

Design of Special Needs Schools for the Blind with a Behavioural Architecture Approach

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Publication Date: 2025/03/03

Abstract: In education, children with special needs require specific services, which are different from children in general. Planning and Designing Special Schools for the Blind are required specifically optimally starting from Site Design to Building Design. The study resulted in the identification of the Walking Path Concept, Optimization of Artificial Lighting, Directional Facilities, Selection of Circulation Forms, Appropriate Circulation Design and Design, Transition Space and Interaction Space, Selection of Mass Composition that ensures comfort, safety and security in studying at the School for Children with Special Needs for the Blind and Selection of the right Colour for Outdoor Signage, Inside Buildings and Rooms (Indoor) to support Independent Children with Partial Blindness.

Keywords: Children with Special Needs; Blind Child; Design for Special Need; Behavioural Architecture.

How to Cite: Sri Astuti Indriyati (2025). Design of Special Needs Schools for the Blind with a Behavioural Architecture Approach. *International Journal of Innovative Science and Research Technology*, 10(2), 1131-1136.
<https://doi.org/10.5281/zenodo.14949842>

I. INTRODUCTION

Children with special needs are children with special characteristics that are different from children in general without always showing mental, emotional or physical disabilities. In education, children with special needs require specific services, which are different from children in general.

The Central Statistics Agency has successfully collected Data on people with Disabilities in the 2018 RISKESDAS (Basic Health Research) activities, there are 37 million people with Disabilities in Indonesia, 3.3% of whom are children aged 5-17 years. While in DKI Jakarta itself there are 4.8% of people with Disabilities aged 5-17 years who we usually call Children with Special Needs.

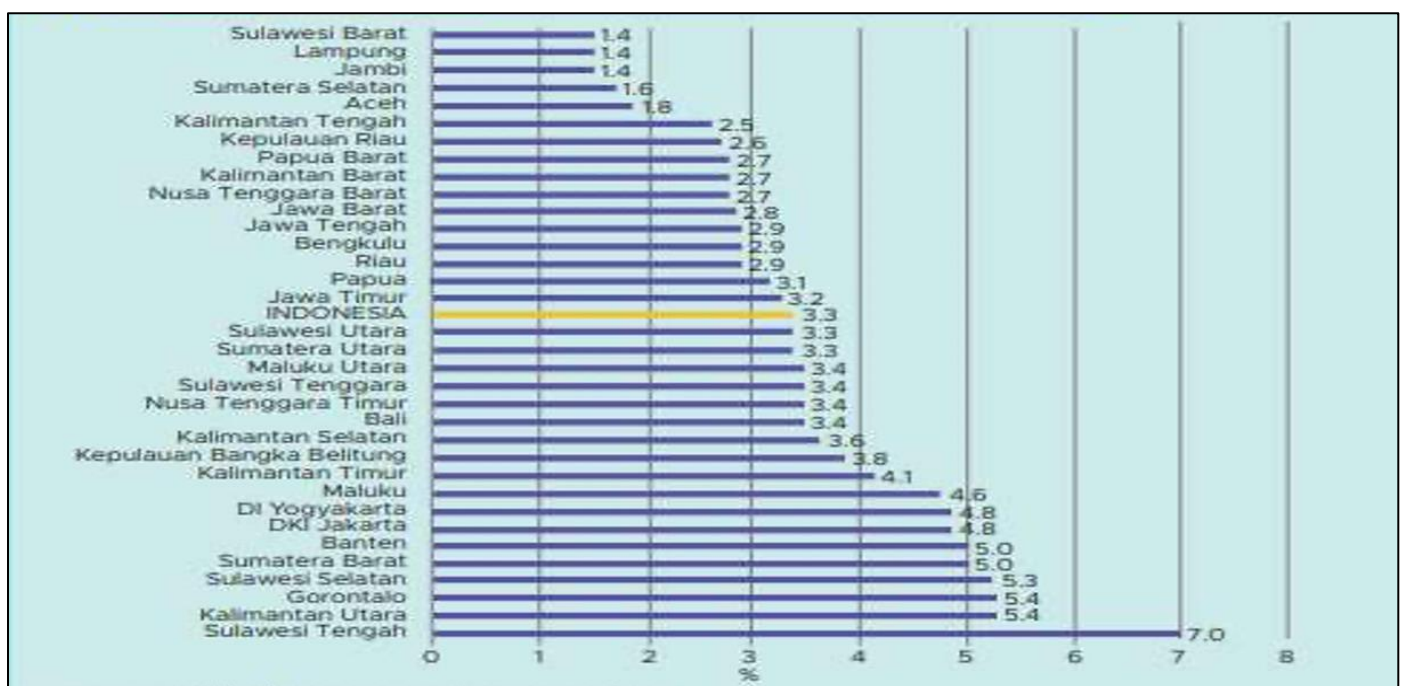


Fig 1 Disability Proportion Data Graph for Children aged 5-17 by Province in Year 2018
(Source: Data and Information Centre, Ministry of Health, Republic of Indonesia)

