

# Furniture Design in the Form of Storage Rack as a Stimulation Media for Development Aspects of Children Aged 1–5 Years

*By Restu Hendriyani Magh'firoh*



# Furniture Design in the Form of Storage Rack as a Stimulation Media for Development Aspects of Children Aged 1–5 Years

Restu Hendriyani Magh'firoh, Swesti Anjampiana Bentri, Briantito Adiwena, and Stephanie Putri Nimaz Purnomo

## Abstract

The golden age is the most important period in a child's growth and development. In the age range of 1–5 years, children will be faced with stages of development from the motor, cognitive, and creative aspects. In the stage of growth and development, play is a necessity for children. Through playing, children gain knowledge and experience that can develop their abilities. The purpose of the research is to design a furniture in the form of multifunctional storage racks for children's play activities that can also stimulate aspects of the child development in children aged 1–5 years. The research method uses literature studies, interview techniques, and distributing questionnaires. The design method used is design thinking method from the Hasso Plattner Institute at Stanford (d.school), and the stages include understand, observe, define point of view, ideation, prototype. The design result is a storage rack furniture with brand called *Joykids* that came with the features that support the play activities of children aged 1–5 years in development stage. The design work is named *Joyspace* and is realized in the form of a prototype along with a diorama in scale of 1:5 with material made of balsa wood. Hopefully, its design will be useful for any children according its purpose and can be an inspiration for other product designers.

## Keywords

Furniture • Storage rack • Stimulation • Development aspects • Golden age

R. H. Magh'firoh (✉) · S. A. Bentri · B. Adiwena · N. Purnomo  
Product Design Department, Faculty of Design,  
Institut Informatika Indonesia, Surabaya, Indonesia  
e-mail: [restu@ikado.ac.id](mailto:restu@ikado.ac.id)

© The Author(s), under exclusive license to Springer Nature Switzerland AG 2024  
R. Cano-Guervos et al. (eds.), *Sustainability in Creative Industries*, Advances in Science, Technology & Innovation, [https://doi.org/10.1007/978-3-031-50894-3\\_7](https://doi.org/10.1007/978-3-031-50894-3_7)

## 1 Introduction

Every child will experience the golden age or also known as the golden age. Golden age is the most important period in the growth and development of children in the first five years. The brain develops very rapidly in these five years. In this age range, children will be faced with the development of motoric, cognitive, and creative aspects. Montessori (Hainstock & Hainstock, 1999) states that the golden age is a period when children begin to be sensitive to receiving stimulation and various educational efforts from their environment, both intentional and unintentional, so that developmental stimulation is very important that children develop optimally. Starting from learning to walk, developing visual vision, doodling, counting, active running and jumping activities, to activities for children's interest in toy collections at the age of 1 to 5 years, things that can hinder the development of children in the golden age include lack of nutrition and stimulation. The stimulation in question is inducement and training so that the expected abilities appear. It can be concluded that the growth period needs to be supported by stimulants so that it is not hampered, one of which is playing activities.

Play is the main activity for a child. Hariwijaya and Sukaca (2009) describe that playing is an activity that children do repeatedly for pleasure without any goals and objectives to be achieved. Play is a necessity for children because through playing children will gain knowledge and experience that can develop their abilities. At the age of 1–5 years, children really like to play; in playing, children will get fun; with pleasure, all experiences will be more easily absorbed. This shows that in playing, children can also learn. Learning is a process of change. These changes can be seen in the form of increased behavior, such as knowledge, attitudes, skills, habits, understanding, skills, and other abilities.

Playing activities are enjoyed by children, and toys that children really like can be used to attract attention and develop the child's capacity and knowledge. Every parent

certainly has a desire for their child to grow and develop well. This encourages parents to be able to support the quality of their children's play activities well at home. The interaction between parents and children is indeed the most important in the growth and development of children, but the media can also support the growth and development of the little one. Moreover, if the media has more functions, besides being able to be used for playing media, it can also be used as a medium for learning. One of them is media storage racks. Storage racks are one of the furniture that many parents choose to meet the needs of their children. Storage racks are considered more versatile, because they can store various kinds of children's needs and make the room neater. In addition, through the media storage racks, children will be trained to get used to putting their toys into the racks after playing. It is just that, the design of the existing storage rack is still fairly standard and lacks more benefits, for example, as a stimulation medium for children's growth and development.

