

Evaluation of The Special School Criteria in Meeting the Needs of Students with Mentally Disabled

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Abstract

The needs of people with cognitive impairment are rarely accommodated in the field of architecture and design. There have been a few standards of design in assessing the suitability of building design for children with the mentally disabled. Evaluation of the design standards for special school inclusion as stipulated in the Education Law No. 33 of 2008 in meeting the needs of mentally disabled students needs to be carried out. This research examined the school design standards for students with mentally disabled based on the relevant literature. The inclusive design proposed in this study can be used to assess the implementation of the inclusive design in meeting the needs of students mentally disabled at special schools. The results of this research add up to the references in the design literature that fit the needs of people with the mentally disabled.

Keywords: *Design criteria; Inclusive design; Mentally disabled; Special Schools;*

Introduction

Mentally disabled children whose thinking and communication are limited. Some children even have distinctive physical characteristics. The difficulty of obtaining access to interact with mentally disabled children has received less attention in the community. (Douglas et al., 2009 and Castell, 2012) This also happens in architecture where the mentally disabled do not get the right facilities so they have very little space to learn and interact (Schelings et al., 2017). The problem is due to the absence of school standards specifically made to accommodate children with cognitive disorders such as Mentally disabled. Even the standards and requirements for type C special schools set by the Minister of Education (2008) are still too general and no model school accurately shows the proper school that meets the needs of Mentally disabled students. According to Tufvesson (2009), People with mentally

disabled such as Down syndrome and autism have extra sensitivity, making it hard for them to concentrate. Therefore buildings that allow excessive stimulation such as sound, and indoor lighting that affects concentration do not suit students with mental disorders. Building Designs need to accommodate the needs of children mentally disabled by considering the activities, characters, and special needs of children Mentally disabled. Inclusive architectural design is required to guarantee equal rights and proper treatment for the learning process of students with mentally disable (Abouelsaad et al, 2018). Stated that inclusive schools are the best option to provide equality and non-discriminative treatment. In Indonesia, the standards of inclusive schools are set in the Ministerial Regulation of the Ministry of Education 2008 No. 33. However, the law has not specifically discussed the design of buildings for children with cognitive disorders, especially the Mentally disabled.

Therefore it is necessary to evaluate the standards for special schools (SLB) issued by the Minister of National Education Law No. 33 of 2008 which follow the principles of

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inclusive design and can create a physical environment that can meet the needs of the mentally disabled. This study explored the design standards for children Mentally disabled from various literature to propose the most appropriate design criteria for an inclusive design. The inclusive design approach was employed in assessing whether the current design standards used in Indonesia have met the inclusive design principles and addressed the needs of mentally disabled students. The results of this study add up to the references of the field of design and provide an overview of appropriate design criteria to meet the needs of children with mental disorders.

Literature Review

Identifying the criteria for schools for students mentally disabled is necessary for the evaluation of the standard of special school facilities and infrastructure in Indonesia. For this reason, the author conducted a literature review on the mentally disabled and the principle of inclusive design to accommodate the needs of mentally disabled students into an inclusive design to get the right design criteria for the mentally disabled.

Mentally disabled

Mentally disabled is a child who has obstacles or delays in mental development (intellectual function) accompanied by an inability to learn, carry out daily activities independently, and have difficulty adjusting. According to the American Psychiatric Association (2013), mentally disabled children based on their learning groups are divided into:

1. Educable

This group is the lightest because educable children still have academic abilities equivalent to regular elementary school's

2. Trainable

have limited access to academic education but still can take care of themselves, self-defense, and social adjustment.

3. Custodial

have limitations in carrying out activities independently, self-defense, and social adjustment. By providing continuous and special training, children can learn how to help themselves and their communicative abilities. This group usually requires support and supervision.

