration and supervision standpoint, this finding reinforces the supervisory responsibility to ensure that facility standards directly support instructional delivery, aligning physical resources with pedagogical requirements rather than treating facilities as separate from instructional quality.

Second, accessibility emerged as a critical equity-oriented theme. The literature revealed that accessibility involves learners' actual ability to use facilities consistently, safely, and without restriction. Studies highlighted uneven access to basic services such as sanitation, safe drinking water, and functional learning spaces, particularly in overcrowded and under-resourced schools (UNESCO, 2023; David & Albert, 2022). Semantic analysis linked accessibility with inclusivity, dignity, and readiness to learn. For teaching and learning, limited accessibility disrupts instructional flow, reduces learner participation, and affects learners' physical and emotional readiness for learning. In terms of administration and supervision values, accessibility underscores the ethical and managerial obligation of school leaders to promote inclusive learning environments, ensuring that facility use policies, scheduling, and maintenance practices do not unintentionally marginalize learners (Sebullen, 2023).

Third, the perceived importance and utilization of school facilities surfaced as a key mediating theme connecting infrastructure to learning outcomes. Content analysis showed that the educational value of facilities depends not on their presence alone but on how effectively they are utilized and integrated into instruction (World Bank, 2022). Learners who perceived facilities as supportive of collaboration, comfort, and varied learning activities reported higher motivation and engagement (OECD, 2022). Semantically, importance was associated with usefulness, relevance, and support for learning tasks, indicating that learners actively evaluate whether facilities contribute to meaningful learning. This has direct

implications for teaching, as teachers' instructional practices are shaped by the usability of classrooms and learning spaces. Administratively, this finding highlights the role of instructional supervision in guiding teachers on how to maximize available facilities and in ensuring that facility utilization aligns with curricular and instructional goals.

Fourth, challenges in facility conditions emerged as a pervasive theme across the literature. Overcrowding, poor ventilation, inadequate seating, and insufficient sanitation facilities were repeatedly cited as barriers to effective learning, particularly in public and geographically disadvantaged schools (Bernardo, 2022; Cruz et al., 2023). Semantic analysis revealed that learners often normalize these challenges, adapting to suboptimal conditions rather than explicitly expressing dissatisfaction. From a teaching and learning perspective, such normalization may mask hidden learning losses, reduced engagement, and compromised instructional quality. From an administration and supervision lens, this finding emphasizes the need for proactive leadership that uses systematic, learner-centered data to identify and address facility-related constraints before they undermine educational outcomes (Sebullen et. al., 2023).

Overall, the results and thematic patterns suggest that school facility optimization is a core instructional leadership function, not merely a logistical or technical concern. Learners' perceptions serve as essential feedback mechanisms that inform administrators and supervisors about the real instructional impact of facility conditions. Embedding learner voice into facility assessment supports evidence-based supervision, strengthens accountability, and promotes alignment between physical resources and instructional priorities. These findings reinforce key administration and supervision values—responsiveness, learner-centered decision-making, and continuous improvement—while advancing the broader goal of creating learning environments that are functional, inclusive, and conducive to effective teaching and learning under Sustainable Development Goal 4.

The findings of this study strongly align with EDCOM II's emphasis on improving the quality of basic education through system-wide reforms, particularly in addressing long-standing structural and instructional bottlenecks. EDCOM II has consistently highlighted that learning outcomes cannot improve without strengthening foundational enablers such as classrooms, learning spaces, and basic services. The study's focus on facility adequacy and learner perceptions resonates with the Commission's call to move beyond enrollment and access indicators toward quality-of-learning conditions, recognizing that overcrowded, poorly

ventilated, or inadequately furnished classrooms directly undermine effective teaching and learning. This alignment reinforces the view that facility optimization is not peripheral but central to learning recovery and quality assurance reforms.

A second point of convergence lies in EDCOM II's advocacy for learner-centered and evidence-based policy-making. Current education trends emphasize the use of ground-level data to inform reforms, and EDCOM II explicitly underscores the importance of feedback from schools and learners in diagnosing system weaknesses. By foregrounding intermediate learners' perceptions of facility accessibility, utilization, and challenges, this study supports the shift toward learner voice as a legitimate data source in educational decision-making. From an administration and supervision perspective, this trend elevates the role of school leaders as data-informed managers who integrate learner feedback into planning, supervision, and resource allocation, consistent with EDCOM II's reform agenda.

