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Land Limitations and Institutional Adaptation in Early Childhood Education

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Abstract:
This study examines the impact of land limitations on the learning ecosystem, educational infrastructure capacity, and institutional adaptive strategies at Raudhatul Athfal. Employing a qualitative case study design, data were collected through direct observations and semi-structured interviews with the head of the institution, teachers, parents, and students. The findings reveal that spatial constraints significantly restrict children's movement space, reduce the variation of learning activities—particularly gross motor activities—increase classroom density, and limit the availability and functionality of educational facilities and infrastructure. Overcrowded classrooms and shared use of specialized rooms affect instructional effectiveness, scheduling, and student comfort. However, the study also identifies adaptive institutional responses, including multifunctional classroom design, rotational scheduling of space usage, the use of portable and flexible learning media, vertical space optimization, and collaboration with the surrounding community to access alternative learning spaces. The study concludes that educational quality in spatially constrained environments depends not solely on physical infrastructure but on institutional resilience and adaptive capacity. Future research is recommended to employ mixed-method and comparative multi-site designs to quantitatively assess the long-term impact of spatial constraints on children's developmental outcomes and learning achievement.

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INTRODUCTION

Early childhood education plays a fundamental role in shaping children's character, cognitive development, and social–emotional competencies (Sa'adah & Formen, 2021; Setiawati et al., 2023; Snyman et al., 2023). Institutions such as Raudhatul Athfal serve as essential environments where children learn, play, and develop holistically through meaningful and developmentally appropriate activities (Susanti & Wahyuningtyas, 2021). However, the implementation of learning activities in early childhood institutions is often influenced by various contextual challenges that may affect the overall quality of the teaching and learning process.

One recurring challenge is the limited land area available to the institution. Restricted physical space significantly affects the effectiveness of learning activities, particularly in early childhood settings where play, exploration, and gross motor development require ample space (Grieshaber & Hunkin, 2023; Heikka et al., 2021;

Utamimah et al., 2025). Limited land reduces children's freedom of movement and constrains opportunities for active engagement, which are central to early childhood pedagogy. Consequently, outdoor learning activities, physical play, and movement-based exploration may not be optimally implemented.

Spatial constraints also directly influence the availability and adequacy of educational facilities and infrastructure. Essential facilities such as playgrounds, art rooms, and sports areas are difficult to provide in ideal conditions due to physical limitations (Gadaire et al., 2020; Lansing et al., 2023; Widowati & Wakid, 2024). As a result, institutions are required to adopt various adjustments, including the use of multifunctional spaces, rotational scheduling of activities, and the utilization of external areas outside the school premises for specific programs. These adjustments reflect institutional efforts to maintain learning continuity despite structural limitations.

From a management perspective, limited land presents additional challenges in creating a safe, comfortable, and engaging learning environment. Inefficient spatial arrangements may lead to overcrowding, reduced learner comfort, and heightened safety concerns, particularly during play activities conducted in confined areas. Therefore, land limitation is not merely a physical issue but one that has broader implications for pedagogical quality, classroom management, and child development outcomes.

Previous studies have widely examined the relationship between educational facilities and learning quality, as well as the effectiveness of classroom space utilization in instructional processes (Damayanti & Farihah, 2023; Maphie, 2023; Noer, 2023). However, much of the existing literature focuses on general infrastructure adequacy and does not comprehensively explore how land limitations specifically shape learning patterns, children's social interaction, motor development opportunities, and institutional adaptive strategies within spatially constrained environments.

Furthermore, earlier research often positions limited land as either a supporting or inhibiting factor in facility provision, without sufficiently linking it to pedagogical innovation and teacher creativity in managing restricted spaces. In early childhood institutions such as Raudhatul Athfal, learning spaces function not only as physical venues for instruction but also as exploratory environments that are integral to children's holistic development. Thus, the implications of land limitation extend beyond infrastructure concerns to encompass pedagogical and managerial dimensions.

This study aims to analyze the impact of limited land on the learning process, the availability of educational facilities and infrastructure, and the adaptive strategies implemented by the institution to maintain educational quality. By positioning land limitation not solely as a constraint but also as a catalyst for innovation in early childhood learning management, this research seeks to fill the existing gap in the literature. The study was conducted at Raudhatul Athfal Raudhatul Qurro, Tanjung Balai, North Sumatra, Indonesia.

