DEAF SPACE IN BAZNAS DKI JAKARTA PESANTREN TAHFIZ DIFABEL COMPLEX

Latansa Amanta[1]*, Rizka Maharani[1]

[1] *Universitas Pembangunan Nasional "Veteran" Jawa Timur, Surabaya, Indonesia*

Abstract: *The Tahfiz Islamic Boarding School (Pesantren) for the hearing impaired is a significant innovative step in overcoming the challenges of access to religious education for individuals with disabilities in Indonesia. This research aims to thoroughly explore and analyze the application of deaf space architecture in the KH. Lutfi Fathullah BAZNAS DKI Jakarta Pesantren Tahfiz Difabel Complex, which is exclusively designed to meet the needs of deaf people. This research was conducted using a qualitative approach with two elaborations. The first is through interview and observation. The second examines deaf space architecture through literature studies via the internet. This research provides an in-depth description of how the architectural design of the boarding school complex has taken into account aspects of inclusivity for deaf people. The results highlight that the main buildings, such as classrooms, places of worship, dormitories, and other public areas, haven't been designed by considering the accessibility and safety needs of people with disabilities by integrating passive design in the form of other supporting facilities effectively. However, this research also highlights the need for continued efforts in monitoring and evaluation to ensure the sustainability and effectiveness of inclusivity in practice in order to meet the needs of the disabled holistically.*

keywords: *inclusive architecture, deaf space, Pesantren.*

Latansa Amanta*

E-mail: 21051010106@student.upnjatim.ac.id

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Introduction

The Quran must be read and learned by all, including people who are deaf or hard of hearing. Recite what has been revealed to you, the Quran (Al-Kahf: 27). Learning the Quran provides important religious values and helps in the development of cognitive and language skills of deaf students.

One method of education for deaf children is through the segregation system, which provides special education separate from hearing-able children [1]. The government has attempted to provide Quranic education services for children with special needs in a segregated manner, including boarding schools specifically for people who are deaf or hard of hearing. One example is the Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS (BAZIS) Jakarta (Fig.1), which is located in Jakarta City and organizes special religious education programs for children with special needs, such as deaf children.

Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS (BAZIS) DKI Jakarta was established in 2022 and is located at Jl. Manunggal Jaya, RT.8/RW.4, Lebak Bulus, Cilandak, South Jakarta. The name of this pesantren is taken from the name of a figure of the National Amil Zakat Agency, KH. Lutfi Fathullah, who is known as a renowned hadith scholar. Due to the limited teaching staff, this boarding school only accommodates female students. So this pesantren has yet to be able to add classes for male students. With

Fig. 1. *Pondok Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS Jakarta*

a total area of 2400m², this pesantren provides various facilities that support learning activities for female students with special needs. These facilities include three classrooms, two gazebos, a laundry room, a prayer room, a student (santri) dormitory, student toilets, an administration room, a VIP toilet, a kitchen, a management room, a warehouse, and a dining room. There are two deaf-friendly classrooms for junior high and high school, with 23 deaf students in junior high school and 7 in high school. The deaf-friendly classroom for junior high school has a total area of 70 sqm and can accommodate ten students per class.

The pesantren is strategically located close to the village office. Access to the pesantren can be through Lebak Bulus III road, then enter Manunggal Jaya road for about 300 meters (Fig.2).

Fig. 2. *Block Plan of Pondok Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS Jakarta*

Deafness is a hearing disability that varies from mild to severe and is classified into two categories: deafness and hard of hearing [2]. Hearing loss causes individuals to rely heavily on their sense of sight. This results in how they interact with their surroundings being slightly different from people with normal hearing, especially regarding space awareness, communication, and attempts to protect themselves. One example of a common adaptation is using sign language.

The activities of students at the Pondok Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS (BAZIS) DKI Jakarta last about five hours a day every week. Two learning subjects help deaf students communicate: the Quran memorization program and the general curriculum, like in schools. Learning the Quran not only provides religious value but also helps develop the cognitive and language skills of deaf students. The theoretical learning method here is more passive compared to pesantren in general, with more use of pictures and writing.

Individuals who have hearing can communicate verbally from one place to another, while individuals who are deaf can only communicate through sight. The limitation in hearing causes deaf children to tend to rely on visual and sensory abilities [3]. The difference in human sensory and auditory abilities allows hearing individuals to capture the sounds around them more than deaf individuals, who can only see within their visual range. Research by Sirvage in 2012 and by Chiambretto and Trillingsgaard in 2016 highlighted that the body movements of deaf humans can only be seen within a 180-degree visual range (Fig.3).

In the context of space experience for deaf individuals, a concept of space design guidelines can be used. This concept includes five main aspects, namely 1) space and proximity, 2) sensory reach, 3) mobility and proximity, 4) light and color, and 5) acoustics [4,5].

The reach of deaf individuals is limited to visual. Although this is one of the means used by deaf individuals to gain information about their environment, they also use vibration, touch, and shared or social cues to achieve the 360-degree sensory reach that hearing typically provides [4].