Most of the needs of people with mental retardation are the same as the needs of others. However, the gradation is wider than other children's, making design needs more complex. Some additional needs can be identified. According to Greater St Louis (2012), Mental retardation is associated with an increased risk of several health problems experienced by some children such as Down syndrome which has congenital diseases such as heart defects, hearing loss, weakened immune system, poor eyesight, and an increased risk of early dementia. With this identification, considerations arise regarding the need for the mentally disabled to the physical environment:

1. Design that considers physical conditions

Some children with mental retardation such as Down syndrome have muscle hypotonia problems are explained by the Mentally Disabled Association of the Greater St Louis (2012), a medical term used to describe a decrease in muscle tone (the amount of resistance to movement in a muscle). Symptoms of hypotonia include problems with mobility and posture, difficulty breathing and speaking, lethargy, and joints, and poor reflexes. So we need a design that doesn't require too much energy for down syndrome. Therefore, a design that does not require the mentally disabled to use much of their energy is necessary.

2. Safety-Based Design

According to Mcallister (2010), stated that children with cognitive disorders mostly have difficulty controlling their motor skills and they are often hyperactive. Safety with high visibility should be a consideration.

3. Simple and intuitive design

Most children with mentally disabled will have difficulty understanding and remembering information because they have short-term memory or working memory (Greater St Louis, 2012 and Kim Jiu et al., 2020). Of course, this will make it difficult for them to access, understand, and process information like normal people, most students with intellectual disabilities will probably require more support than simply audio versions of the text (Douglas et al., 2009). The design of the school environment must present information clearly and regularl. According to Kim Jiu (2020), the right method will help students easily understand the material presented. Teaching aids such as pictures

and videos are often used by teachers in teaching.

Special School

The Standards of Special Schools have been regulated in Law Number 33 of 2008 as follows. The following are some of the standards contained in the Regulation of the Minister of Health of the Republic of Indonesia Law No. 33 of 2008:

Classroom

1. A classroom is a place for theory and practical learning activities using simple tools.
2. Classrooms have a minimum number equal to the number of study groups.
3. Classrooms have a maximum capacity of 5 students for Elementary Special School classrooms and 8 students for Junior High Special schools.
4. The minimum ratio of classroom area is 3 m²/student.
5. A classroom with less than 5 students has a minimum area of 15 m²
6. The minimum classroom width is 3 m.
7. Classrooms have windows that allow adequate lighting for reading activities and outside views.
8. Classrooms have proper doors that allow everyone to immediately leave the room with proper locks.
9. There is one side of the semi-permanent wall that allows two classrooms to be combined.

Self-Development Space for Mentally-Retarded Students (C)

Schools that cater to mentally disabled elementary and junior high school students need to have at least one self-development room with a minimum area of 24 m². The self-development room is equipped with a special bathroom and lavatory for exercise or the existing restroom can be used

The Self-development room functions accommodate self-development learning activities which include:

1. Self-necessities: Eat, drink, and keep your body clean.
2. Self-care: Dress up and makeup
3. Occupation: Performing daily activities include washing and ironing clothes, polishing shoes, making drinks, installing

bed sheets, and cleaning floors.

Inclusive Design

Inclusive architecture is a concept of thinking in architecture that has the aim of achieving the concept of design equality without limiting users. According to (Caldin, 2014), inclusive design is the most suitable approach for children with mental disabilities, other approaches such as universal have the potential to accumulate disability from a greater diversity of users, as a result, the design object is reduced to the lowest possible general use (John et al., 2015). Therefore, the inclusive approach is considered the most appropriate to respond to needs compared to other approaches

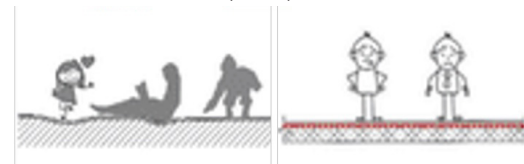
According to the Commission for Architecture and the Built Environment (2006), Design must reflect the diversity of people who use it and not impose obstacles of any kind. The development principles proposed by CUBE that can be used as parameters in the design are:

1. The inclusive design here is intended so that everyone can use a design that is safe, easy, and not mandatory. The design must deal with the dangers and adverse consequences of actions not taken or taken (CUBE, 2006 and Dukes et al., 2009)

According to Jebri & Chen (2021), floors for children with disabilities should use floor materials that are soft, comfortable to move, and not slippery. Better to use a vinyl floor surface with a soft foam carpet to minimize the risk.