Based on the explanation above, it is necessary to design furniture that has a storage function and can support play activities and can be a medium for stimulating developmental aspects of children aged 1–5 years. By considering the use of color, shape selection, and safety aspects for use by children aged 1–5 years, this furniture also has the concept of being able to help parents in maintaining the neatness of the room and the concept of modular furniture to facilitate assembly or flexible use. This design will use the concept of astronomy, because it is considered to be able to hone children and arouse their interest in knowledge and science. The benefit of introducing the world of astronomy to children from an early age is to stimulate children's interest in knowledge and science and to hone children's reasoning. Introducing celestial bodies to children can inspire fantasy and appreciate science (Hidayat, 2007). This design will use plywood as the main material, and furniture finishing also considers health and safety for children by using materials that are odorless and toxic when used around children, one of which is Duco paint.

## 12

### 1.1 Research Questions and Objectives

- How to design furniture in the form of storage rack as a stimulation media for development aspects for children aged 1–5 years?
- The design of furniture is in the form of storage shelves as a medium for stimulating aspects of development and supporting play activities for children aged 1–5 years. Storage shelves that have a storage function can support activities or play activities for children aged 1–5 years. Taking into account the use of color, shape selection, and safety aspects for use by children aged 1–5 years, this

design has a modular furniture concept designed to facilitate assembly or flexible use. The concept of astronomical shapes is used in this design, because it is considered to sharpen children's reasoning and stimulate their interest in knowledge and science. This design will use plywood as the main material with a finish that is odorless and toxic when used around children, one of which is Duco paint. The features in the deviation rack are as follows: (1) handle feature for children aged 1 year; (2) magnet board feature along with magnet games with an astronaut theme for children aged 2 years; (3) supporting media for magnetic games in the form of numbers for children aged 3 years; (4) media for drawing and scribbling for children aged 4 years; (5) storage features and sofa features for 5-year-olds.

## 2 Method

### 2.1 Research Methods

This design uses qualitative research methods. In this design, the questionnaire is one of the methods to find data by being distributed online. According to Sugiyono (2015), a questionnaire is a data collection technique by means of which the researcher provides a list of questions or written statements to be answered by respondents. In this design, the questionnaire is one of the methods to find more data. Questionnaire is developed with a target audience of parents who have children with an age range of 1–5 years. This questionnaire was conducted to find out how often children aged 1–5 years interact with the environment and to determine the design style. Based on the results of the questionnaire, 68.8% of the 112 respondents knew that the golden age is a period of child development that must be supported by stimulation and the surrounding environment so that the period of growth is optimal. For children's interactions with the environment, 53.6% rarely interact with the outside world. For the selection of media types, 61% of respondents chose storage shelves as furniture to be used to meet children's needs. According to respondents, storage racks are more versatile; the top can be used as a table, and the inside of the shelf can be used as storage. For design style, 69.2% of respondents chose contemporary design style as an aesthetic and attractive design for children's furniture. Apart from that, they also conducted interviews. According to Esterberg (Sugiyono, 2015), an interview is a meeting conducted by two people to exchange information or an idea by way of question and answer, so that it can be pursued into a conclusion or meaning in a particular topic. This method is carried out to get to know the world of child development and also to get an understanding of the

concepts needed by designers to produce optimal product results. The interview was conducted with Mrs. Firesta Farizal M.Psi, who is a child psychologist to get to know the world <sup>10</sup> child growth and development and the stimulation needs of children aged 1 to 5 years as well as to gain an understanding of the concepts needed by designers to produce optimal product results. Based on the interview results, it is said that the golden age is the most important period in child development, in the first 5 years. In the growth and development of children, the most important is the stimulation. Stimulation of children can be given in play activities. Various types of household furniture can be a medium for children to play to turn on their imagination. In addition, playing with the environment can also reduce stress levels in children, fatigue, depression and increase the range of concentration while studying. Literature studies are <sup>7</sup> carried out to collect data from various scientific sources in the form of books, journals, articles, and previous research. This method is carried out to reproduce the data needed to support optimal design results.

