

Adaptive Design Analysis on Children's Bedroom Within Their Growth Period

(Case Study: Kids Bedroom Design in Pakubuwono Residence Interior Project,
South Jakarta)

Sharlene¹, Mariana²

¹(Faculty of Visual Arts and Design, Universitas Tarumanagara, Jakarta)

²(Faculty of Visual Arts and Design, Universitas Tarumanagara, Jakarta)

ABSTRACT: Early age acts as one of the most important age in a child's development caused by their rapid growth. In addition to the need of intensive care, the rapid growth of children also causes rapid changes in their needs, one of which is the interior of the child's bedroom. A child's bedroom must be able to adapt and grow together with the child, in order to sustain their needs. In the case study of the Kids Bedroom design at the Pakubuwono Residence Project, an adaptive, timeless and kids-friendly design is needed, specially designed for a 2-year-old boy so that he can grow along in his bedroom for the next few years without much design change or renovations, due to the change of aesthetics or functionality. Based on the analysis, an ergonomic study table with adjustable height, padding and headboard with a timeless design to bookshelves that can adapt over time are some examples of designs that applies the concept of adaptive, sustainable, and the concept of a growing house/space. With this, the child's bedroom is expected to be able to support the needs of a child's space along with their growth more efficiently with a lower cost.

KEYWORDS –Adaptive, Child, Ergonomics, Growth, Sustainable

I. INTRODUCTION

Early age seems to be the golden period in a child's development, where at this stage, a very rapid growth spurt occurs (Permatasari, 2022). Children at this age needs good care from parents or adults in their family environment, in order to develop properly according to their age (Listyaningrum, 2015). However, this growth spurt sometimes causes a problem which is quite challenging for the child's parents. According to Ryan Mario Yasin (2017), the founder of Petit Pli, a children's clothing company that prioritizes sustainability, a child grows seven sizes in their first two years on earth. This results in a lot of clothes being wasted and a lot of budget needed for the child's needs at their peak growth and development stage. In addition to clothing and other basic necessities, the children's environment also greatly influences their growth and development, including the bedroom they occupied.

Children at an early stage in their growth tends to spend more time at home. Therefore, the house, especially the child's bedroom, which acts as the child's closest environment and facility, must be safe, comfortable and able to meet the child's needs during their rapid growth period. The child's bedroom is not just a place for rest, it serves as a space for play, learning, and self-expression. A well-designed bedroom can significantly contribute

to a child's physical, cognitive, and emotional development. Therefore, it is imperative that this space is thoughtfully designed to provide and withstand the dynamic needs of a growing child. However, along with the rapid growth spurt of children during early age, can the interior of the bedroom adapt thoroughly?

This study aims to further introduce the concept of adaptive design in a children's room design, which provides a more efficient and easier alternative to support children's growth needs, which also acts as an affordable alternative to minimize major room renovations as children grow and develop. A lot of factors are needed to be considered in designing a comfortable kids bedroom, such as the use of children's ergonomics, a sustainable and kids friendly alternative for the choice of material and designs, and various innovations regarding this theory are needed in order to create a mindful and cost efficient kids bedroom.

II. RESEARCH METHOD

The research method/approach used in this study is a qualitative method, with collective data obtained from a case study. The data is in the form of observation studies and design results and presented in the form of descriptions, images, tables, etc, that contains comparisons and implementations of theory and on-site data.

The design process applied is a 5-stage design according to Rosemary Botti Salitsky (2009), namely the process of observation, analysis, ideation, design development and evaluation stages:

1. Observation : Data is collected through a client design brief that explains the problems that must be solved. The data collected is in the form of client biodata, age, gender and the problems faced. Based on the data that has been obtained, the problems, wants and needs of the client can be identified, which will later be answered/provided with solutions in the form of interior design.
2. Analysis : The data obtained through the design brief is then analyzed by comparing the needs of a 2-year-old baby with a baby with an older age (> 6 years), and determining what facilities can be improved and adapted to minimize interior renovations and repurchases of the toddler's materialistic needs, but can still meet their daily needs optimally.
3. Ideation: The design continues to the ideation process where the client's problems and needs are solved through innovative solutions aligned with existing theories, which not only focus on needs, but also align with the ambience and aesthetics of the room.
4. Design Development: The stage when the previously created design concept is developed and realized on the existing space/object. The design concept is adjusted to the space requirements at the existing location and designed according to the child's needs.
5. Evaluation: After the design development process, the finished design is then evaluated and reviewed whether the final product is appropriate and answers the needs of the objectives and problems identified before.