The five concepts aim to expand an individual's ability to respond to space by considering the limitations in the 180-degree visual range, with the hope of increasing space awareness to 360 degrees [5]. From this, it is essential to note that the prominent ability of deaf individuals lies in the sensory range of the eyes (visual) [6].

The boarding school building is generally oriented in an east-to-west direction, as shown in Figure 4, so it is exposed to the most sunlight in the morning and evening. The sun moves from east to west from around 5:00 am to 6:00 pm. In the deaf classroom building, the sun is directly above at around 12:00 am to 2:00 pm, with the highest intensity between 10:00 am and 3:00 pm. For visual comfort, the orientation of the deaf

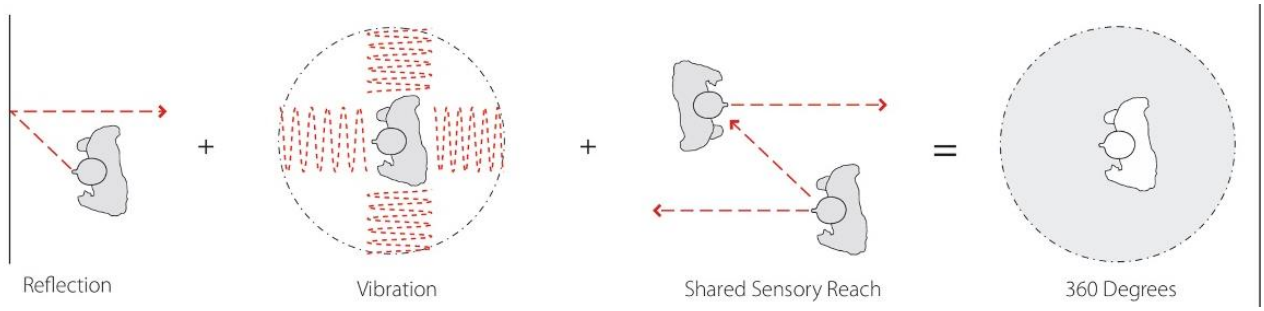


Fig. 3. *Deaf Humans Visual Range [4]*

boarding school building follows an east-to-west direction rather than north-to-south. This orientation allows daylight and glare control along the long side of the building and minimizes glare from sunrise or sunset. The deaf pesantren building receives optimal daylight, which is not allowed to enter the building directly. There is a corridor in front of the building, a facade, and many windows on the sides so that the natural sunlight does not give direct glare to the students.

One of the main elements of visual range is color. Color not only plays a role in aesthetics or creating a particular atmosphere in a place, but it can also be used to identify specific areas, divide the space into zones, and draw attention to certain areas of the room. For example, a white-painted ceiling with a black floor will give the impression of greater height than otherwise [7].

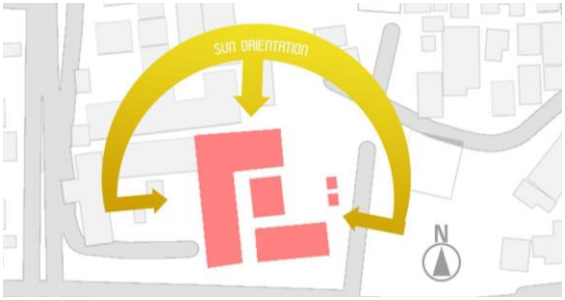


Fig. 4. *Orientation of the Building Mass Order of Pondok Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS Jakarta*

Although deaf students experience limitations in hearing and verbal communication, they are expected to be able to carry out daily activities independently without relying on the help of others; this depends on the environment in which they live, which also has a significant impact on the process of forming their independence. In this context, the design of the pesantren environment has a vital role in shaping the character of deaf santri. Based on theory and direct observation of the behavioral characteristics of people who are deaf or hard of hearing indoors, their needs include spaces that allow movement according to human body size and utilize visual access capabilities to recognize the environment. When interacting or communicating, they must face each other. Therefore, the environmental factors where they live and live need to be arranged according to the behavioral activities of deaf students as users to apply interior deaf space in the pesantren environment effectively.

Based on the explanation above, it can be concluded that the concept of deaf space has a significant impact. Therefore, applying this concept in the environment of Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS (BAZIS) Jakarta is worth considering. The hope is that using the idea of deaf space can help deaf students develop and improve their ability to overcome challenges that may arise in their surrounding environment and find solutions to various problems. So this research aims to examine the concept of Deaf Space in the pesantren environment.

Based on the problem formulation described above, the objectives of this study are 1) to examine the concept of deaf space in the permanent environment and 2) to provide an understanding of the need for deaf space in the boarding school environment.

This research is new to a previous study by R. Permadi et al., which focused on designing a Deaf Special School (SLB-B), a general education institution. This research focuses on Hansel Bauman's five deaf space concepts applied to the Boarding School for the Disabled, which has an Islamic curriculum, so that the idea of Hansel Bauman's deaf space will acculturate with the Islamic learning system, especially in the Quran memorization learning system.