RESEARCH METHOD

This study employed a descriptive qualitative case study design to obtain an in-depth understanding of how land limitations influence the learning ecosystem, infrastructure capacity, and adaptive strategies at Raudhatul Athfal Raudhatul Qurro, Tanjung Balai. A qualitative approach was selected because the research seeks to explore contextual realities, participants' experiences, and institutional responses within a

naturally occurring setting rather than to measure variables quantitatively. This approach enables a comprehensive interpretation of meanings, practices, and management strategies that emerge in response to spatial constraints (Nasir & Sukmawati, 2023).

The research subjects consisted of the head of the institution, classroom teachers, and educational staff directly involved in managing learning activities and physical space. In addition, parents and selected students were included to obtain complementary perspectives regarding the learning experience. Informants were selected using purposive sampling, based on their relevance, experience, and direct involvement in addressing spatial limitations within the institution.

Data were collected through three primary techniques. (1) Non-participant observation was conducted to examine classroom density, spatial layout, utilization of facilities, children's movement patterns, and the implementation of indoor and outdoor learning activities. (2) Semi-structured in-depth interviews were carried out with key informants to explore perceptions, challenges, and adaptive strategies related to limited land. (3) Documentation analysis included photographs of physical spaces, room layouts, school activity records, and institutional documents related to student enrollment and facility management.

The data were analyzed using the interactive model of Miles and Huberman, which includes data condensation, data display, and conclusion drawing/verification (Mirza et al., 2023). All data finding were first transcribed and organized systematically. During the data condensation stage, the researcher selected, coded, and categorized data according to the three main analytical themes: spatial learning ecosystem, infrastructure capacity, and adaptive institutional strategies. The coded data were then presented in structured narrative matrices and thematic descriptions to identify patterns, relationships, and contrasts across informants and data sources. Interpretation was conducted iteratively by continuously comparing observational findings, interview statements, and documentation results to ensure consistency. Conclusions were drawn gradually through ongoing verification, supported by source and technique triangulation to enhance the credibility and trustworthiness of the findings.

RESULTS AND DISCUSSION

Spatially Restricted Learning Ecosystem

Field observations indicate that land limitations significantly shape the learning ecosystem at RA Raudhatul Qurro. The available area for instructional and play activities is highly restricted, resulting in relatively small classrooms accommodating a considerable number of students. This spatial density limits children's mobility and requires highly efficient arrangements of desks, chairs, and learning materials to ensure that daily instructional activities can proceed without disruption.

Learning activities are predominantly conducted inside the classroom. Most daily routines—including singing, drawing, early literacy and numeracy exercises, and storytelling—take place within the same confined space. Activities involving gross motor development, such as ball games, jumping, or group physical exercises, are rarely implemented due to the limited availability of outdoor space. When outdoor activities occur, children utilize the narrow front yard in rotation to prevent overcrowding.

The constrained physical environment also influences instructional design. Teachers tend to prioritize learning strategies that require minimal movement, such as stationary educational games, rhythm clapping, role-play, storytelling, and visual media–

based instruction. During group work, the close proximity between students frequently leads to increased noise levels and reduced concentration, requiring teachers to provide clear instructions and continuously reorganize seating arrangements to maintain classroom order and safety. Some children choose to remain on the classroom terrace due to space restrictions. This situation suggests that children's need for active physical movement has not been fully accommodated within the existing physical environment.

These observational findings are corroborated by interview data. The Head of the Institution acknowledged the disproportionality between land size and increasing student enrollment, stating, "We are aware that the land at this institution is very limited. However, we strive to organize the space as effectively as possible so that children can continue to learn and play. Sometimes we change the function of the classroom; for example, in the morning it is used for learning, while in the afternoon it can be used for motor skills or creative activities." This statement reflects institutional awareness and efforts toward spatial optimization.