III. THEORY AND DESIGN OVERVIEW

A child's bedroom acts one of the kid's closest environment, in which the child spends most of his/her time during their early stages of life. So, in order to create a comfortable and efficient space, a kid's bedroom must be able to meet the following two aspects (Atika, 2015):

- a. Meet functional demands: including the size and location of the child's bed to create a healthy and comfortable sleeping space.
- b. Meet aesthetic demands: have design demands that are harmonious, in tune, and in line with the character of the occupant.

3.1 Adaptive Design

As a child grows, the needs of the child also increased, one of which is in terms of house/environment facilities. Therefore, the design of a child's bedroom must be adaptive as the child grows. The term adaptive is a person's ability to be able to adjust to the norms or standards that apply in their environment (Balqis, 2021). Meanwhile, in the scope of interior and architecture, adaptive design in the form of adaptive reuse, describes the process of a space/building with an old function being developed into a new function so that it can accommodate needs (Rahayu, 2023). This process ensures that the space/building could adapt thoroughly by changing the old function into a new one without building/creating a new accommodation as a respond to a new necessity. The concept of adaptive reuse has a significant support as

a positive strategy to make the environment more sustainable (Andanwert, 2020). Following are the benefits of Adaptive Design:

- a. Cost-Effectiveness: reduces the need for frequent and costly renovations, providing a budget-friendly solution for new families.
- b. Flexibility: The use of adjustable and modular elements allows the room to be easily modified to accommodate a growing child's changing needs and preferences.
- c. Sustainability: Promotes a more sustainable approach to home interior design, by minimizing the need for new materials and renovations.
- d. Enhanced Comfort and Safety: Prioritizes the child's comfort and safety by ensuring that the room remains suitable and secure as the child grows.

3.2 Growing Space/House

With a concept that resembles a growing house, which defines as an idea for planning a residential house that can be built in stages by taking into account if either the young family who lives in the house will have children in the future, an increase in the family's economy or which gradually wants to develop their room or house according to their needs (Aryani, 2019). With this design concept, it is expected to reduce the negative impact of design changes and maintain the quality of the facilities in terms of comfort and health (Aryani, 2017).

Similar to buildings, to meet the needs of toddlers with their significant growth, a child's bedroom must be able to develop old functions into new functions, by minimizing major renovations and focusing to increase the use of interior elements/furniture to accommodate their needs.

3.3 Ergonomics

An adaptive design also requires sustainable room ergonomics. As children grow, the need for room ergonomics also increases.

- a. Anthropometry can be interpreted as a science that is specifically related to the dimensions of the human body (Hasimjaya, et al., 2017)
- b. Ergonomics comes from Latin, namely *ergon* (work) and *nomos* (natural law). Ergonomics is defined as the study of human aspects in their work environment which are reviewed in terms of anatomy, physiology, psychology, engineering, management and design, (Nurmianto, 1996, p.1).

3.4 Sustainability

The concept of sustainability is also needed to support the problem of ergonomic needs, where sustainability or sustainable design is a relationship or method of planting or using resources, where these resources will not be permanently damaged (Bitutomo, 2023).

The subject of the study was a 2-year-old baby. He is the first child of a young couple living in Pakubuwono Residence, South Jakarta. The object of the study is a workspace measuring 3540 x 4750 mm, which is to be converted into a child's room. This room has facilities in the form of a door as access to other rooms, as well as a window parallel to the door. The room is not completely square because there are columns on both the right and left sides that give the room its own uniqueness. Based on the brief given by the client's mother, this baby's room must have a functional design, both aesthetically pleasing and prioritizes a child-friendly design. This bedroom is also expected to be used for a long period of time within the child's growth period with minimal renovation/design changes. This children's room consists of several facilities that support the needs of a child's room, including a bed with a mattress, wardrobe, diaper changing station cabinet, adjustable study desk and also a reading corner.