Methods

The research method chosen is descriptive qualitative. This research will utilize interviews, observations, and literature analysis data. This research focuses on the Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS (BAZIS) in South Jakarta, with research subjects being the teaching staff from the pesantren. And this observation and interview was conducted in May 2024.

The data in this study are divided into two types: primary data obtained directly from respondents through interviews and secondary data derived from literature studies such as books and scientific journals. The sampling technique used was purposive sampling, namely interviewing teaching staff who have taught at the pesantren since its inception.

The data collection techniques include literature study, interviews, observation, and documentation. Data analysis was conducted qualitatively by processing data from various sources such as notes, photos, and interview results. The results of this analysis were then used to conclude the research problem, such as the chart in Figure 5.

This research applies the data analysis technique developed by Miles and Huberman [8], which consists of three main stages: data reduction, data presentation, and conclusion drawing. Data reduction is done by collecting information about deaf space in pesantren through interviews and observations. The data was then presented in various forms, such as tables, graphs, stories, and documents, to facilitate understanding and conclusion.

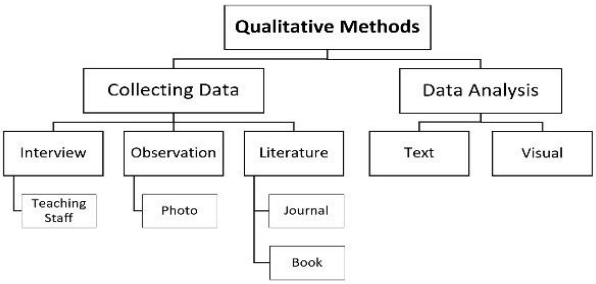


Fig. 5. *Research Method*

Data verification and conclusion drawing are based on valid and consistent evidence so that the research results can be accounted for.

Results and Discussion

This chapter presents the results of research conducted regarding applying the concept of deaf space in the environment of Pondok Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS (BAZIS) DKI Jakarta. Five deaf space concepts were studied in this research. These five concepts underlie the design of deaf space: space and proximity, sensory reach, mobility and proximity, light and color, and acoustics [7].

These five concepts are guidelines designed to create an environment that is more inclusive and responsive to the needs of deaf students:

1. *Space and proximity* – examines how space is organized and optimized to enable effective interaction between deaf students and facilitate their daily activities [7].
2. *Sensory reach* – explains how space design allows deaf santris to maximize their sense of sight, extending their visual range and improving navigation within the pesantren environment [7].
3. *Light and color* – examines the use of light and color in the interior design of pesantren to improve visual comfort and assist deaf students in space orientation and learning activities [7].
4. *Mobility and proximity* – discusses how movement and accessibility within the pesantren are organized to facilitate the mobility of deaf santris, including pathways and furniture arrangements that support affordability [7].
5. *Acoustics* – evaluating the acoustic aspects in the pesantren environment. Although deaf santris do not rely on hearing, minimizing sound disturbances that affect comfort and concentration is vital [7].

The results of this research are expected to provide a deeper understanding of how the application of deaf space concepts can support the independence and well-being of deaf santri in the pesantren environment. A detailed analysis of each idea will be presented in the following subsections, showing the relevance and effectiveness of deaf space design in the specific context of Pondok Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS (BAZIS) DKI Jakarta.

Sensory Reach

Deaf children have limited speaking and hearing abilities, so visual media is a suitable learning medium. The way to explain visual media to deaf children is with lip language or lip movements [9], which makes them need cues that can stimulate other visual and sensory abilities in the form of signs, labeling, use of materials, etc. Spatial orientation and awareness of the activities around us are essential for maintaining well-being. Visual connection, openness, and transparency are vital to expanding the sensory range of deaf students but must be balanced with considerations of privacy and comfort, as well as "degree of enclosure." Setting the degree of openness appropriate to the situation is necessary to balance visual availability, privacy, and safety [4].

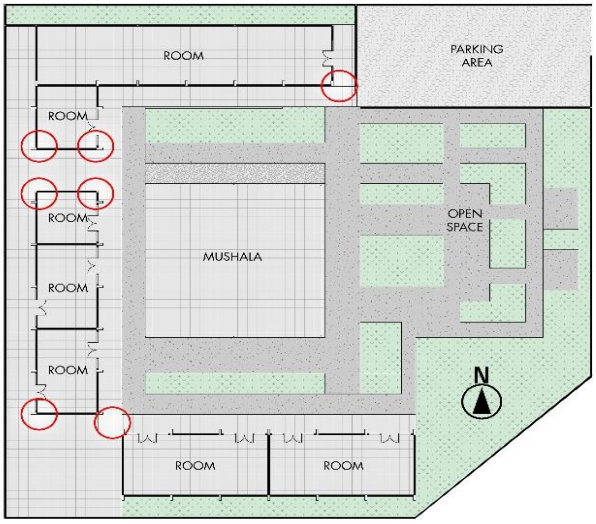


Fig. 6. *Blind corner at the Pondok Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS Jakarta*

According to Hansel Bauman, the standard angles used in deaf space design include oblique, curved, transmission, or curvatures that provide a more comfortable visual appearance. The space in the Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS (BAZIS) DKI Jakarta still has right angles or sharp corners in the corridor (Fig.6), creating blind corners, so students must be careful not to bump into others when crossing the intersection (Fig.7).