## 2.2 Design Method

<sup>12</sup> According to Hasso Plattner (Doorley et al., 2018), the design method used in this design process is design thinking from the Hasso Plattner Institute at Stanford (d.school) which was developed and adapted to the needs of the problems discussed in the following stages:

- Understand: Understand, determine, and collect literature data about the needs of children's shelf furniture and existing problems.
- Observe: Observation to get to know the child's character and needs during the golden age.
- Define Point of View: Brainstorming and mind mapping to determine the concept according to the needs of the existing problems.
- Ideation: Create a design concept and target user segmentation, create a design schematic with a sketch complete with material and color information.
- Prototype: Making prototypes along with material descriptions, colors, details, and perspectives for developing solutions.

## 3 Literature Review

### 3.1 Golden Age

<sup>4</sup> Toddlers are very important for the intellectual and creative development of children which is referred to as "the golden

age" or the age to develop children. The golden period lasts from the time the child is in the womb until an early age, which is 0–6 years. However, the period of baby in the womb until birth, until the age of 4 (four) years, is the most decisive period (Suyadi, 2010). This period of child development that only comes once in a lifetime should not be wasted. Education must be started from an early age so that it is not too late. The development of a child's brain structure will continue to grow and show early childhood experiences, imagination, heard language, and form brain networks. Through cognitive development, the function of thinking can be used quickly and precisely to overcome a situation to solve a problem. So parents must understand the need for optimal child growth and development and must also always monitor the child. For children aged 1 to 5 years, stimulation can be given in the form of play, and in playing, children will learn many things.

### 3.2 Stimulation of Children Aged 1–5 Years

Stimulation is a form of activity to train children's basic skills so that they can grow and develop optimally. Early childhood education is important in building human resources, so one way to take advantage of this period is to provide stimulation and stimulate the growth of the little one's brain, one of which is playing (Nurlailis Saadah et al., 2020). Stimulation of children's growth and development can be done by everyone who interacts or through playing and learning media. According to Wulandari (2021), the development of toddlers can be monitored through a number of aspects, namely:

- Cognitive (intelligence)
- Gross motor (movements that involve the muscles of the body, calves, and arms)
- Fine motor (relating to fingers and palms)
- Language skill
- Socio-emotional.

<sup>35</sup> The following stimulation can be given to children aged 1–5 years:

- At the age of 1 to 2 years, a lot of moving and exploring will make children get to know many new things around them. This can train children's motor skills, especially gross. As for fine motor skills, it is necessary to provide opportunities for children to hold various types of objects. This will make children familiar with various textures, flavors, and colors. This stimulus will help children develop all their senses. Using items according to their function, for example drinking from a cup, can train



children's cognitive. Exploring new things independently can train children's creativity and emotions.

- Entering the age of 3 to 4 years, children's gross motor skills can be trained with various aids such as going up and down stairs or chairs or other physical activities. Children's independence has begun to be seen because their growth and development is getting more perfect, so they can let them try to eat on their own and clean up their toys. Stimulus in the form of examples and simple commands makes children know the right way and the reasons why he needs to do it himself. A child's growing imagination also makes him better at writing or drawing many things to stimulate his fine motor skills.
- At the age of 4 to 5 years, it is necessary to train children to do more challenging physical activities such as swinging and climbing. Imitating pictures or sticking can train their fine motor skills. Counting to 10 or even more can stimulate cognitive.

### 3.3 Playing

Playing is an activity carried out by every child, and it is said that children fill most of their lives by playing. Play activities are a very important part in the growth and development of children, because children will learn many things in playing. Catron and Allen (Sujiono, 2009) argue that basically playing has the main goal of maintaining optimal development and growth in early childhood through a play approach that is creative, interactive, and integrated with the children's play environment. The world of children is a world of play; when they play, children will absorb everything that happens in the surrounding environment. "play is also an essential demand and need for early childhood, through playing children will be able to satisfy the demands and developmental needs of the dimensions of the motor, cognitive, creativity, language, emotion, social, values, and attitude to life" (Moeslichatoen, 2004). Playing can be a learning process for children, especially from the age of 1 to 5 years, because they play by knowing their surroundings. Learning that is carried out in a fun way through the fun gained while playing can allow children to learn without pressure, so that children get their motor skills and intelligence that will develop optimally. Therefore, at this time, parents begin to socialize the roles that are expected to develop in children through the types of games provided.

