



Assessment of Child-Friendly Interior Architecture in Kindergartens of Banda Aceh

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Abstract. This study aims to examine the interior elements of kindergarten spaces by examining the application of child-friendly architectural principles at the Aisyiyah Bustanul Athfal Kindergarten (TK ABA) in Banda Aceh City. The study focused on three main aspects: safety, comfort, and stimulation. The research method used was a case study of six ABA Kindergartens in Banda Aceh City, using a qualitative approach through field observations, structured and semi-structured interviews, and questionnaires. The results indicate that most kindergartens meet several child-friendly school criteria, such as the use of bright colors, good natural lighting, and table and chair layouts that encourage social interaction. Several shortcomings remain, making them less than fully safe for children. This study emphasizes the importance of comprehensively implementing child-friendly architectural principles to create a safe, comfortable learning environment that supports children's physical, cognitive, and emotional development.

Keywords: Child-friendly architecture, Child-Friendly School, kindergarten interiors, safety, comfort, stimulation.

1 Introduction

Children start to become sensitive to environmental stimuli during the golden age, which is characterized by functional, psychological, and physical maturity that reacts to the stimuli encountered [1]. Following the family setting, schools are essential for fostering children's development. Schools must be properly designed as educational institutions in order to foster the development of a generation that is resilient, healthy, and character-driven.

In order to address educational challenges, UNICEF recommends the Child-Friendly School (CFS) program as a secure and welcoming learning environment. The three most basic children's rights, provision, protection, and participation, must be taken in to account by UNICEF's Child-Friendly School model [2]. A school that is equally accessible and provides children with a clean, safe, healthy, and nurturing atmosphere is considered child-friendly. the requirements for a child-friendly environment fall into

three categories: safety, comfort, and stimulation in the elements of outdoor and interior spaces [3], [4]. A Child-Friendly School (CFS) can also be understood as a democratic setting founded on children's rights, where all students are welcomed without distinction, the teaching and learning process is structured in accordance with the needs and interests of children, and safety, health, and child protection measures are put in place. Gender discrimination does not exist in this setting [5].

Banda Aceh, one of the cities that received the Child-Friendly City Award, has a flagship initiative called "Towards a Child-Friendly City." It is anticipated that this approach will enhance the physical, psychological, and emotional aspects of children's learning surroundings. A key component of the Child-Friendly City (SRA) idea is the application of child-friendly architectural concepts, especially in kindergarten settings where children begin their official education.

Examining kindergarten facilities' outside and interior kid-friendliness is essential, as explained above. Aisyiyah Kindergarten, a private school in Banda Aceh, was the site of field observations for this study.

Previous studies generally focused on child-friendly school environments and educational facilities. However, limited studies specifically examine the interior architectural quality of kindergarten classrooms in Banda Aceh based on safety, comfort, and stimulation criteria. Therefore, this study aims to evaluate the implementation of child-friendly interior architectural principles in ABA kindergartens in Banda Aceh.

2 Literature

Schools should be constructed with children's needs, safety, and comfort in mind, with a focus on their growth. The learning process and the infrastructure that is provided are two assessment factors that are used to describe child-friendly schools [6]. This study concentrated on child-friendly architecture, which examines design elements that affect the infrastructure of school buildings. The physical, emotional, and psychological aspects of children are taken into account in this design study, which integrates architectural principles with user needs, especially with regard to interior features.

When parents desire to enroll their children in formal education between the ages of four and six, kindergartens (TK) are their first and most important option. As a result, it is essential to guarantee dependable and safe kindergarten design. Every kid has the right to an environment free from harm and violence.

In order to protect children's development, the Convention on the Rights of the Child (1989) places a strong emphasis on fundamental human rights principles, such as respect for language, culture, religion, and individual viewpoints; access that facilitates learning; and quality that fosters cognitive and affective growth.

In order to provide sufficient educational facilities for the country's future generations, child-friendly architecture must be prioritized. A children's service center environment must have 16 elements, including: context, outdoors, rules, community, inclusion, and spaces in between: art space, bathrooms, kitchen, dining room, storage, office, outreach, transparency and nature, details of color, texture, and ceiling, scale, interaction, and furniture [7]. The landscape, spatial program, spatial elements, and complementarities are the four main categories into which these elements fall.