From the figure above, it indicates that The 2018 Riskesdas results showed that 3.3% of children aged 5-17 experienced disabilities, the highest were Central Sulawesi (7.0%), North Kalimantan and Gorontalo (5.4% each). Meanwhile, the lowest proportions are West Sulawesi, Lampung and Jambi (1.4% each).

In the 1945 Constitution, chapter XII, article 31 paragraph 1, it is stated that "Every citizen has the right to receive education." This statement means that all citizens, including citizens with special needs, have the right to receive education and teaching.

One of the educational institutions intended for children with special needs is a special school. Special schools (School for Special Needs) are educational institutions specifically for children with special needs.

As a provider of integrated education services for children with special needs, special schools need to provide

special services that are not usually available in schools in general, both in terms of education and the provision of facilities and infrastructure. For this reason, buildings with adequate facilities and accessibility are needed.

School for Special Needs usually have facilities that are not available in schools in general because the function of the school itself is only to provide education according to the abilities of the children themselves. The facilities that will be provided later also function to support and increase the desire to learn for children with special needs.

According to Law Number 28 of 2002 concerning Buildings, accessibility is a facility provided for everyone including people with special needs (disabilities) and the elderly in order to realize equal opportunities in all aspects of life and livelihood. The implementation of accessibility in the School for Children with Special Needs will provide a sense of security and comfort when in the school environment.

Table 1 Overview of Special Education Conditions in Each Province

School Type : Public or Private Schools in Each Province

Year : 2018/2019

Province	No of Schools	New Entrants	Students	Repeaters	Drop Out
DKI Jakarta	87	1.183	5.745	40	31

(Source: Centre for Education and Culture Data and Statistics, Ministry of Education and Culture 2018)

Of the 87 Special Schools in Jakarta and 5,745 students, the existing facilities in several Special Schools in Jakarta currently do not optimally meet the needs of children with special needs. Where the existing facilities still have to be adjusted to support all the needs of special methods in the teaching and learning process by paying attention to physical and psychological needs that meet the standards for children with special needs, so that children with special needs can also carry out their activities optimally like normal children.

From the description above, it is necessary to have a development plan for Special Schools in Jakarta. By implementing Behavioural Architecture that is able to support the needs of children with special needs. So that if developed properly, it is hoped that this SLB will be able to become a Resource Centre to realize children with special needs who are skilled, creative, independent, and intelligent. Some of the problem formulations that are summarized in general are as follows: (1) How to design a building with an architectural approach to Special School for Children with Special Needs?; (2) How to create a room that can accommodate the needs of Children with Disabilities?; (3) How to create comfort, convenience and a sense of security in the teaching and learning process in the school environment?

II. REVIEW OF CHILDREN WITH SPECIAL NEEDS

According to Heward, children with special needs are children with special characteristics that are different from children in general without always showing mental, emotional or physical disabilities.

There are several terms used to indicate the condition of children with special needs. The term children with special needs is the latest term used and is a translation of (children with special needs) which has been widely used in the international world.

Children with Special Needs can also be interpreted as children who are slow or have disorders (retarded) but can also be interpreted as children who have extraordinary abilities and intelligence. Therefore, Children with Special Needs require special handling in meeting their learning needs according to their abilities and potential.

➤ *Children with Special Needs: Blind*

The Directorate of Special School Development also initiated, there are several types of groups that are included in Children with Special Needs, including

- Blind;
- Deaf;
- Physically Disabled;
- Gifted Children;
- Mentally Disabled;
- Emotionally Disabled;
- Speech Disabled;
- Autism

This research will specifically discuss Children with Special Needs, namely Blindness.

Blind people are individuals who have visual impairments.

Blind people can be classified into two groups: Total Blindness

(Blind) and Low Vision. The definition of Blind according to Kaufman & Hallahan is an individual who has weak vision or visual accuracy of less than 6/60 after correction or no longer has vision.