Figure 1. Illustration of flooring for intellectually-retarded children

Source: Jebri & Chen (2021)



Several schools have vinyl floors, including j.p Lord School uses vinyl floors with intuitive colors for children with intellectual disabilities.

Figure 2. The flooring of JP Lord school, Omaha
Source: <https://www.bcdm.net/> accessed on June 25th, 2022



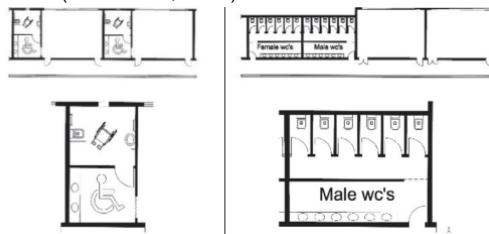
Children with mentally disabled tend to move actively and need desks and chairs with rounded edges to avoid injuries.

Figure 3. The desk and chair at JP Lord School, Omaha
Source: (a) <https://www.bcdm.net/> (b) (Olding, 2019)



In addition to prioritizing security, the inclusive design also emphasizes convenience. User-friendly design is very important for children Mentally disabled and have intellectual disabilities. Jebрил (2021), explained that children with intellectual disabilities cannot carry out their activities independently and need intensive adult supervision there by facilities that support the independence of these students are needed. One example is by designing toilets that are easy to reach for children Mentally disabled close to the classrooms.

Figure 4. Toilet for students with intellectual disorders
Source: (Jebрил et al., 2021)



2. Responsive

The inclusive design principle proposed by CABE (2006) highlights the importance of responsiveness to users based on their needs. In the case of this research, the design should concern the needs of children mentally disabled as follows:

a. Simple and orderly. Students with intellectual disabilities have problems

processing information because they have problems with their memory (Mariano et al., 2020)

b. Avoid energy-draining design. Children with Mentally disabled often have muscle hypotonia problems. (Greater St Louis, 2012).

c. Safe and easy to control. Children with Mentally disabled often act unpredictably so safe and easy-to-control design is necessary (Greater St Louis, 2012).

3. Flexible

The flexibility of the design is an important aspect. The universal design also has a similar principle called Flexibility in use. The Center for Excellence in Universal Design (CEUD) proposed four principles:

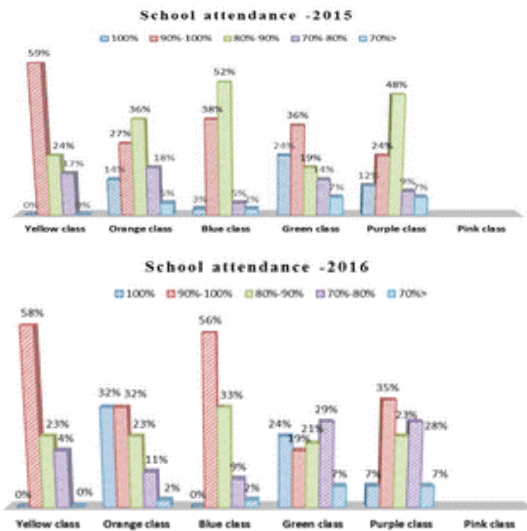
- Every user can find at least one effective way to use this product effectively
- Simple design that can be used in different ways, e.g. the design can be used with the right hand or the left-hand
- The design should be easy-to-use without requiring high accuracy or preciseness.
- This design can be used at different rates (fast or slow)

4. Convenient

This principle prioritizes user comfort by considering the design environment and design operation that should not require excessive use of energy. According to de Chambrier (2021) the choice of colors for the study room has a psychological influence that can affect children's productivity in learning.