Fig. 7. *The corner of the room at the KH. Lutfi Fathullah BAZNAS Jakarta Tahfiz Difabel Pesantren*

This characteristic of deaf psychology is applied to help or even increase the stimulation of the senses that deaf people have. By using other senses, deaf students are expected to be able to read different situations through existing visuals. For example, the wall elements use transparent glass accents on the door so that students who are in the classroom can find out if there are people at the door; the addition of glass material to the interior accents so that students can quickly respond if there is a call from behind [10].

The door in the deaf pesantren room at Pondok Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS (BAZIS) DKI Jakarta uses a wooden door without a layer of transparent glass on both sides (Fig.8). This condition increases the risk of deaf students colliding when opening the door because they cannot see who is behind it. In addition, the door opening in this pesantren room leads out, so students must be careful not to bump into other people. This risk can be minimized by adding transparent glass to the door so that deaf students can see the person behind the door.

In the building of Pondok Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS (BAZIS) DKI Jakarta, windows are placed almost throughout the building. Nearly all rooms use transparent glass material. The use of transparent glass aims to give deaf students a broad view and allow them to clearly see the situation outside and inside the room.

The windows used in this pesantren are almost the same as the window system in general, which uses a type of nako glass window (Fig.9). The window is made in such a way that students with special needs, especially blind students, do not hit it when walking. If the window can be opened with the addition of swing window hinges, there is a high probability that students with special needs can hit the window when passing by.

Fig. 8. *The Door at Pondok Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS Jakarta*

Fig. 9. *Window at the Pondok Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS Jakarta*

Nako glass windows have advantages in regulating airflow according to the desired conditions of the occupants and are easy to maintain [11]. With nako glass windows, air circulation in the room can be optimized.

The seating arrangement in the study room for deaf students is adjusted to the learning needs because the furniture is portable (movable). This classroom's table and chair model can be easily arranged according to learning needs. Seating arrangements are arranged in rows and parallel apart (Fig.10). This seating arrangement is intended so that deaf students can focus on paying attention to the material delivered by their ustadz (teacher).

When deaf individuals are seated in groups, it is essential to arrange the seating so that they can see each other's faces and maintain eye contact with all participants. Square and rectangular tables become problematic for groups larger than four, with the issues worsening as the group size increases. Therefore, round and horseshoe-shaped tables are preferred [4].

There is a comparative optimization of seating arrangements in the deaf space literature. A "U" or horseshoe-shaped seating arrangement effectively gives everyone equal visual access [4,12]. The semi-circular arrangement is usually used for more than four students, for example, seven students, and requires a larger room size, usually applied to a square room. At the same time, the "U" - shaped arrangement is often used in classrooms with four students. However, the "U" - shaped seating arrangement has disadvantages if applied in this deaf pesantren class because it can divert the concentration of the students. They may be unable to focus on the ustadz and are easily distracted by other deaf students. The seating arrangement currently applied in this pesantren classroom is lined and parallel (Fig.11). So that students can see and focus on the ustadz during the learning process.

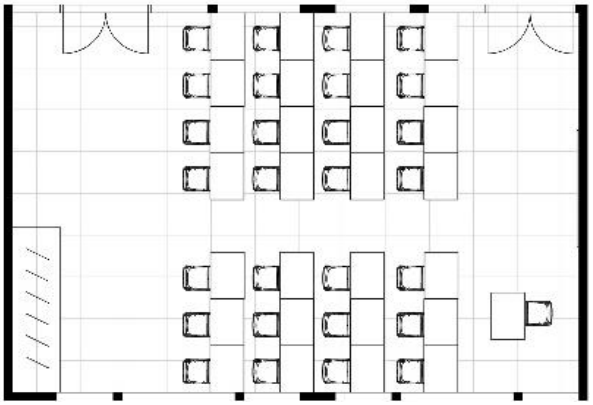


Fig. 10. *Seating arrangement at Pondok Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS Jakarta*

Fig. 11. *Classroom at Pondok Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS Jakarta*

Space and Proximity

Deaf people need more space than hearing people to attend to their environment freely. Large and spacious visual spaces facilitate communication and environmental awareness for deaf people. For example, two deaf students communicate more visually than with sign language or spoken speech. The space and proximity

characteristics of the deaf form a comfortable space for them to do their activities. The language and communication skills of deaf students often require visual skills in communication.