The physical environment in which children live is one of the major factors that influences their learning and directs their performance. The teaching-learning process and communication between students will not flourish if teachers do not involve them in learning activities. When selecting the ideal school for their children's development, parents are concerned about this [8].

A kindergarten's interior design heavily relies on lighting. Lighting in a kindergarten fosters cognitive and physiological growth while also enhancing the sensation of scale and space. Children's injuries can be decreased in an area with clear lighting effects [9]. Anthropometric and ergonomic factors are also quite important in kindergarten facilities. These have to do with the user's size and how it affects environmental elements that support health and safety. The usage of furniture and how it responds to pupils' postures are examples of ergonomic classroom design in kindergartens. The use and efficacy of activities are determined by ergonomically built furniture and spatial components, which also support users' long-term physiology [9].

A kindergarten classroom's lighting design has a significant impact on the growth of the students. Students' performance will be better impacted by classrooms with adequate natural light than by those with little. Large windows are better than skylights or small, movable windows in classrooms [9]. Higher performance, better mood, and enhanced perception of visual stimuli are all associated with increased natural light consumption [9]. The direction of the building, its location, the type of windows, and seasonal variations are the main factors that determine how much natural.

According to Judith Seaver's study, "The Philosophy of the Educational Approach" [10], the interior design of educational buildings should be directly linked to the educational program. The main trend in designing modern preschool institutions should be an "open structure" layout and the elimination of traditional corridor systems.

Movable partitions, different floor levels, varied floor coverings, and other techniques can be used to create calm and lively zones within a huge room. Youngsters are free to engage and do as they choose. As a result, there is no wasted space and the area flows.

The following guidelines should be followed in order to provide preschool-aged children with a comfortable atmosphere [10]:

1. An open-plan design that permits active mobility in every area;

2. Using surfaces with different textures to let kids explore and create new sensory experiences;
3. Private areas for leisure, quiet play, and solitary education;
4. Visual variety of shapes and areas, as well as the production of contrast;
5. Interaction with the natural world and the external environment;
6. Using functional architecture to create a feeling of space.

Because it fosters a favorable learning environment, the quality of preschool spaces with a modified open-plan design has the strongest correlation with the school environment's preparedness to support cognitive development (SR) in preschoolers [11]. This method works well for altering both open and closed space planning since it makes it possible to create cozy areas that might improve learning. Additionally, the places shouldn't be too small to prevent kids from feeling overburdened.

Kindergarten is a place for play, entertainment, and joy in addition to being an instructional setting. Learning also happens unconsciously as kids play and start to enjoy the activity. Therefore, while constructing a kindergarten, it is crucial to take children's psychological and cognitive needs into account, especially when creating play areas that will impact a child's personality development.

These are some things to think about when designing a kindergarten's interior [12]:

1. Low shelves should ideally divide the interior so that kids can view what's going on around them.
2. When modifying bookshelves, it is important to consider the child's height, which is around 60 cm.
3. For storage cabinets, sliding doors are ideal.
4. The amount of space should be suitable for the number of kids. Their energy and inventiveness may be stifled by cramped, narrow areas.
5. For both amusement and instructional purposes, geometric shapes can be applied to windows and walls.
6. In addition to artificial lighting, ideal classroom lighting incorporates shadows and natural light.
7. Switches and outlets should be out of children's reach.
8. Children's food and beverages should be kept in a specific location.
9. Toys should be stored in classrooms so kids may quickly get them and store them at the end of the day.
10. It's also necessary to provide some unique areas, like spots for a little alone time. Children can have private areas created by interesting nooks. It is possible to make good use of seemingly worthless spaces, like the corners of buildings or beneath the steps.

The theories and guidelines listed below can be used to create safe environments that promote children's development [13]:

1. Accessibility: Children should be able to roam around and engage with others without constant supervision.
2. Universal Design for Learning: Areas should be adaptable, offering a variety of ways for people to participate, express themselves, and communicate.
3. Physical design safety: Steer clear of dangers like toxic materials or sharp surfaces. Spaces shouldn't be too big or too remote from a psychological standpoint. To make a space feel comfortable, ergonomic design should be taken into account.
4. Biophilic Design: Including natural features, like gardens or natural lighting, can improve learning and lessen stress.