The classroom teacher emphasized the pedagogical implications of spatial limitations, "If the children want to play or do physical exercise, the space is indeed not wide enough. We usually replace these activities with stationary games, such as rhythm clapping, role-playing, or watching educational videos. Sometimes we also take the children to the front yard to observe plants, but they have to take turns so that it does not become too crowded." A parent also confirmed this condition, "I know the land is not spacious, but my child still enjoys going to school here. The teachers are patient and often create creative activities in the classroom. However, when they play outside, they have to take turns."

The findings indicate that land limitations constitute a significant structural constraint shaping the learning ecosystem at Raudhatul Athfal. Spatial density reduces opportunities for varied motor activities and intensifies classroom management challenges. Nevertheless, the consistency between observational and interview data demonstrates that adaptive space management, flexible scheduling, and teacher creativity mitigate the negative effects of physical constraints. Thus, while spatial restriction influences pedagogical practices and activity variation, it does not fundamentally hinder the continuity or meaningfulness of the learning process.

Limited Educational Infrastructure Capacity

Observational data indicate that land limitations substantially constrain the availability and expansion of educational facilities and infrastructure at the institution. The school is situated in a densely populated area, where spatial expansion is structurally restricted. As a result, the development of additional classrooms, specialized rooms, playgrounds, and other supporting facilities remains highly limited.

The restricted land area directly affects the adequacy and functionality of core learning facilities. Several rooms serve multiple purposes due to insufficient space. For example, certain instructional rooms are alternately used as additional classrooms when student enrollment increases. Similarly, the absence of a sufficiently large sports field and green open space reduces opportunities for structured physical education and outdoor learning activities.

Spatial constraints also influence comfort and instructional effectiveness. Overcrowded classrooms contribute to reduced student concentration and increased classroom management challenges. Supporting facilities such as parking areas, canteens,

and extracurricular activity rooms are limited in capacity, requiring staggered scheduling or the relocation of certain activities outside the school premises. Although the institution has attempted to address these constraints by optimizing room-use schedules and constructing multi-story buildings, these measures have not fully resolved the structural limitations in Table 1.

Table 1. Summarizes The Key Impacts of Land Limitations on Infrastructure Capacity

Aspect of Infrastructure	Observed Condition	Impact on Learning Process
Classrooms	Limited size; high student density	Reduced mobility and concentration
Specialized Rooms (e.g., Tahfiz)	Shared and rotational use	Restricted instructional time
Playground/Sports Field	Very limited outdoor area	Reduced physical activity variation
Supporting Facilities	Inadequate parking and activity spaces	Staggered scheduling and space competition

Interview data further reinforce these findings. The School Principal acknowledged that land constraints represent a major obstacle to infrastructure development, stating, "We want to add a playground and a sports field, but the school's land does not allow it. Therefore, we have to utilize the existing area as efficiently as possible." This statement reflects institutional awareness of spatial limitations and ongoing efforts to optimize existing facilities. A Tahfiz teacher emphasized the pedagogical implications of shared facilities: "The children are actually enthusiastic about memorizing, but because the space is limited, we have to implement a rotating schedule. Sometimes, a class has to wait several days to use the Tahfiz room." Despite these limitations, the student acknowledged that teachers strive to maintain an enjoyable learning atmosphere.

Land limitations significantly reduce educational infrastructure capacity, affecting instructional time allocation, activity variation, and student comfort. The consistency between observational and interview data indicates that spatial constraints operate as a structural barrier influencing both managerial decision-making and pedagogical implementation. However, institutional optimization strategies partially mitigate these effects, suggesting that while infrastructure capacity is limited, educational continuity remains sustained through adaptive management practices.

Adaptive Institutional Response Strategies

Land limitations constitute a structural challenge in the implementation of teaching and learning activities at Raudhatul Athfal. Located in a densely populated area, the institution operates within a highly restricted physical environment. Despite these constraints, the school demonstrates systematic adaptive strategies to ensure that educational delivery remains effective, engaging, and developmentally appropriate for early childhood learners.

At the institutional level, spatial optimization serves as a primary adaptive mechanism. Classrooms are designed as multifunctional spaces capable of accommodating academic instruction, play-based learning, religious activities, and creative projects. Movable furniture and flexible layouts allow rapid reconfiguration of the room according to activity needs. Outdoor areas, although limited, are scheduled rotationally to provide equitable access for gross motor development activities.