Deaf people are more dominant with face-to-face characteristics to more easily understand messages through spoken or sign language. They need ample space to demonstrate sign language, so wider walkways and ramps are essential. Wider walkways allow communication with the interlocutor while walking safely. This boarding school has no walkways, but almost all areas use 1500 mm wide corridors. The best practice chosen by Universal Design experts is 1200 mm for barrier-free pedestrian width. However, in areas with higher frequency, it is recommended to use a width of 1830 mm [13]. After reviewing the universal design standards, we see that the road corridor in this pesantren is sufficient for just a pedestrian path.

The shape of the proposed room considers the psychological characteristics of people who are deaf or hard of hearing, such as resembling a circle, to be more flexible and facilitate the view between students. This circular shape provides positive value for deaf psychology, especially in reducing fatigue due to communication activities. The design of the communal area in the Pondok Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS (BAZIS) DKI Jakarta is dominated by a circular shape, which is applied to the gazebo, prayer room, garden, and so on, to support the function of deaf people.

However, the existing learning space must be revised because it cannot adjust to learning needs. For example, during certain learning activities, such as Al-Quran memorization deposit activities, students move from the classroom to the mushala or gazebo to carry out teaching and learning activities in a circle (Fig.12).

Fig. 12. *Learning at Mushala Pondok Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS Jakarta*

Light and Color

Lighting is one of the critical factors in space design that supports user comfort [14], given the dependence of deaf people on their visual abilities. Of course, adequate lighting is needed to keep the room illuminated and avoid its adverse effects. The negative effects of poor lighting include 1) eye fatigue, 2) mental fatigue, 3) damage to the visual apparatus, 4) complaints of soreness around the eyes, and 5) increased risk of accidents [15].

Visual comfort is closely related to the lighting standards that have been set. SNI 03-6197-2000 sets visual comfort standards tailored to specific activities and needs: general classrooms require lighting of 250 lux, computer rooms require 500 lux, drawing rooms require 700 lux, and wood workshops require lighting between 200 and 1000 lux [16].

The Pondok Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS (BAZIS) DKI Jakarta places the spaces around a garden in the center of the site so that each room can access natural lighting because other structures block no side of the building. The corridor in front of the room ensures that sunlight does not directly daze the students. Even and adequate lighting in the classroom of deaf students facing the park is obtained from the many windows on the side of the building. Artificial lighting in each classroom uses downlight-type lamps (Fig.13) with 40 watts of power and a light temperature of 4000K cool tone. Cool light (4000K) produces a higher ability to concentrate, and warmer light (3000K) can improve communication [17]. Lighting conditions like this can give a bright impression and increase concentration and productivity in learning. This lighting is by SNI standards[1], where the optimal minimum lighting level for classrooms is 250 lux with color rendering group 1 or 2 and cool white or daylight temperature (Table 1). With this lighting, deaf students can read sign language, lips, and body language during learning.

[1] SNI 03-6197-2000 Standar Nasional Indonesia Badan Standardisasi Nasional Konservasi energi pada sistem pencahayaan

A bright window behind a person or a focal point in space causes a high contrast between the subject and the environment (backlight) (Fig.14). A person standing in front of a bright window will be silhouetted, causing difficulty reading facial expressions and eye contact [4].

Fig. 13. *Lights in the Classroom of Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS Jakarta*

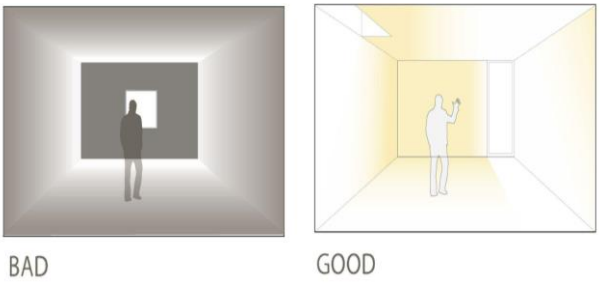


Fig. 14. *Backlight Illustration [4]*

Table 1. Room Lighting Standards [14]

Material	Light Levels (Lux)	Color Rendering Group
Library	0.09	1 or 2
Lobby, Corridor	0.07	1
Storage Room	0.02	3

The condition of the disabled boarding school space is considered feasible according to Hansel Bauman's regulations because it meets the lighting standards that do not cause backlight, according to Hansel Bauman's inclusive design principles, which emphasize the importance of even lighting to avoid glare and shadows that interfere with vision. The classrooms in this pesantren have lighting from all directions, which ensures uniform light distribution throughout the room and prevents overpowering light sources from one direction, which can cause backlighting and harsh shadows and reduce visibility (**Fig. 15**).