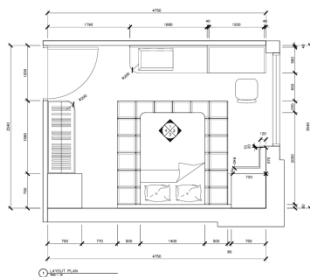


Fig. 1 Bedroom Layout
Source : Sharlene, 2024

Aesthetically, the design prioritizes organic shapes that are in sync with the concept of a child's room, with a combination of walnut-colored wood with timeless white duco. Considering that the user of this room is male, wallpaper with cute animal patterns is also applied.



Fig. 2 Bedroom Perspective 1
Source : Sharlene, 2024



Fig. 3 Bedroom Perspective 2
Source : Sharlene, 2024



Fig. 4 Bedroom Perspective 3
Source : Sharlene, 2024

This design also emphasizes the concept of kids friendly design where the furniture located in the corner of the room is curved, so that it could not endanger the room user. The concept of kids friendly is also applied to the ergonomics of the room, where the furnitures are designed to be reached by children (bed, study desk, open shelving on the lower wardrobe and reading corner). These designs are made using lower heights, to ensure the ability of the child to use and reach a certain facility. However, some furnitures are also designed with the aim not be reached by children (upper wardrobe, diaper changing station, kettle/mini pantry) which are made higher.

As time goes by, the 2-year-old baby will grow into a toddler, and soon enters elementary school. Therefore, the room design must be adaptive to accompany the child in growing. Some room facilities that can be developed by implementing adaptive aspects, sustainability and growing space which includes the bed area, study table and reading area.

IV. THEORY IMPLEMENTATION AND PROBLEM SOLVING

In order to create an adaptive, sustainable and a kids friendly bedroom, some room facilities must adapt and implement the theory needed in order to grow together with the child, as the owner of the bedroom. These specific furnitures/facilities include :

4.1 Multifunctional Bed Area

The sleeping area in this child's bedroom consists of an organic shaped fabric headboard, accompanied by indirect lighting, which applies a timeless design, a 2400 x 2250 mm lower mattress which consists of 375 x 400 mm square mattresses, and a standard 1400 x 2000 mm bed.

Implementing the theory of a kids friendly design, the sleeping area is made so that the distance between the mattress and the floor is low enough to minimize accidents such as falling from the mattress, etc. that could endanger the child. A mattress made with a low height can also make it easier for parents/babysitters to look after the child. In addition, the mattress is also multifunctional as it can also function as a children's play area. The mattress that surrounds the bed is made wide enough so that children can play and explore more freely.

However, over time, there are times when children grow up and need/want a mattress with a standard height in general. At that time, the mattress can be changed with a divan, but the mattress and headboard can still be used/reused to minimize changing/purchasing new furniture and with the aim to be more cost efficient and to adapt with the child's growth.



Fig. 5 Comparison of initial bed area design with further adaptation
Source : Sharlene, 2024

4.2 Adjustable Study Desk

The rapid growth of children also affects the height of the child's study table. Parents tend to replace new study tables and chairs when the old ones are no longer suitable for use, which is very inefficient in terms of cost. Therefore, the study table in this room applies an adjustable table height system, in which applies to the theory of an adaptive design.

The following is the knee height size data for children aged 6-11 years according to the book Human Dimension and Interior Space (1979). The data in the table shows a comparison of the standard knee height sizes for children aged <6 years, 6-8 years and >8 years with a table height that can be adjusted to the child's height and comfort in using the study table. With this adjustable study table, parents can minimize the cost required to buy a new study table because of the child's rapid growth.

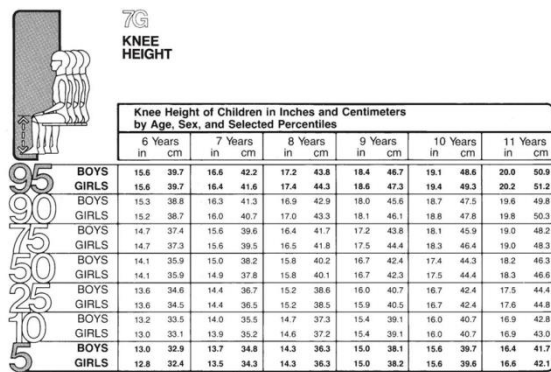


Fig. 6 Kids Knee Height
 Source : Panero, 1979

Level	Age	Kids Knee Height	Table Base Height	Under Table Height
1	<6	<35 cm	61 cm	45 cm
2	6-8	35 - 40 cm	68 cm	52 cm
3	>8	>40 cm	75 cm	59 cm