A child's safety, comfort, and development are directly impacted by the choice of materials [13]:

1. Non-toxic materials: Steer clear of dangerous substances found in paint, furniture, and finishes, such as formaldehyde, phthalates, or lead.
2. b. The danger of harm from falls is decreased by soft, shock-absorbing surfaces like rubber, cork, or foam flooring.
3. c. Durability and ease of upkeep: Select materials that are resistant to stains and scratches, such as washable wall paint or vinyl flooring.
4. d. Sustainability and comfort: Natural materials, including wood, promote children's wellbeing while enhancing thermal and acoustic comfort.
5. e. Visibility for supervision: To make monitoring easier without sacrificing their privacy, choose frosted or clear glass.

Reducing risk is only one aspect of child-safe architectural design; another is creating environments that promote children's physical, mental, and overall wellbeing. To provide a secure, stimulating environment that encourages learning and discovery, a strategy that integrates developmental psychology, sustainability principles, and safety precautions is essential. Emotionally and physically comfortable places can be created through the use of natural components, suitable material selection, sufficient supervision, and child-friendly design. Examples of this strategy include play places that foster creativity, natural lighting, and adequate air circulation. In a similar vein, kindergartens are described as living ecosystems where children develop organically rather than strict educational establishments. Future learning environments must take into account play as the cornerstone of education, freedom within buildings, small, community-focused units, and natural settings [14].

3 Methods

Examining the kid-friendly interior architecture of Banda Aceh's Aisiyiah Bustanul Athfal Kindergarten is the aim of this study. A case study is the research methodology employed. Case studies are useful for examining real-world events [15]. A case study, according to Creswell (1998) [16], is a model that stresses exploration that unites a linked system (bounded system).

The physical state of the school and user behavior observations were among the data gathered for the case study. Data for this study was gathered through field observations, questionnaires, and interviews. Both formal and semi-structured interviews were used. A questionnaire was used to gather structured data, and semi-structured questions encouraged flexible but controlled replies based on the research emphasis.

Aisyiyah Bustanul Athfal (ABA) Kindergarten in Banda Aceh serves as the research's case study. ABA Batoh Kindergarten, ABA Merduati Kindergarten, ABA Lhong Raya Kindergarten, ABA Sukaramai Kindergarten, ABA Cot Bak Mee Kindergarten, and ABA Ceurih Kindergarten were the six case studies that were looked at. The six ABA kindergartens were selected because they represent all existing ABA kindergartens in Banda Aceh City. Therefore, the study covered the entire population of ABA kindergartens in the city. The respondents consisted of school principals/teachers and parents. Each kindergarten was represented by four teachers or school representatives and two parents, resulting in a total of 30 respondents. The respondents were selected purposively based on their direct involvement in children's learning activities and their understanding of the classroom environment.

Safety, comfort, and stimulation in interior aspects are the three criteria for a child-friendly setting, according to the research title [4]. In this study, safety criteria included material safety, accessibility, supervision, and environmental security. Comfort criteria included thermal, visual, acoustic, and spatial comfort. Stimulation criteria referred to visual and spatial elements that support children's cognitive, emotional, and social development.

The assessment of child-friendly interior criteria was conducted using an observational checklist adapted from child-friendly school indicators proposed by UNICEF and previous studies. The evaluation applied four assessment categories: highly fulfilled, fulfilled, partially fulfilled, and not fulfilled. The scoring results were based on field observations, questionnaire responses, interviews, and documentation. The following are the specific observations:

1. Field observation: surveying the kindergarten building and noting factors such as complementarities, spatial programs, and spatial elements.
2. Comprehensive observation components: comfort criteria, which include aspects of thermal, acoustic, visual, and spatial comfort; safety criteria, which include aspects of security, supervision, environmental safety, and environmental health; and stimulation criteria, which include aspects of spatial and visual stimulation.