The results of this study indicate that blue and other cool colors stimulate creative thinking. Prolonged exposure to blue color affects students' right brain work/activities that involve creativity. On the other hand, blue-colored classrooms do not stimulate students' skills in Mathematics and activities that involve critical analysis. Yellow and orange (warm colors) enhance the left brain which is a perfect color choice in learning as it would improve students' logic. Students taught in the green-colored class had a balanced preference for the three subjects tested (Hettiarachchi et al., 2017)

Figure 5. The influence of colors on students' productivity
Source: (Hettiarachchi & Nayanathara, 2017)



5. Accommodating

The design should accommodate people with different characteristics regardless of age, sex, mobility, ethnic, and user conditions. There are several aspects that can accommodate mentally retarded children, including:

Signage

explanations with pictures or symbols are very effective for mentally retarded children (Hosseini et al., 2012). Signage is an important part for everyone, especially in enabling children with intellectual disabilities to move around their school environment as freely as possible (UNICEF, 2013). Signage must be clear, contrasting, and use symbols that are easy to understand, in addition to placing the signage at a height that is comfortable for users to see.

Figure 6. placement of signage
Source: (United nations children's fund, 2013)

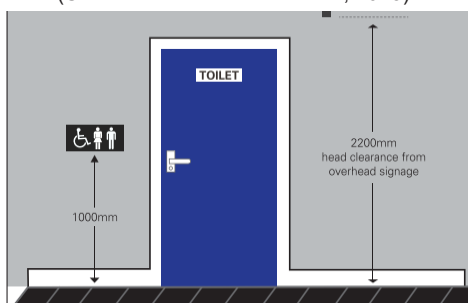


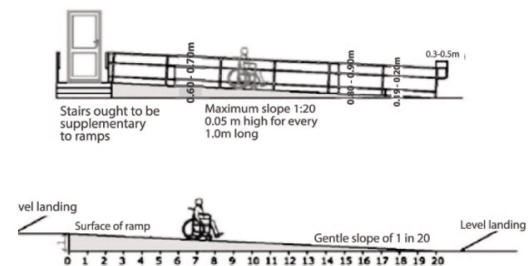
Figure 7. signage at Boston children's hospital
Source: <https://www.behance.net/gallery/4011612/Boston-Children's-Hospital> diakses 5 Agustus 2022



6. Welcoming

Inclusive Design must be barrier-free to access the physical Environment which may exclude some people. Inclusive design should be a comfortable and pleasant environment for everyone to allow limitless interaction.

Figure 8. uses the ramp as vertical access to different needs.
Source: Ministry of Education, 2015



7. Realistic

This principle was different from inclusive design to universal design. The inclusive design offers more than one solution to accommodate everyone's needs since one solution may not work for all. For children with intellectual disabilities, learning cannot occur one way as children should be given the freedom to choose the learning atmosphere that they prefer. one of them is to keep children's emotions in check by providing different study room design options by providing an outdoor study room (Mara et al., 2011 and Delgado et al., 2020).

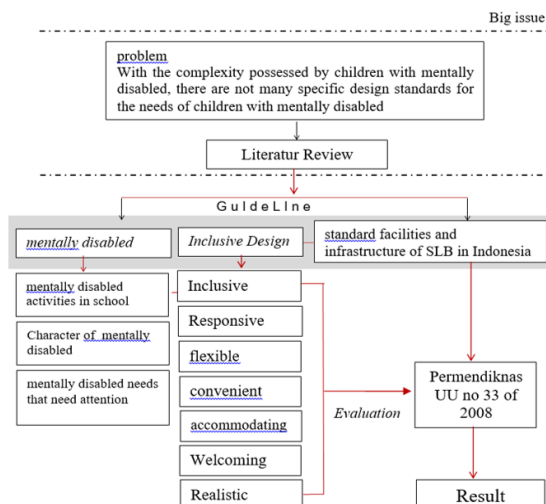
Figure 9. Alternative outdoor learning space
Source: <https://www.parkworksc.com/products/outdoor-classroom/>