### 3.4 Storage Rack Furniture

Furniture comes from the French, namely furniture comes from the word *fournir* which means furnish or home or home

furnishings. Furniture is a home fixture that includes all items such as chairs, tables, and cabinets. Meanwhile, according to the KBBI, rack are wooden parapets for placing plates, bowls, kitchen utensils, and so on. It can also be considered as a cupboard without a door or a piece of board with pillars for books, shoes, and other items. More generally, rack is a stacked place (container) to store goods. Apart from being functional in terms of its function as a storage area, it can also have decorative benefits by placing various decorations or collections of art objects to beautify the house.

The selection of furniture for children needs to be considered. Tjahjono (2017) says there are several things that need to be considered, such as:

- Tables and chairs must be adjusted to the appropriate size and weight for children so that they are comfortable when using them, and there is no risk of accidents due to difficulties when using or when cleaning tables and chairs.
- The edges of children's tables and chairs are not tapered.
- Lockers where children's play equipment and books are stored within their reach.
- When using plastic material on the chair, make sure it is sturdy enough and not slippery.
- When using wood materials, the paint used should be safe for children, odorless, and nontoxic. In addition, the surface made of wood should not be rough because it can injure the child.

### 3.5 Ergonomics

Ergonomics is the science, art, and application of technology to harmonize all facilities used both activities and in resting on the basis of human abilities and limitations both physically and mentally so that the overall quality of life becomes even better (Tarwaka & Sudiajeng, 2004). Ergonomics is very important to consider in designing furniture. Children have different ergonomics from adults so that the furniture and facilities provided must be adjusted to a height that suits them so that there is no danger or injury to children such as muscle disorders (Jalaludin, 2011). The concept of ergonomics in this design refers to anthropometric standards for children aged 1–5 years (12–60 months). Child Anthropometry Standards are used to assess or determine the nutritional status of children. Assessment of children's nutritional status is done by comparing the results of measurements of weight and length/height with the Child Anthropometric Standards. The classification of nutritional status assessment based on the anthropometric index is in accordance with the nutritional status category in the WHO Child Growth Standards for children aged 1–5 years.

### 3.6 The Concept of Astronomical Forms for Early Childhood

Shape is an important element in design. The shape of children's furniture can be an important part of the design. The safety level of its users is also influenced by how the furniture is designed, especially children aged 1–5 years who still have very active behavior. Geometric shapes are an option for designing children's furniture. In addition, using interesting forms of developing elements that exist in the natural surroundings such as plants and animals will be very helpful and stimulate growth and development and all the creativity possessed by children. One of them is astronomy. Astronomy is a natural science that involves observing celestial bodies such as stars, planets, comets, nebulae, star clusters, or galaxies. During the golden age, children should also be introduced to activities that can stimulate their interest in knowledge, science, and astronomy. Introducing celestial bodies to children can inspire fantasy and appreciate science (Hidayat, 2007). The introduction of space issues to children from an early age will be very useful to stimulate children's reasoning and imagination. It can also stimulate children to be more sensitive and concerned about technological advances.

### 3.7 Colors for Early Childhood

Color is a design element that can be utilized to create attractive design works. As color can affect human psychology, it can also convey certain messages. Several psychologists, such as Hemphill in 1996, Lang in 1993, and Mahnke in 1996, have conducted research on color and its relationship with children's emotions. They admit that there is indeed a relationship between color and children's emotions. In playing activities, children aged 1–5 years will be active and creative. Melani and Sari (2015) said that bright colors can make the atmosphere of the room more lively so that it stimulates children to be active, happy, and creative. Meanwhile, according to an interview with child psychologist Stella Sriwulandari S.Psi, in 2022, ages 1–3 years usually prefer standard colors so they are easier to recognize and learn. But for ages 3–5 years, you can add secondary colors because they are better at seeing differences. For the needs of furniture, which is to support children's play activities, it is better to use soft colors so that children can focus on the toys in it.