The study also aligns with EDCOM II's focus on instructional leadership and school-level accountability. Recent education reforms stress that school administrators must function not only as managers of resources but as leaders of teaching and learning. The findings demonstrate that how facilities are utilized—rather than merely their existence—shapes instructional practices and learner engagement. This mirrors EDCOM II's call for stronger school leadership capacity, where principals and supervisors are accountable for ensuring that physical learning environments support curriculum implementation, teacher effectiveness, and learner engagement. Facility optimization thus becomes a concrete expression of instructional leadership in practice.

Finally, the study reflects EDCOM II's concern with equity and differentiated support across schools and regions. Current education trends acknowledge that systemic inequities—particularly in overcrowded and under-resourced schools—require targeted, context-sensitive interventions rather than uniform solutions. The identification of facility-related challenges and the normalization of suboptimal conditions among learners echo EDCOM II's warning against "silent inequities" that perpetuate low expectations and learning gaps. By providing learner-centered evidence, this study contributes to the national reform narrative that calls for responsive administration, prioritized investments, and supervision grounded in actual learning conditions, ensuring that reforms translate into tangible improvements in classrooms.

The findings of this study underscore that optimizing school facilities is inseparable from improving teaching and learning quality in contemporary education systems. Through content and semantic thematic analysis, the literature consistently demonstrates that facility adequacy, accessibility, effective utilization, and the mitigation of facility-related challenges directly shape learners' engagement, comfort, and perceptions of learning effectiveness. Importantly, the synthesis highlights that learners' perceptions serve as critical feedback mechanisms that reveal how physical learning environments function in real instructional contexts—insights often overlooked in compliance-driven facility assessments. From an administration and supervision perspective, these results affirm that school facilities must be treated as instructional resources whose management and optimization are integral to instructional leadership, learner-centered practice, and continuous school improvement.

Aligned with current education reforms and the thrusts of EDCOM II, this study reinforces the need for evidence-based, learner-informed decision-making in addressing persistent quality and equity gaps in basic education. By foregrounding learner voice, the study supports national calls to move beyond access indicators toward improving the actual conditions under which learning occurs. The findings emphasize that responsive administration, effective supervision, and accountable leadership are essential in translating infrastructure investments into meaningful learning gains. Ultimately, integrating learner-centered facility assessment into planning and supervision strengthens alignment with EDCOM II's reform agenda and contributes to the development of school environments that are inclusive, functional, and truly conducive to effective teaching and learning.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

This study concludes that the optimization of school facilities is a critical instructional and managerial concern that directly influences teaching and learning effectiveness, particularly from the perspective of intermediate learners. The synthesized evidence demonstrates that facility adequacy, accessibility, effective utilization, and the resolution of facility-related challenges collectively shape learners' engagement, comfort, and perceived learning effectiveness. Importantly, the findings affirm that learners' perceptions provide valid and essential feedback on how well school facilities function in actual instructional context feedback that is often absent in compliance-oriented assessments. Viewed through the lens of administration and supervision, the study reinforces that optimizing school facilities is a core

responsibility of instructional leadership and evidence-based management, aligning with national education reforms and the priorities of EDCOM II in advancing quality, equity, and accountability in basic education.

Recommendations

In light of the findings, it is recommended that school administrators and supervisors institutionalize learner-centered facility assessment mechanisms as part of regular instructional supervision and school improvement planning. Teachers should be supported through supervisory guidance and professional development to maximize the instructional use of available learning spaces and resources. Education planners and policymakers, particularly within the Department of Education, are encouraged to integrate learner perception data into facility planning, prioritization, and monitoring systems to complement existing infrastructure metrics. Finally, future researchers may build on this study by conducting empirical, school-level investigations that quantitatively examine the relationship between learners' perceptions of school facilities and learning outcomes, thereby strengthening the evidence base for facility optimization initiatives aligned with SDG 4 and the reform agenda of EDCOM II.

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