At the pedagogical level, teachers employ instructional adaptations that align with spatial limitations. Learning media are predominantly portable and space-efficient, including letter cards, puzzles, mini project-based materials, storytelling props, and digital resources. Teachers also extend learning beyond the classroom by utilizing nearby community spaces—such as small parks or neighbors' yards—when possible, thereby partially compensating for the lack of institutional outdoor facilities. To systematize these adaptive strategies, the following key categories can be visualized in a chart or conceptual model in Figure 1.

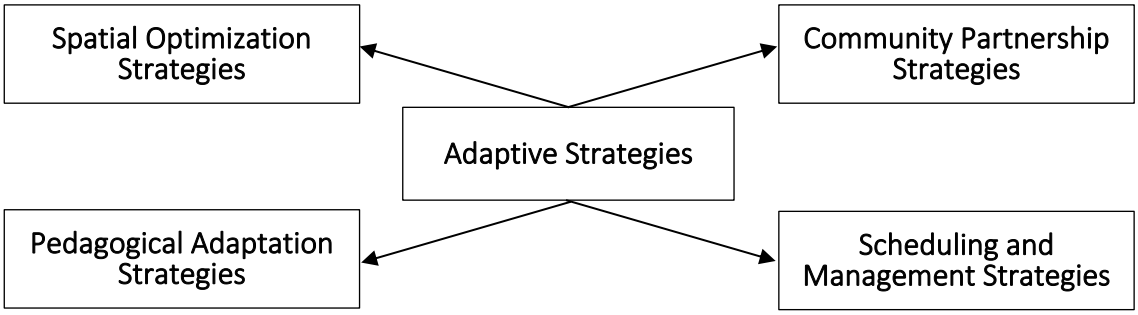


Figure 1. Adaptive Strategies

Interview findings corroborate the observational data. The Head of the Institution emphasized the commitment to maintaining quality despite constraints, stating: "We manage the limited space by creating multifunctional classrooms. One room can be used for learning, play, and even religious activities. We also implement a rotating schedule so that all children can remain active comfortably." He further explained that collaboration with the surrounding community enables the school to use external open spaces for major events, including religious celebrations.

A classroom teacher highlighted the importance of pedagogical flexibility: "We often use small and easily movable learning media, such as letter cards, puzzles, and simple teaching aids. In addition, we take the children to learn outdoors, for example in the front yard or nearby areas around the school, so that they can remain physically active." Similarly, a parent affirmed: "I see that the teachers are patient and creative. My child often tells me that learning activities remain fun even though the rooms are small. Sometimes they study while playing in the yards of neighbors near the school." These perspectives demonstrate shared awareness and collaborative adaptation among stakeholders.

Adaptive institutional response at Raudhatul Athfal operates across structural, pedagogical, managerial, and community dimensions. The convergence between observation and interview data suggests that spatial constraints have stimulated innovation rather than stagnation. The adaptive strategies identified in this study illustrate institutional resilience in the face of structural limitations. Rather than perceiving land constraints solely as a barrier, the institution transforms them into a catalyst for creativity, collaborative governance, and pedagogical flexibility. This indicates that while infrastructure capacity may be physically limited, adaptive leadership, teacher agency, and community engagement function as critical mediating factors that sustain educational quality within spatially restricted environments.

Discussion

Land limitations represent a structural challenge for many early childhood education institutions, particularly those situated in densely populated urban areas. The present findings confirm that spatial constraints significantly shape the learning ecosystem at Raudhatul Athfal, particularly in relation to children's movement, activity variation, and classroom dynamics. An ideal early childhood environment should provide sufficient space for exploration and gross motor development, as physical activity is central to cognitive and socio-emotional growth (Grieshaber & Hunkin, 2023; Sakti et al., 2024). In this study, limited classroom size and high student density resulted in predominantly indoor, table-based learning activities, reducing opportunities for outdoor exploration. Similar patterns have been reported in institutions with restricted play areas, where physical activities are often replaced with sedentary tasks.