Table 1 Table Base Levels
 Source : Sharlene, 2024

According to the data below, an adjustable table with 3 levels is needed to design an adaptive study desk for a growing child. An interlocking system between the base and the table itself is needed to create an adjustable and attach/detachable table system. The levels of the table adjuster are spaced in a sequence of 5cm per level to ensure and adapt to the child's growth needs. To balance the features of this study table, the study chair should also have an adjustable height to better adjust the height of the child's feet to the height of the table.



Fig. 7 Comparoson of Table Level 1, 2, 3
 Source : Sharlene, 2024

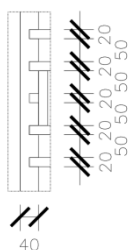


Fig. 8 Table adjuster
 Source : Sharlene, 2024

4.3 Reading Corner

The reading corner applies as the children's reading area, consisting of shelves with children's books in one corner of the room. These shelves have a walnut wood finish that matches the color theme of the room and book stands that have a brass finish. The design of the shelves are also kids-friendly, because it has corners that are curved to protect children from sharp corners. In addition, the starting point of the shelf placement is also considered, which is on the floor of the room and continues to several other shelves that are placed parallel upwards that are adjusted to the height that can be reached by children.

However, as time goes by, children will grow taller along with their increasing reading needs, so the capacity of the reading corner can adapt and enlarge, by adding several shelves upwards according to the child's height and reach.

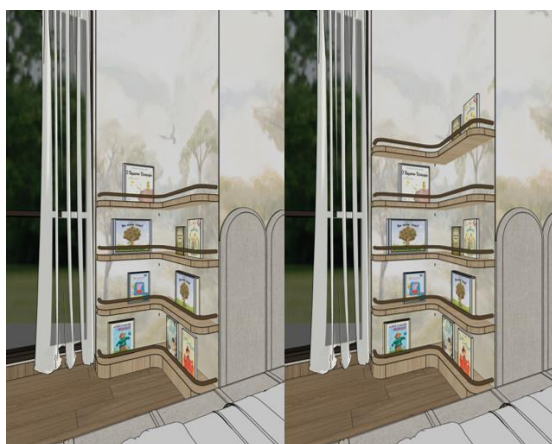


Fig. 9 Comparison of initial reading corner design with further adaptation
Source : Sharlene, 2024

V. CONCLUSION

The rapid growth of early childhood causes rapid changes in children's needs, one of which is in the interior of the child's bedroom. A child's bedroom must have new innovations so that it can adapt well along with the growth and development of the child, namely by applying the concept of adaptive, sustainable and growing space in the design.

Based on the data obtained in this study, it can be concluded that the design of the child's room that will be occupied by the user is quite comfortable, innovative and applies concepts such as adaptive, sustainable and growing space in various facilities/furniture in the room. Among them are multifunctional mattress beds that can adapt to become mattresses in general but still maintains its old furniture, study tables with adjustable table heights to adjust to the child's growth and development and reading corners that can be added along with the child's height growth which is parallel to the child's increasing reading needs. In addition to function, this child's room is also designed with a timeless and neutral concept, so that the design can still be maintained for the next few years.

This research is discussed in sufficient detail because the scope of the discussion tends to be narrow both in terms of the area of space and the topic of discussion. However, there are still several things that can be improved by this research, including the absence of interviews/meetings with clients directly so that data collection tends to be less detailed because it only relies on design briefs along with WhatsApp messages between researchers and clients. Then also the lack of reference journals that discuss adaptive design is also an obstacle for researchers. Since this research is still far from perfect, and there are still many aspects that can be improved, hopefully, further research can be studied with a more complete and informative scope regarding adaptive design. Because adaptive design is a very important and interesting topic to discuss, apart from the scope of children's rooms, other rooms in the house such as bathrooms, kitchens, living rooms, etc. are also interesting and in need

to be discussed.

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