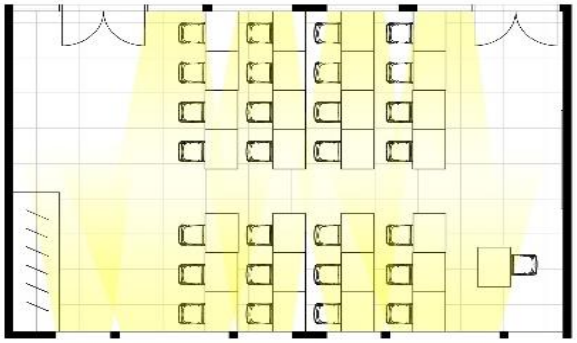


Fig. 15. *Classroom Openings at Tahfiz Pesantren with Disabilities KH. Lutfi Fathullah BAZNAS Jakarta*

Color selection can undoubtedly affect the characteristics and behavior of deaf users. According to Witabora et al., a color scheme combines several colors chosen with aesthetic harmony in mind, capable of conveying a specific message or meaning and related to particular emotions or impressions [18]. Choosing colors that contrast with the skin can improve visual focus for users with difficulty paying attention to the other person. Since communication between deaf and hard-of-hearing people depends heavily on visual clarity, colors that contrast and match the skin tone are best for sign language backgrounds. Blue and green are colors that contrast with most skin tones. In addition, blue and green colors visually prevent overstimulation of the eyes and provide a background against which the eyes can rest [4].

The walls in this pesantren are dominantly colored with white and brown bricks, the floor uses white ceramic tiles, and the ceiling is painted white. The furniture uses a combination of brown, gray, white, and black colors from wood materials. The whiteboard contains the alphabet and numbers on the top. The color of the tiles and ceiling in this classroom is white, which creates the impression of a spacious, open, and shiny room, which positively affects the condition of the room's occupants, especially deaf people who need high concentration in the learning process. The vigorous intensity of the white color on the tiles gives a calm and spacious impression, supporting the necessary atmosphere for concentration without pressure. The wall paint colors chosen are white and brick brown. Psychologically, white symbolizes success, light, goodness, purity,

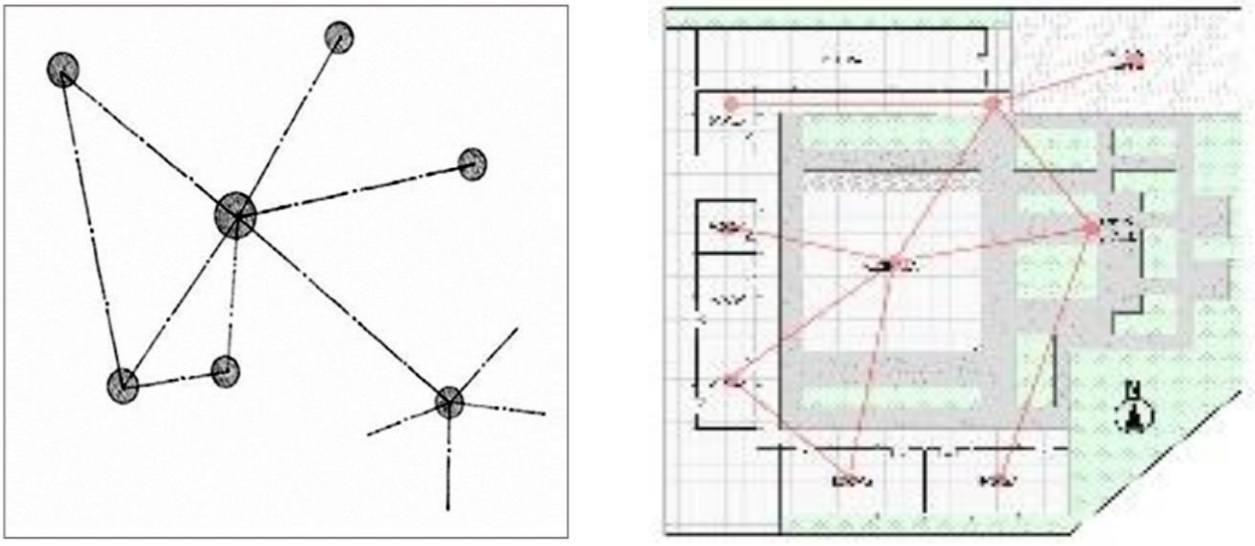
innocence, and simplicity [19]. However, brown is less than ideal because it matches the color of human skin, making it difficult for deaf people to focus on sign language that uses hand gestures. On the other hand, aesthetically, the combination of brown with white, wood, and black furniture creates a good atmosphere for the learning process. The furniture in this classroom is painted in black, white, grey, and brown (**Fig. 16)**.

Fig. 16. *Building Color Accents at the Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS Jakarta*

Mobility and Proximity

This principle is similar to the principle of space and proximity but focuses more on the movement of deaf students. The communication characteristics of people who are deaf or hard of hearing use their imagination, so they tend not to pay much attention to their surroundings, especially when concentrating on talking to each other. Their ideal space is spacious, open, and wide, allowing them to focus on the road and their interlocutors. Space from this principle includes walking areas, classrooms, and access to corridors and ramps that need to be considered for deaf people. They need wider circulation paths to accommodate conversations with signs while walking, mainly when two or more deaf students communicate while moving. The path they walk on should have good circulation and visibility, be visible from a distance, and be free of obstructions, abrupt transitions, or angles. Any obstacles to the movement of deaf santris can disrupt their conversations, so these pathways should be as clear as possible (Fig.17a).