Moreover, spatial density influences classroom management and social interaction. Close proximity between children increases noise levels and reduces concentration, requiring more intensive teacher supervision. Limited play areas also restrict spontaneous peer interaction and gross motor engagement, which are critical for early childhood development (Rohali & Sitorus, 2025; Sakinah et al., 2022; Widat & Wulandari, 2023). Although teachers implemented rotational play schedules to ensure equitable access to outdoor space, the frequency and duration of physical activity remained constrained. These findings reinforce the argument that physical learning environments directly affect pedagogical flexibility and developmental opportunities in early childhood settings.

Regarding infrastructure capacity, the study demonstrates that land constraints limit the provision of adequate educational facilities. Observations revealed multifunctional use of rooms, absence of sufficient green space, and shared utilization of specialized facilities. Adequate infrastructure is widely recognized as a determinant of learning comfort and instructional effectiveness (Aini et al., 2025; Amelia et al., 2022; Feliana et al., 2024). However, urban schools frequently encounter spatial barriers that hinder facility expansion (Debrah et al., 2021; Hidayah, 2021). The findings show that certain rooms are repurposed for multiple functions, which may reduce instructional specificity and limit program implementation.

Classroom overcrowding and limited specialized spaces also affect instructional continuity and student concentration. High-density classrooms are associated with increased learning disturbances and reduced comfort (Mahara, 2024). The shared use of facilities, such as the Tahfiz room, restricts instructional time allocation and necessitates rotational scheduling, potentially influencing learning depth and achievement (Nurrahman et al., 2023). Although vertical construction and space optimization strategies were implemented, these measures only partially addressed infrastructure deficits, confirming that spatial constraints remain a systemic limitation.

Despite these structural challenges, the study highlights significant adaptive institutional response strategies. The multifunctional classroom model, flexible furniture arrangement, and rotational scheduling observed at Raudhatul Athfal reflect adaptive space management practices. Flexible classroom design is considered an effective strategy for maintaining learning variation in limited environments (Ismail et al., 2024; Rawashdeh et al., 2021). Teachers' use of portable and movable learning media further supports instructional continuity without requiring additional physical space, demonstrating pedagogical responsiveness to environmental constraints.

Community-based adaptation also emerged as a critical strategy. The utilization of nearby community spaces for events and outdoor learning aligns with environment-based learning approaches, which emphasize the surrounding community as a learning resource (Efendi, 2022; Villegas-Ch et al., 2021). Institutional collaboration with parents and local stakeholders reflects adaptive educational governance in resource-constrained settings. Effective space management and educator creativity are central competencies in early childhood administration when facing physical limitations (Sanjani, 2024; Zuhdi et al., 2024). Teacher innovation and flexibility significantly mediate the relationship between infrastructure constraints and learning quality.

This study contributes to the literature by demonstrating that land limitations, while structurally restrictive, do not inevitably diminish educational quality when mediated by adaptive leadership, teacher creativity, and community collaboration. The findings extend prior research on physical learning environments by integrating spatial constraints, infrastructure capacity, and adaptive governance within a single analytical framework. Practically, the study suggests the need for policy support in urban land planning, vertical school design, and community-based facility integration. Theoretically, it reinforces the argument that educational resilience in early childhood settings depends not solely on physical infrastructure but on adaptive institutional capacity and collaborative stakeholder engagement.

CONCLUSION

This study concludes that land limitations at Raudhatul Athfal significantly influence the learning ecosystem, infrastructure capacity, and institutional management practices. Spatial constraints reduce children's movement opportunities, limit the variation of learning activities, and increase classroom density, thereby affecting comfort and instructional dynamics. Infrastructure capacity is also restricted, resulting in multifunctional room usage, rotational scheduling, and limited availability of specialized and outdoor facilities. However, the findings demonstrate that adaptive institutional response strategies—such as flexible classroom design, portable learning media, rotational space management, and collaboration with the surrounding community—effectively mitigate the negative impacts of limited land. These adaptive practices indicate that educational quality is not determined solely by physical space, but also by leadership, teacher creativity, and stakeholder collaboration. Nevertheless, this study is limited by its single-site case study design, reliance on qualitative data, and absence of quantitative measurement of children's developmental outcomes, which may limit generalizability. Future research involving comparative multi-site studies and mixed-method approaches is recommended to provide broader empirical validation of the relationship between spatial constraints and early childhood educational quality.

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