Questionnaires were used to gather research data. Three methods were used to examine observational study data, according to Miles and Huberman [17]: data reduction, data presentation, and conclusion formulation. Data reduction techniques included grouping, tracing, coding, and summarizing. Narrative prose and matrices, tables, and graphs were used to present the data. After gathering data since the start of the study, conclusions were formed gradually. While keeping the research focus, conclusions were made

in an open and flexible way. Conclusions must undergo a verification process that includes reconsideration, a review of the notes and results of the questionnaire, and a review and revision of the conclusions in light of the literature.

4 Results and discussion

4.1 An interior description of Banda Aceh's Aisyiyah Bustanul Athfal Kindergarten (ABA Kindergarten)

Aisyiyah Bustanul Athfal Kindergarten (ABA Kindergarten) is a Muhammadiyah-affiliated private kindergarten school located in Banda Aceh. In Banda Aceh, there are six ABA kindergartens located in several districts:

TK ABA Batoh.

This kindergarten is situated on the Muhammadiyah University of Aceh campus in the Luengbata District (Figure 1). It is made up of three structures. White ceramic floors are used. Children can't easily reach some cabinets and shelves, but the most of the furniture is scaled to their height. Certain pieces of furniture, such the corners and edges of tables, cupboards, and shelves, have sharp edges that could hurt kids if they bump into them.

Light green and pink have been selected as the room's hues. It has a white ceiling. using light and neutral colors is the most adaptable way to assist children's activities and enable them to be more expressive and flexible. (Shafira, Armanila, and Siregar 2022). Letters and images that act as instructional visualizations adorn the walls. There isn't a room set aside for role-playing or reading. Every room has windows for direct lighting, which promotes comfort and concentration while learning.

Early children learn to share, take turns, and comprehend each other's feelings as part of their social and emotional development. Provide a classroom that is adaptable so that the furniture may be rearranged to provide the ideal learning environment.



Fig. 1. TK ABA Batoh Classroom

TK ABA Merduati

The address of this kindergarten is Jl. Prof. Abdul Majid Ibrahim, Merduati, Kuta Raja Kota District, Banda Aceh (Figure 2). It is made up of three building masses and four classrooms. White ceramic floors are used.

The Muhammadiyah organization's unique identity is reflected in the school's design. The predominant green and yellow hues of classes A, B1, and B2 demonstrate this. The school is intended to be a two-story structure. These hues complement those frequently found in the Muhammadiyah logo. In the meantime, B3's office and classroom continue to be white, setting them apart from the other structures.

Early children learn to share, take turns, and comprehend each other's feelings as part of their social and emotional development. As can be observed from the tables grouped around chairs, tables and chairs are set up in groups. Every classroom uses this arrangement. Some cabinets and shelves are hard for kids to reach, but the tables and chairs are kid-sized. Additionally, the chairs are rearranged as necessary.



Figure 2. TK ABA Merduati Classroom

TK ABA Lhong Raya.

Jl. Sultan Malikul Saleh, Lhong Raya, Banda Raya District, Banda Aceh City is the address of this kindergarten (Figure 3). There are two building masses and five classrooms. White ceramic floors are used. Some cabinets and shelves are hard to reach, but the tables and chairs are the right size for the kids.

The colors yellow, blue, and pink predominate throughout the classroom. The door frames and ceiling trim have a bright green accent, and the classroom walls are adorned with pictures and ornaments that are both gorgeous and instructive for the kids. Early children learn to share, take turns, and comprehend each other's feelings as part of their social and emotional development. Every classroom has a group arrangement of tables and chairs. Tables and chairs can be rearranged as necessary. Sometimes students use a sitting area with carpet or mats instead of chairs and tables to learn and engage. The kindergarten has a hall-like common area with no barriers.



Figure 3. Ruang Kelas TK ABA Classroom

TK ABA Sukaramai.



Figure 4. TK ABA Sukaramai Classroom

The address of this kindergarten is Jl. Pattimura No. 38, Sukaramai, Baiturrahman District, Banda Aceh City (Figure 4). It is housed in a single structure with two classrooms. The classrooms are connected to a small indoor play area. There are puzzle mats covering some sections of the white tile floor. There are open shelves to help with cleaning and arranging after play, and the tables and chairs are kid-sized.