➤ *Insight into the Behaviour of the Blind*

The character and needs and Learning Behaviour of children with special needs can usually be detected early. Blind children usually show certain Behaviours that tend to be excessive. These Behavioural disorders can be seen in the child's Behaviour from an early age, such as the following:

- Rubbing the eyes excessively
- Closing or protecting the eyes when there is light or other things
- Tilting the head when looking at an object
- Leaning the head forward
- Difficulty reading or in other work that uses the eyes
- Blinking more than usual
- Getting angry easily when doing work that involves eye concentration
- Reading books at a very close distance to the eyes
- Unable to see distant objects
- Frowning or squinting when observing objects
- Not interested in work or tasks that require vision, such as looking at pictures or reading
- Odd in playing games that require focus on the eyes
- Many complain about sore eyes
- Feeling dizzy when reading text
- Complaining about itchy, burning eyes, or excessive scratching due to itching
- Complaining about double objects seen by the eye
- Based on the points mentioned above, it can be concluded that the Behaviour or tendencies that are usually done by blind people are
- Stereotypical attitudes in children, such as shaking their legs repeatedly
- Tendency to feel suspicious of others
- Relying on hearing and touch as a substitute for sight
- Tendency to look down
- Focusing concentration on the ears in analyzing the surrounding conditions.

- Tendency to direct or stretch out his hand to find out the situation in front of him
- For Totally Blind people, they can still distinguish between dark and light situations.

III. ANALYSIS OF THE APPLICATION OF BEHAVIOURAL ARCHITECTURE IN THE PLANNING AND DESIGN OF BUILDINGS FOR CHILDREN WITH SPECIAL NEEDS (BLIND)

The approach is based on the results of the needs analysis of the main users of the building. The concept of Behavioural Architecture is applied and implemented according to the special needs of the users of the Special School building. Analysis of children's Behaviour and conditions and solutions in its design are very diverse. From the diversity of types of Children with Special Needs, there are different Behavioural tendencies and needs in each type, so that fulfilling their needs will be more complex.

The Behaviour and Condition of Children with Special Needs with Visual Impairments can be identified as follows: (1) Can still feel the presence of Light; (2) Still able to distinguish dark and light; (3) Relying on hearing and touch as a substitute for sight; and (4) Tends to direct or extend his hand to find out the situation around him.

Blind Behaviour at a Certain Age can be classified as follows: (1) Children's age (totally blind since birth): Stereotypic/repetitive Behaviour that is less common such as shaking the body, stamping feet, shaking the head and pressing the eyes in a fairly high frequency in a fairly short period of time and the emergence of sensory in the sense of touch that is quite varied; (2) Children's age (totally blind since childhood): Still not proficient in analyzing the surrounding conditions, tend to experience injuries due to frequent bumps and falls; (3) Teenage age (totally blind since birth): Trained in analyzing the surrounding conditions; (4) Teenage age (totally blind due to accidents): Similar to children who have just experienced blindness, often experience injuries due to collisions with surrounding objects and falls

All conditions have a tendency to prioritize hand movements when walking or analyzing surrounding objects; analyzing a person through sound and smell.

➤ *Application of Behavioural Architecture to Site Application*

Identification of Behavioural Tendencies and Design Solution Efforts that can be done can be seen in Table 2 below.

Table 2 Analysis of Identification of Behavioural Tendencies of Children with Special Needs with Visual Impairments

Diffable Types	Behavioural Tendencies	Design Solutions
Blind Child	Relying on hearing and touch as a substitute for sight, Tends to point or reach out to find out the situation that needs help to move. Can still feel the presence of light. around him, the director/tool makes it easier	Implementation of barrier-free pedestrian paths for the visually impaired to reach the building and use guiding blocks. Incoming circulation is distinguished from vehicle entry circulation. Placement of spaces placed in the east so that sunlight can enter directly as natural lighting.

➤ *Application of Behavioural Architecture to Time and Space*

The condition of space and its influence on time and user psychology related to space.

Table 3 Identify Behavioural Tendencies & Specific Needs Over Time

Diffable Type	Morning	Afternoon	Evening/Night
Blind Child	In the morning and afternoon, lighting will come through the opening optimally, visually impaired people who can still distinguish between dark and light use it to find directions. The arrangement in the opening so that it can guide the disabled in their activities easily	Natural lighting are also used as direction indicators for visually impaired people. The direction sound can be used for totally blind child.	At night, the sound reflection is heard louder, so it can be used to help blind children. Optimizing artificial lighting in a room as another directional facility, because some blind people can still distinguish between dark and light.