The circulation system in the deaf pesantren complex is closely related to the activities carried out by the deaf santris. This system affects the smooth running of activities and provides flexibility for deaf santri. The furniture arrangement is essential in arranging circulation patterns to create adequate flow with clear directions. This circulation pattern becomes a direction that provides continuity for users of the room to the function of the space. In the Pondok Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS (BAZIS) DKI Jakarta, the circulation pattern applied is a networking pattern [20]. With 30 deaf female students, a minimalist open space arrangement fills the middle area of the site so that circulation outside the building feels wide and the view of deaf students is not blocked (Fig.17b).



(a) **(b)**

Fig. 17. *(a) Circulation Networking [17],*
(b) Circulation Patterns at Pondok Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS Jakarta

Users with hearing loss need ease of movement and activity. In addition to movement space, tools and movement systems must also be considered. For example, ramps in boarding schools for people with other disabilities. Ramps should be configured to create an adequate deaf space environment so that movement and conversation while walking can occur smoothly and reduce the risk of tripping. Ramps should be used primarily in the central circulation paths, such as the access path to the 2nd floor. Ramp width varies from 900 mm to 1220 mm, with the best practice being 1000 mm for one person [13]. Intersections must be carefully designed to maintain ease of access and communication for deaf students. There is a difference in elevation between the park and the pedestrian walkway, with the park contour being about 5-10 cm lower than the pedestrian walkway, as shown in Figure 18(a). The ramp is made with a width of about 1000 mm, as shown in Figure 18(b), which is sufficient for the circulation of one person, with the top of the ramp merging with the floor to minimize the risk of tripping.

(a) **(b)**

Fig. 18. *(a) Elevation of Pedestrian Path at Pondok Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS Jakarta [Author, 2024], (b) Ramp at Pondok Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS Jakarta*

The corridor in this classroom is about 1500 mm wide, as shown in Figure 19, enough for two people to walk side by side. However, this width could be improved for students who communicate while walking. Deaf students need more space to move comfortably and freely when communicating. The circulation path in the corridor in front of the deaf classroom is considered less than optimal due to the narrow width of the corridor and the presence of large pillars that block the view of the deaf students. Hence, this path needs to be more visible from a distance.

The relationship between existing elements and mobility affects the emotional state of people who are deaf or hard of hearing. The distance between objects and individuals is well-considered so as not to disturb the atmosphere. The classroom area for deaf students in this pesantren is 70 m², which is considered optimal for activities because it is only occupied by fifteen deaf students and one teacher. Furniture and furnishings in this classroom are applied minimally along the walls with a small amount so that the space does not feel claustrophobic. The ceiling is not too prominent and is accented with a matte white color that does not readily reflect light that dazzles the eyes.

Fig. 19. *Corridor at Pondok Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS Jakarta*

Acoustic

Buildings for deaf users require quiet acoustic conditions with minimal background noise to prevent distractions, especially for deaf students who use hearing aids. Deaf students need quiet spaces, although not all spaces need to be so. Some rooms that require low noise levels should be designed to be soundproof. The acoustic system in classrooms used by deaf students is essential to note. Rooms that are too noisy will produce sound echoes, one of the primary sources of distracting background noise, and should be avoided, given the limited hearing of deaf santri.

The Pondok Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS (BAZIS) DKI Jakarta is located next to the local village office. Vegetation around the garden and corridor of the pesantren helps reduce classroom noise. The garden in this pesantren has enough vegetation to muffle outside sounds, including those from the urban village office. As the deaf santri need a low-noise environment, the vegetation in front of the deaf classrooms reduces noise. Some deaf santris have varying residual hearing, so it is crucial to maintain low noise levels in the classrooms. The large amount of vegetation in this pesantren helps minimize outside noise, especially with the vegetation along the corridor in front of the deaf classroom (Fig.20).

Fig. 20. *Vegetation at Pondok Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS Jakarta*

The rooms in the Pondok Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS (BAZIS) DKI Jakarta generally use gypsum material for partitions and ceilings, while the walls are made of concrete, brick, and plaster and finished with white paint. The floors are tiled, the doors are wooden, and there are glass windows in every room. These materials have a low level of sound absorption, making them less effective in reducing noise from outside (Table 2). In general, porous materials tend to absorb sound energy more effectively than other materials. The pores allow sound waves to enter the material [21]. Classrooms for deaf students require a room that is well-maintained and easy to clean. Ceramic tile flooring was chosen because it is where the students do their activities, and they are still vulnerable to disease. Ceramic tile is a strong and durable material, making it easy to clean and ideal for use. However, ceramic tile is considered less able to reduce noise. Because ceramics are reflective of sound, they can cause unwanted reflected sounds, such as echoes or excessive reverberation [22].