The primary colors used in this kindergarten are natural and contrasting hues like red, yellow, and green. To encourage children's growth and creativity, the classrooms have a variety of wall and ceiling decorations. To encourage youngsters to interact with one another, tables and chairs are set up in groups. The furniture is meant to fit children between the ages of four and five. A puzzle mat covers a seating space in the classroom's corner. Usually, this space is used for reading and play.

TK ABA Cot Bak Me.



Figure 5. TK ABA Cot bak Me Classroom

The address of this kindergarten is Jl. Cot Bak Me No. 1, Lamteh, Ulee Kareng District, Banda Aceh City (Figure 5). The kindergarten is housed in a two-story structure with four classrooms. Because of the small student capacity, the second level is not utilized as a classroom. There is a classroom in the indoor play area. White ceramic tiles make up the classroom's floor, while certain sections are carpeted for seating. There are shelves for simple cleaning and arranging after play, and the tables and chairs are kid-sized.

This kindergarten's colors and lighting provide a cozy, secure, and stimulating atmosphere for kids' growth. The kindergarten makes use of contrasting hues including yellow, red, and green. The walls of classrooms B3 and A are also entirely white. To encourage youngsters to interact with one another, tables and chairs are set up in groups. The furniture is meant to fit children between the ages of four and five. In the classroom's corner is a seating area with a plastic carpet.

TK ABA Ceurih.



Figure 6. TK ABA Ceurih Classroom

The address of this kindergarten is Jl. Jurong Dagang, Lr. Abdullah Ali No. 2, Ceurih, Ulee Kareng District, Banda Aceh City (Figure 6). The kindergarten is housed in a one-story structure with four classrooms. The classrooms are connected to the indoor play area. Brown ceramic tiles make up the inside floor, while plastic carpets are used in some places to provide seating.

Shelves and display tables are easily accessible, and tables and chairs are kid-sized. Children can grow in a cozy, secure, and fascinating environment thanks to the colors and lights. Soft, neutral hues like cream, pink, and pastel green are used in the kindergarten. To encourage youngsters to interact with one another, tables and chairs are set up in groups. In the middle of the classroom is a plastic carpeted seating area.

4.2 A Child-Friendly Study of Banda Aceh City's Aisiyiah Bustanul Athfal Kindergarten (TK ABA) Interior

The requirements for kid-friendly architecture in classroom interiors are shown in Table 2. Since the majority of children's activities take place in classrooms for interaction, the assessment was limited to classrooms. In this instance, the interior design is in line with Table 2.

Children's comfort and interaction are supported by the furniture's arrangement and size. There are still sharp corners on important facilities like student desks and chairs. Additionally, pupils find it challenging to open a number of cupboards. This illustrates the necessity of taking anthropometric and ergonomic factors into account when creating user-friendly furniture.

The majority of ABA kindergartens lack spaces like reading corners, hallways, prayer rooms, and lesehan (expression areas) where students can study alone and interact with one another. These facilities are exclusive to ABA kindergartens in Sukaramai and Lhong Raya. Students' ability to communicate and express themselves is so restricted.

All of Banda Aceh's ABA kindergartens lack facilities for the disabled. Ramp access and other minimal facilities for the disabled are preferred since they indirectly lessen sharp edges that could endanger children. Additionally, ABA kindergarten buildings lack emergency exits.

The assessment applied a four-point scoring system adapted from UNICEF Child-Friendly School indicators and previous child-friendly architectural studies. Each criterion was evaluated through direct field observations, questionnaires, interviews, and documentation. The scoring categories were defined as follows:

- 4 = Highly Fulfilled
- 3 = Fulfilled
- 2 = Partially Fulfilled
- 1 = Not Fulfilled

The assessment focused on three main aspects of child-friendly interior architecture: safety, comfort, and stimulation. The scoring indicators for each criterion are described in Table 1.