Method

The research method uses qualitative methods, according to Nazir (2011) This qualitative study was performed to understand certain phenomena experienced by the researchers themselves or the subjects such as behavior, perception, motivation, action, and descriptions of certain contexts through natural approaches. In this research, a systematic literature review was employed to summarize the results of primary research to present more comprehensive and balanced facts regarding design standards that fit the needs of Mentally disabled students. The design standards for Mentally disabled students allow the researchers to assess whether or not special schools are still relevant in addressing the needs of students mentally disabled. A better understanding of the flow of this research is in figure 10.

Figure 10. Research Framework
Source: Researcher's



Results and Discussions

The researchers found several relevant design criteria for children with Mentally disabled and children with cognitive impairment in general. The kinds of literature obtained in this research were adapted into the parameters used in evaluating whether the SLB design standard according to the Minister of National Education Regulation No. 33 of 2008 applies inclusive design principles that are friendly for students mentally disabled as seen in Table 1. evaluation of the standards of facilities in special schools.

Table 1. evaluation of standard facilities and infrastructure for special schools for mental retardation

Variable	No	Literature	Standard
Inclusive			
	1.1	Floor surfaces are carpets or mat ⁽¹⁾ ⁽⁴⁾	X
	1.2	the surface of the ramp anti-slip/matte finish ⁽⁹⁾	X
	1.3	Furniture is made of durable materials. ⁽¹⁾ ⁽²⁾	X
	1.4	Round-edged desks and chairs to avoid injuries ⁽²⁾ ⁽⁷⁾	X
	1.5	The railing should be made at 850-1000mm height above the ground ⁽³⁾	O
	1.6	The staircase railing is 900 -1000 mm above the first rung ⁽³⁾	O
	1.7	The farthest distance to the stairs should not exceed 25 m. ⁽³⁾	O
	1.8	Toilets should be built nearby the classrooms for easier access and control over students. ⁽⁴⁾	X
	1.9	The need for a head-rest on the chair ⁽⁵⁾ ⁽⁶⁾	X
	1.10	the location of the emergency (fire escape) stairs identifiable with a sign ⁽⁹⁾	X
	1.11	there are grills/wire meshes on the windows to safeguard children from falling ⁽⁹⁾	X
	1.12	emergency exits marked with directional arrow signs ⁽⁹⁾	X

1.13	there are both audio and visual emergency alarms in all areas ⁽⁹⁾	X			
3 / 13					
Responsive					
2.1	Desk height – every student should have a comfortable desk with an ergonomic design because students with low muscle tone need assistance to reduce exhaustion. ⁽⁵⁾	X			
2.2	Chair height should be adjusted to average students' weight so that the feet cannot touch the ground, Feet position can reduce fatigue. ⁽⁵⁾	X			
2.3	Having a self-development space that facilitates learning activities based on students' needs. ⁽⁵⁾	O			
2.4	The design should be made comfortable for students with mentally disabled and often have hypotonia. ⁽⁵⁾	X			
1 / 4					
Flexible					
3.1	Having extra spaces in the classroom allows students to arrange their classrooms as they wish.	O			
3.2	Two classes can be united by building a semi-permanent wall	X			
3.3	The multimedia room can support various learning activities	O			
3.4	Having certain circulatory rooms to connect special rooms.	X			
3.5	Portable desks and chairs	O			
3 / 5					
			Convenient		
			4.1	Concern about visual comfort :	X
				Using warm colors stimulates the left brain/logic. (yellow, orange)	
				Using cool colors in rooms enhances students' skills or creativity. (blue)	
			4.2	Concern about Acoustic comfort : Soundproof wall	X
			4.3	Rest area every 60 meters beside the trails. ⁽³⁾	X
			4.4	Chair height between 350mm - 425mm and not exceeding 450 mm. ⁽³⁾	X
			4.5	Stairs are uniform in height between 100mm-175mm. ⁽³⁾	O
			4.6	The stair's width should be between 230mm-280mm. ⁽³⁾	O
			4.7	Using signage with color contrast from the walls and using Braille letters at strategic places.	X
			4.8	The color of the doors should be contracted to the background wall. Wheelchair access is available.	X
			4.9	Using bright room signs.	X
			2 / 9		
			Accommodating		
			5.1	Contract-colored door from the background wall with wheelchair access.	X
			5.2	The design should accommodate everyone's needs regardless of age, gender, or physical ability.	O
			5.3	Using easy-to-reach directions (using color games) to make accessibility easier ⁽¹⁰⁾	X