The wall structure of this classroom consists of concrete, brick, and plaster, finished with a layer of white paint. Concrete was chosen because it is permanent, durable, and resistant to weather conditions, thus ensuring a sturdy and long-lasting building. Concrete walls provide vital protection for residents on the move for long periods. This material is chosen based on the conditions in Cilandak, which is close to Depok and has a mild temperature with a tropical climate, so the building remains resistant to various weather conditions. However, Indonesia's tropical architectural style has a light structure and open external walls, making it challenging to dampen sound [24].

The structural arrangement of the ceiling has an impact on the height or lowness of a room in the building. The ceiling functions as a sound distributor in acoustic systems, so it usually uses more reflective materials than absorbent. However, the shape of the ceiling itself must be considered to direct the expected sound reflection [22]. For this reason, the choice of material on the roof also impacts the room's acoustics; research revealed that the amount of sound reflected from the roof is constant, both when the building is complete and empty. In empty and full conditions, the direct sound value obtained with absorbent material is the same as that obtained without. However, the value of the sound reflected from the roof is lower than that without the absorbent material, showing that the purpose of placing absorbent materials on the roof is to control the intensity of sound caused by roof reflection [25]. The high or low sound is also influenced by the shape of the ceiling structure, such as curves, sloping, or flat. The Pondok Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS (BAZIS) DKI Jakarta adopts a ceiling structure made of gypsum material without any additional sound-absorbing ornaments. Gypsum should be applied by filling the gaps using sound-absorbing materials such as glass wool to prevent sound propagation to other rooms. However, gypsum is now available that can reduce sound effectively [22].

The windows in this pesantren are made of wood and clear glass, with frames painted dark brown and finished with varnish to maintain the wood's color. Clear glass is chosen so that natural light can enter the classroom, creating a comfortable environment for deaf students to do their activities. The placement of windows almost across the entire building wall allows visual access for visually impaired people who pass by.

Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS (BAZIS) DKI Jakarta adopts wooden doors. The general structure of the door consists of a frame and a door leaf, all made of wood. These materials are used in many common types of doors, including double doors. Wood has sound-absorbing properties, making it suitable for supporting sound absorption. However, if combined with some hard finishing, it can reduce the absorption [22].

Table 2. Acoustic Material Sound Absorption Coefficient [23]

Material	Frequency (Hz)				
	125	**500**	**1000**	**2000**	**4000**
Gypsum Board	0.29	0.05	0.04	0.07	0.09
Wood	0.15	0.10	0.07	0.06	0.07
Glass	0.18	0.04	0.03	0.02	0.02
Concrete	0.01	0.02	0.02	0.02	0.03
Brick	0.03	0.03	0.04	0.05	0.07

The furniture elements in the Pondok Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS (BAZIS) DKI Jakarta are mainly made of wood, such as chairs, tables, and shelves, with furniture finishes that are safe and comfortable for deaf students. The selection of wood materials for these pieces of furniture aims to reduce the negative impact of chemicals and increase the durability of the furniture. Classroom furniture includes tables, chairs, cabinets, display shelves, bookshelves, and notice boards.

The furniture is intended to encourage positive learning experiences and increase social interaction among deaf students. The function of the furniture includes reducing noise from inside and outside the room. When an object produces sound and is blocked by a boundary plane, the sound will likely be reflected. The speed of sound propagation and the characteristics of the barrier (such as density, shape, and smoothness of the surface) will determine the magnitude and direction of the reflected sound [22]. Although the space in this deaf boarding school is not very large, the furniture placed in the classroom is quite numerous and spread out around it, helping reduce the duration of reverberation or excessive sound reflections that can cause disturbance for deaf students or those with hearing loss.

Conclusion

Based on the analysis of deaf space in the Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS (BAZIS) Jakarta, the researcher concluded the following.

The space needed by deaf children must allow movement appropriate to the human body's size and rely on visual access to recognize the environment and to interact or communicate with each other. Therefore, the environment in which they live and move should be arranged according to the behavior of deaf children so that they can effectively apply interior deaf space in the classroom.

Some areas in the Jakarta Pesantren Tahfiz Difabel KH. Lutfi Fathullah BAZNAS (BAZIS) complex are not by the deaf space interior principles developed by Hansel Bauman. The shortcomings lie in the principles of sensory reach, mobility and proximity, and the use of color. Visibility and circulation could be more optimal because there are still right angles, doors with openings leading out, narrow corridor widths, many large pillars that interfere with the view, and the absence of standard background colors. However, the other deaf space principles have been implemented well enough to support santri learning effectively.

Conflict of Interest

The authors declare no conflicts of interest.

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Latansa Amanta, researcher (Architecture and Design) *(Indonesia, Surabaya), Universitas Pembangunan Nasional "Veteran" Jawa Timur, Student at the Department of Architecture, 21051010106@student.upnjatim.ac.id*

Rizka Maharani, Master of Architecture (Architecture and Design) *(Indonesia, Surabaya), Universitas Pembangunan Nasional "Veteran" Jawa Timur, Lecturer at the Department of Architecture, rizka.tiara.ar@upnjatim.ac.id*