Table 1. The scoring indicators for each criterion

No	Assessment Criteria	Score 4 (Highly Fulfilled)	Score 3 (Fulfilled)	Score 2 (Partially Fulfilled)	Score 1 (Not Fulfilled)
1	Flexible furniture arrangement	Furniture layout is highly flexible and	Furniture arrangement supports interaction but	Interaction is somewhat limited due	Furniture arrangement does not

	supports interaction	strongly supports group interaction	is not fully flexible	to the furniture arrangement	support interaction
2	Furniture size is appropriate for children's comfort	All furniture is fully suitable for children's anthropometric dimensions	Most furniture is suitable for children	Several furniture elements are difficult for children to use	Furniture dimensions are not suitable for children
3	Availability of reading corners or independent learning areas	Dedicated and comfortable learning areas are fully available	Independent learning areas are available but limited	Learning areas are very limited	No learning areas are available
4	Informative, interesting, and educational learning media	Learning media are complete, attractive, and interactive	Learning media are sufficiently available and educational	Learning media are limited	Very limited or no educational media are available
5	Bright interior colors	Interior colors are bright, harmonious, and stimulating	Interior colors adequately support learning activities	Interior colors are monotonous or less stimulating	Interior colors do not support the learning environment
6	Maximum natural lighting	Classrooms receive optimal natural lighting without artificial lighting	Natural lighting is sufficient	Natural lighting is limited	Classrooms are poorly lit and depend on artificial lighting
7	Safe interior materials (non-sharp, non-slip, non-toxic)	Materials are fully safe and child-friendly	Materials are generally safe with minor risks	Several materials present safety concerns	Materials are unsafe for children
8	Ventilation system using natural ventilation and additional fans	Natural ventilation and air circulation function optimally	Ventilation is adequate	Ventilation is insufficient	Ventilation is poor and uncomfortable

9	Availability of disability facilities	Disability facilities are fully available	Some disability facilities are available	Disability facilities are very limited	No disability facilities are available
10	Availability of supporting spaces (expression room, reading room, resting room, health room, hall)	Supporting spaces are complete and functional	Most supporting spaces are available	Only a few supporting spaces are available	Supporting spaces are not available

Table 2. Child-Friendly Criteria in Six Aisiyyah Bustanul Athfal Kindergartens in Banda Aceh City Child-Friendly

Criteria in the Interior Aisiyyah Bustanul Athfal	Aisiyyah Bustanul Athfal Kindergarten (ABA)					
	A	B	C	D	E	F
1. Flexible furniture arrangement facilitates interaction	3	4	4	4	4	4
2. Children's comfort is taken into consideration when sizing furniture.	3	4	4	4	4	4
3. There are dedicated study spaces and reading corners.	1	1	1	3	1	3
4. Informative, interesting, and instructional learning media.	4	1	4	4	4	4
5. Vibrant interiors.	4	3	4	4	4	4
6. The most natural light possible (no artificial lighting).	4	2	4	4	4	4
7. Extremely safe inside materials (non-toxic, non-slip, and non-sharp).	3	3	3	3	2	4
8. The ventilation system makes use of both extra fans and natural ventilation.	3	3	3	3	3	4
9. There are facilities for individuals with disabilities.	1	1	1	1	1	1
10. There are support areas (reading room, restrooms, health room, hall, and expression room)	1	1	3	3	1	4
Totals	27	26	35	33	32	36

Table information:

4	Highly Fulfilled	A	TK ABA Batoh Cabang Leung Bata
3	Fulfilled	B	TK ABA Merduati.
2	Partially Fulfilled	C	TK ABA Lhong Raya.
1	Not Fulfilled	D	TK ABA Sukaramai
		E	TK ABA Cot Bak Me Ulee Kareng
		F	TK ABA Ceurih Ulee Kareng

Based on Table 2, the highest scores were generally found in lighting, interior color, and furniture arrangement criteria, indicating that most ABA kindergartens have attempted to create visually comfortable learning environments. However, disability facilities and supporting spaces consistently received low scores across all case studies, indicating limited inclusiveness and spatial support for children's independent activities.

To facilitate interpretation of the assessment results, the total scores were categorized into four levels of child-friendliness. Scores ranging from 31–40 were categorized as highly child-friendly, 21–30 as child-friendly, 11–20 as partially child-friendly, and 1–10 as not child-friendly.

Based on the total scores presented in Table 2, TK ABA Ceurih achieved the highest score, indicating the strongest implementation of child-friendly interior principles among the six case studies. In contrast, TK ABA Batoh and TK ABA Merduati obtained relatively lower scores due to the limited availability of supporting spaces, disability facilities, and several safety-related interior elements.