- *Behavioural Tendencies and Implementation of Behavioural Architecture in Territorial Terms is Identified as follows:*

Table 4 Analysis of the identification of Behaviour of Children with Special Needs and Implementation Needs Based on Territory

Diffable Types	Behavioural Tendencies	Design Solutions
Blind Child	Being suspicious of strangers in their ears (recognizing someone by their voice) is not uncommon for them to feel less confident when meeting new people Still unable to accommodate the need to neutralize and control their emotions emotionally	Providing space transitions, which differentiate access for primary and public users, but do not limit interaction activities between the blind and the general public A park and fountain design is needed that supports self-control of emotions

➤ *Application of Behavioural Architecture to Buildings*

Identification of Behavioural Tendencies of Children with Special Needs and Their Application to Building Design Concepts, as seen in Table 5 below:

Table 5 Identification of Behavioural Tendencies and Needs for Application to Buildings

Diffable Types	Behavioural Tendencies	Design Solutions
Blind Child	Blind People Can still feel the presence of Mass composition patterns made with Dark/Bright Light (can distinguish) Tendency to experience Frequently falling, relying on hearing. injuries due to impact	Minimizing the presence of sharp shapes, and Hexagonal shapes as an option by using 3 types of circulation, namely circulation through space, penetrating space and circulation ending in space applied to the building to support its activities and activities. This building also uses 3 forms of circulation space (closed, open on one side and open on both sides using radial, network, and linear circulation

IV. CONCEPTUAL DESIGN

➤ *Concept for Site*

The concept of footprint in the planning and design of Special Schools that implement Behavioural Architecture

must be carried out with the identification of the Behaviour of its users. In the previous chapter, the identification of Behavioural tendencies and needs of its users has been discussed and resulted in a design solution from the following identification results:

Table 6 Planning and Design Concept of the Footprint of a School for Children with Special Needs and the Blind

Diffable Types	Behavioural Tendencies	Design Solutions
Blind Child	Relying on hearing and touch as a substitute for sight, Tends to point or reach out to find out the situation Needs help to move. Can still feel the presence of light around him, director/tool makes it easier	Implementation of barrier-free pedestrian paths for the visually impaired to reach the building and use guiding blocks. The entrance circulation is distinguished from the entrance circulation of vehicles. Placement of spaces placed in the east so that sunlight can enter directly as natural lighting.

➤ *Concept of Planning and Design of Buildings for Blind users*

In the Concept of Planning and Designing Special Schools that apply Behavioural Architecture in their design, Behavioural tendencies and needs of their users must be

considered in each plan, therefore in the previous section the results of the identification of Behavioural tendencies and needs for their buildings have been explained so that the solution to the planning can be concluded, namely:

Table 7 Planning and Design Concept for School Sites for Children with Special Needs and the Blind

Diffable Type	Behavioural Tendencies	Design Solution
Blind Child	Still able to feel the presence of light (can distinguish dark/light), tendency to experience frequent falls, relying on hearing. Often injured due to bumps	The mass composition pattern is made with a hexagonal shape to minimize the sharp shape, using 3 types of circulation, namely circulation through space, penetrating space and circulation ending in space applied to the building to support its activities and activities. This building also uses 3 forms of circulation space (closed, open on one side and open on both sides using radial, network, and liner circulation.

➤ Basic Psychological & Physiological Concepts

The Behavioural Architecture Concept applied to Special Schools is designed so that it can later influence the Behaviour and comfort of building users, especially for children with disabilities or special needs. In this case, it is necessary to consider aspects that must be considered in the design of Special Schools, namely:

➤ Psychological Aspects

In the design of special schools, more focus is placed on the spaces where the main activities take place. In general, School Planning and Design with the Behavioural architecture approach concept pays attention to several general things such

as color selection and others that are adjusted to each zone of the room user.

Teaching and Learning Zone - Blind Area is designed purposively. For classrooms, the appropriate Colour to use are warm and bright Colour because these Colour have a higher emotional effect compared to cold Colour. These warm Colour are easy to combine with contrasting Colour. Contrasting Colour will be easy for partially blind people to see, but the use of color motifs should not be too much because it can confuse the blind.

➤ Recommended Colours for Teaching and Learning Areas:

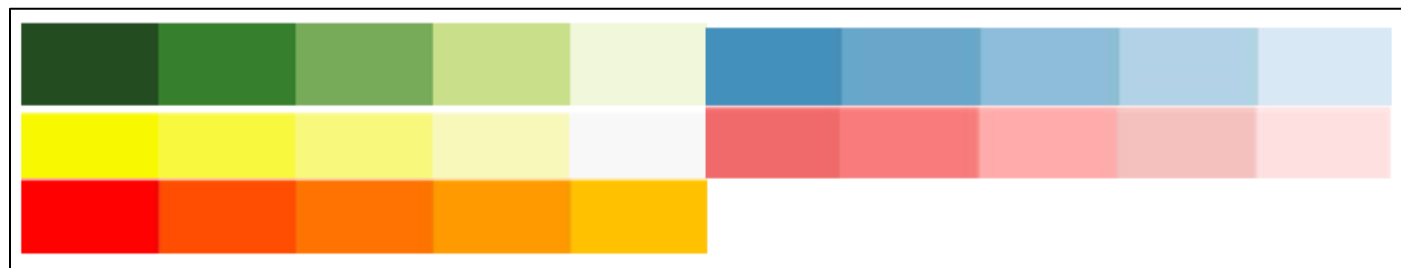


Fig 2 Colour Gradation
(Source: Google)