5.4	signs hung at a height of 1000mm-1600mm from the floor ⁽⁹⁾	X	
			1 / 4
Welcoming			
6.1	Flat floor with no uneven floor that can harm students with mentally disabled.	O	
6.2	Providing enough space between furniture to allow students' mobility, wheelchair access, and the mobility of students with mentally disabled	O	
6.6	Providing enough space between furniture to allow students' mobility, wheelchair access, and the mobility of students with mentally disabled	O	
			3 / 3
Realistic			
7.1	Alternative outdoor learning areas should be available	O	
7.2	Ramps are available for vertical circulation students with physical disabilities	O	
			2 / 2
Total			15 / 39

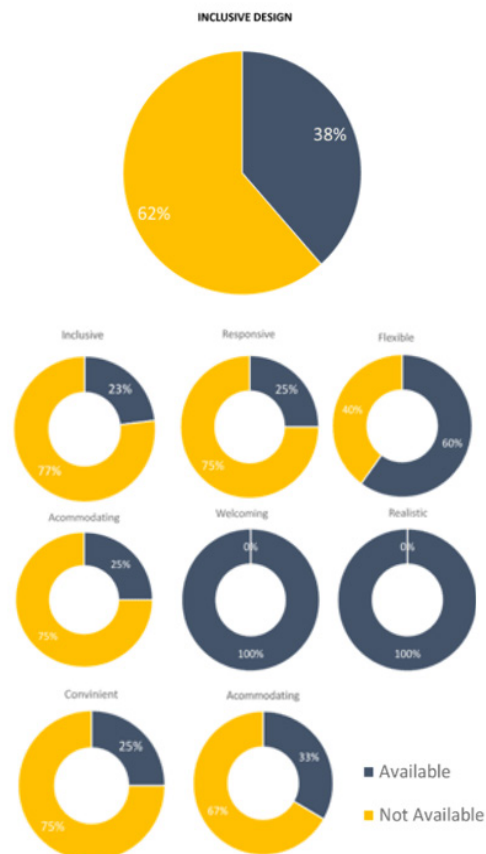
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Source: 1 (Jebriil & Chen, 2021),2 (Education & Report, 2020),3 (Ministry of Education, 2015),4 (Jebriil & Chen, 2021),5 Supporting the Student With Mentally disabled in Your Classroom Information for Teachers),6 (Tufvesson & Tufvesson, 2009), 7 (Olding, 2019) 8 (Hettiarachchi et al., 2017), 9 (accessible Indian campaign. UNICEF 2013),10 (Castell, 2012)

Table 1 presents the implementation of the inclusive design principles based on Law No. 33 of 2008 regarding the standard of facilities and infrastructure for special schools. The results of the inclusive application assessment resulted in a percentage of 38%, with 15 of 39 criteria having been completed. Generally, various designs in Indonesia are not specific to the diversity of needs, including the needs of students Mentally disabled. Law No. 33 2008 over-generalizes the needs of students, where children with special needs are perceived to have the same needs. This view goes contradictory to the principles of inclusive

design which emphasizes that no one design fits all. Of the 7 principles of inclusive design, inclusive, responsive, and convenient aspects obtained the lowest percentages. This shows that the current guidelines have not yet fulfilled the safety, comfort, and needs of Mentally disabled students.