To maximize ventilation, all ABA kindergartens use extra fans in addition to natural ventilation. A room's climate can be enhanced by properly operating natural ventilation, which makes it more comfortable and less humid, resulting in a healthier setting.

Bright colors are used in every kindergarten's interior design. The majority of classrooms use instructive, entertaining, and informational objects that are mounted on the walls and ceilings. There are very few wall-mounted educational resources at ABA Merduati Kindergarten.

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A child-friendly kindergarten's interior should take into account a number of factors, according to the UNICEF Child-Friendly Schools guidebook (Abusafieh et al. 2022): a building that is water-resistant, comfortable, and easily evacuated; a separate administrative office from the classrooms that is easily monitored; separate restrooms for boys and girls; natural ventilation that covers at least 20% of the floor area; learning areas that are bright and airy rather than dark or gloomy; a dedicated area with books and learning resources in a quiet, accessible, and comfortable reading environment; flexible spaces, relaxation rooms, and individual spaces.

Some case studies satisfied the UNICEF guideline's requirements, while others did not. The majority of the case studies lacked reading rooms, relaxation areas, and separate facilities for boys and girls. This condition may be influenced by limited classroom space and multifunctional room usage. Similar findings were reported by Shaari et al. [11], who emphasized that spatial flexibility significantly affects children's cognitive readiness and independent learning behavior.

Safety, health, comfort, safety, and convenience are the five general requirements of child-friendly school design (Nafisa, Barliana, and Rahmannullah 2022). These concepts have been tried in this study, but the facilities for implementation and support are still subpar.

4.3 The impact of design on kids' emotional, social, and cognitive growth.

A room's color scheme and lighting design have an impact on children's cognitive development. This affects how the area is seen. Children's comfort, safety, and creative stimulation are among the perceptions that follow. The majority of ABA kindergartens feature ideal natural lighting systems and vibrant colors, according to case studies.

Student interactions influence social and emotional development. The way the primary furniture, desks and chairs, are arranged has a big impact on how people interact. In Banda Aceh, all ABA kindergartens set up seats in groups. The number of students and the size of the space are taken into account while designing the grouping method.

5 Conclusions

This study looks at the kid-friendly interior design of Banda Aceh City's ABA kindergartens. Six ABA kindergartens were the subject of the investigation. Three primary points were highlighted: stimulation, comfort, and safety. All kindergartens had made an effort to use child-friendly design concepts, but their execution was still not ideal, according to the study. It is possible to reach the following conclusions:

1. Interior Facilities: Natural ventilation, instructional learning materials, and vibrant colors were employed in every ABA kindergarten. Even though much of the furniture was kid-sized, there were still dangerous sharp edges and difficult-to-reach drawers.
2. Support Space and Accessibility: Not every ABA kindergarten included areas for expression and reading. Only the ABA kindergartens in Lhong Raya and Sukaramai had these areas. There were no emergency evacuation routes or special facilities for those with impairments in any of the kindergartens.
3. Materials and Safety: Ceramic tiles and mats, which are thin, hard, and slick flooring, are still used in all ABA kindergartens. In the sitting room, only one school had

puzzle mats all over the floor. The safety and kid-friendliness requirements were not entirely met by the interior materials.

4. Effect of design on child development: Using vibrant interior colors and making the most of natural lighting can improve children's mood and cognitive development. Group study tables and chair arrangements can promote emotional growth and social engagement.
5. Adherence to UNICEF Guidelines: A few requirements, like natural lighting and ventilation, have been satisfied. A reading room, a relaxing area, and separate restrooms for boys and girls are just a few of the crucial elements that have not been equally addressed.

Even though the ABA Kindergarten in Banda Aceh has made an effort to incorporate child-friendly architectural principles, there is still room for improvement in terms of a secure, welcoming, and engaging interior, especially with regard to the choice of materials, the availability of useful spaces, and assistance for kids with special needs. In order for the school environment to assist children's holistic growth and development, more modifications to international recommendations, such as those from UNICEF and the CFS, are required.

This study contributes to the development of child-friendly interior assessment criteria for kindergarten facilities in tropical urban environments, particularly in Banda Aceh. The findings may support future educational design policies and provide references for improving inclusive and child-friendly learning environments.

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