In terms of Management Zone, Commercial Zone and Service Zone are also designed with special Colour. The management, commercial and service areas use neutral, calm but not too contrasting Colour, but still pay attention to the psychological impact of the user. Example: pastel Colour.

➤ Physiological Aspect

The Physiological Aspect in Building Planning and Design refers to the Aspect of Convenience, Safety and Security. Safety is the level of need for a sense of security for children with special needs, therefore several things must be considered, namely:

- **Railing:** The railing on the balcony is made 90-110cm high, and double skin is added to the facade as a safety feature on the balcony, and the railing is also placed on the walls of the school and in vulnerable areas to minimize the occurrence of loss of balance in children with special needs. And it can also be a guide for blind children. Railings are also needed in toilets in schools to make it easier for users in the toilet;
- **Accessibility:** In accessibility, this school prioritizes the use of stairs for vertical access. While for stairs, they have a minimum width of 1.5 m, and a step height of 20cm, and a step width of 25-30cm and are equipped with a handrail

of 85-90cm. The profile of the stairs must also be considered so that it is not dangerous for the user's feet;

- **Social Needs/Social Interaction** requires space to socialize for children with Special Needs. This is very important, because children with special needs have trust issues with others, this affects their social interactions. Therefore, the interior spaces will be arranged radially facing each other which will be separated by a corridor that also creates a social interaction space, and also Centreed on one point. The arrangement of classroom furniture that is Centreed on the teacher so that movements can be controlled by the teacher;
- **Independence:** Children with Special Needs require Independence Training. Some children with special needs have deficiencies in their physical and psychological conditions, therefore aids are needed that can make it easier for children with special needs to carry out their activities and activities in teaching and learning. Example: the application of guiding blocks and guide rails in all areas of the school building, the application of ramps as a substitute for stairs; and
- **Circulation:** Horizontal circulation space that functions as a connecting place between spaces in the building as a place for activities to take place in the form of a corridor that connects between spaces in the building, made with a minimum area of 30% of the total area of the space in the

building, with a minimum width of 1.8 meter and a height of 2.5 meter. In addition, the circulation is made roofed and has good lighting and ventilation circulation.

V. CONCLUSION

In the 1945 Constitution of Republic Indonesia, this is clearly stated that "Every citizen has the right to receive education". This statement means that all citizens, including citizens with special needs, have the right to receive education and teaching. There are 37 million people with Disabilities in Indonesia, 3.3% of whom are children aged 5-17 years. While in DKI Jakarta itself there are 4.8% of people with Disabilities aged 5-17 years who we usually call Children with Special Needs. They need to be accommodated in School where they are able to have their education.

School for Special Needs usually have facilities that are not available in schools in general because the function of the school itself is only to provide education according to the abilities of the children themselves. Of the 87 Special Schools in Jakarta and 5,745 students, the existing facilities in several Special Schools in Jakarta currently do not optimally meet the needs of children with special needs. In the case of Children with Special Needs focussing in Blind as to what research will specifically discuss Children with Special Needs – Blindness, who classified into two groups: Total Blindness (Blind) and Low Vision.

The concept of Behavioural Architecture is applied and implemented according to the special needs of the users of the Special School building. Analysis of children's Behaviour and conditions and solutions in its design are very diverse. Conceptual Design offered including this: Concept for Site. Concept for Planning and Design of Building for Blind Children, Basic of Psychological & Physiological Concept. In more details, the concept like Walking Path Concept, Optimization of Artificial Lighting, Directional Facilities, Selection of Circulation Forms, Appropriate Circulation Design and Design, Transition Space and Interaction Space, Selection of Mass Composition that ensures comfort, safety and security in studying at the School for Children with Special Needs for the Blind and Selection of the right Colour for Outdoor Signage, Inside Buildings and Rooms (Indoor) to support Independent Children with Partial Blindness. Other than that, special design including size for ramps and stairs are defined for the Blindness. These all concepts will help designer dan architect to develop their design concerning Behavioural architecture, particularly for the school provided to those children with special needs.

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