Figure 11. the implementation of inclusive principles at special schools, the Law no 33 of 2008 resource: Author



This is because most of the existing standards in Indonesia are not yet detailed and specific to the diversity of needs, including the Mentally disabled. Some of the design criteria in Law No. 33 2008 over-generalize needs so that it seems that all children with special needs have the same needs. This is certainly contrary to the principle of inclusive design which offers options where a single design solution cannot accommodate all users based on the 7 principles of inclusive design, inclusive, responsive, and convenient aspects get the lowest percentage. This shows that the current guidelines do not pay too much attention to the safety, comfort, and needs of the Mentally Disabled.

The inclusive design emphasizes safety and ease of use. However, the implementation of this aspect only reached 23% due to the lack of awareness regarding the needs of children with mentally disabled and have difficulty controlling their emotions and behavior. The overgeneralization of the current design can lead to the lower effectiveness of the design.

Furthermore, responsiveness only obtained a percentage of 25% which shows this guideline has not involved users in the design process. It is necessary to take into account users' needs and give special attention to students with mentally disabled as they have muscle hypotonia which makes their muscles weaken. These policies and considerations have not been seen in Law No. 33 of 2008.

Convenient and accommodating aspects are the comfort and ease of mobility of the user. The percentage obtained is also very low at 25%. The aspects are rather difficult, especially when students have interactive issues. However, several kinds of literature mentioned other criteria regarding the comfort of children with intellectual disabilities, namely physical comfort, visual comfort, and acoustic comfort. The consideration of these three aspects has not been accommodated in the existing standards, particularly the visual comfort which obtained low scores. Meanwhile, visuals are very influential on the psychology of children, especially in children with cognitive disorders.

This research shows that the standards used in Indonesia have not fully provided a solution for children with the mentally disabled. The lack of design solutions for the mentally disabled makes learning in special schools not optimal, so a design strategy is needed that is suitable for mentally retarded children. Several factors are major for the mentally disabled to pay attention to the security of their physical environment. due to the various activities of the mentally disabled, some are very active because it is difficult to manage emotions. then standard protection alone is not enough to guarantee that children with mental disabilities are safe from potential risks.

Children with mental disabilities have their uniqueness, but they need a comfortable design because some of them are mentally disabled, such as Down syndrome, and have muscle hypotonia, which is a muscle disorder

that makes their muscle abilities not work as well as normal people in general. so that the design needed for the mentally disabled is a design that can minimize excessive physical use that burdens the user it can interfere with learning activities.

The most important thing that can be done is to seek input for standard formulation by evaluating special schools and conducting in-depth interviews with several mentally disabled experts to find out the school's efforts in creating a school physical environment that can meet the needs of mentally disabled. This is expected to enrich design references for people with mentally disabled and can be used as valuable input for standards and become input for formulating appropriate standards to meet the needs of people with mentally disabled.

Conclusions

The design criteria in Law No. 33 of 2008 over-generalize the needs of special needs students. This condition is against the principle of inclusive design which offers options because a single design solution cannot accommodate all users. Children with mentally disabled have unique conditions that their needs cannot be generalized to other users. However, the author cannot violate existing regulations because these results are only based on the literature which does not accurately describe the actual conditions. Therefore, future researchers should assess the physical environment of special schools to gain insights into this matter.

Recommendations

Future researchers are encouraged to assess the physical condition of the school. Type C special schools are preferred by mentally retarded students because these schools may show a different response to the theory and needs of the child. These insights can be analyzed by observing the behavior of mentally retarded students over the years.

In addition, experts such as teachers, psychologists, and other related parties must be involved as mediators who build relationships between typical children and children with mental retardation. The role of experts becomes very important because they

have experience in observing and interacting with mentally retarded students.

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