## 4 Framework for Furniture Design in the Form of Storage Rack

This design creates a new design that can support children's play activities in the growth and development stages of children aged 1–5 years. Home furnishings can be one of

the media that has a role in this. A furniture can be designed to have features that are multifunctional and innovative in helping human needs, not to be missed for the needs of children. Racks are an option for storage as well as being used as a multifunctional medium for play activities which can also train the developmental stimulus of children aged 1–5 years. The design of this storage rack is named Joyspace, which summarizes several features for the different needs of children aged 1 to 5 years into one practical and complex storage furniture.

### 4.1 Feature Concept

The features in the racks can be developed with various innovations to meet the needs of children's growth and development at every stage of their age. Selected features include:

- Handle feature for children aged 1 year.

The handle with a diameter of 2 cm can help a 1-year-old child to lean on or hold on when his walking ability is not yet smooth. By moving close to the furniture, the child can rest on the handle. This can make the child comfortable and can develop the ability to walk.

- Magnetic board feature along with a magnet game with an astronaut theme for 2-year-olds.

Certain parts contain magnetic material that can be attached with other magnetic devices. This can help the child interact by attaching a magnetic game to the board. Children can paste pictures, photos, or other items. By using a variety of colors in the implementation of magnetic games, it can support the development of visual abilities of children aged 2 years.

- Supporting media for the game of magnets in the form of numbers for children aged 3 years.

From the results of observations, children aged 3 years will begin to learn to count well. In this design, features are provided that function to improve children's numeracy skills, but in a fun way.

- Media for drawing and doodling for 4-year-olds.

From the results of observations, children aged 4 years will begin to learn to draw, doodle, and also write. So that this design is made with the whiteboard feature as a learning medium where children can draw and doodle. It can also help parents who struggle when their child likes to scribble

on walls. By considering safe materials and materials that do not absorb marker or marker ink.

- Storage features and sofa features for 5-year-olds.

40 From the results of observations, children aged 5 years are very active in playing and physical activities, such as running, jumping, and climbing. So that the furniture design needs to pay attention to the safety of every corner, so as not to injure a 5-year-old child who is actively playing in his room. The storage feature is made very practical and is sufficient to accommodate quite a lot of and varied children's games. In addition, there is a sofa feature, which functions as a medium for other activities carried out by children, such as reading a book or just sitting and relaxing.

The design of corner shapes and furniture elements is made by avoiding sharp corners to keep children safe. Because the target user is a child in the golden age, the concept of ergonomics comes from the anthropometric size of children aged 1–5 years. The product is made in the form of a prototype with a 1:5 scale ratio, equipped with simple technical features.

#### 4.2 Color Concept

The concept of form shown is the concept of space. This space is expected to represent a product where children can explore and play freely. The presentation of product colors is adjusted to the needs of the specified theme. Psychologically, color has an effect on humans, because in addition to causing a sensation, it also creates feelings of pleasure and displeasure, so the use of color needs to pay attention to psychological factors. Figure 1 is the colors used in this design. Selection based on suitability with the characteristics of the target user.

Each color can cause a different psychological response. Meaning of color (Von Goethe, 1840):

- The use of blue is a symbol of obedience, hope, and trust since time immemorial. It has the effect of lowering



Fig. 1 Selected color. Source personal documentation

arousal and then helping a person to concentrate. Increase calm, peace, love, honesty, kindness, deep emotional.

- The use of yellow is a symbol of intellectual prowess, uplifting, maintaining balance, and a sense of optimism. As the color of the sun, yellow can really brighten up our lives, has a joyful, uplifting, attention-drawing effect. Psychologically, this color is the happiest color on the spectrum, giving feelings of optimism, joy, cheerfulness, and spontaneity.
- The white color symbolizes purity, goodness, and truth. White is often used to give the impression of simplicity, sterility, and security. In addition, the use of white here helps so that children's visuals are not disturbed when drawing or attaching magnetic games to the media.

#### 4.3 Astronomical Shapes Concept

In the design process, this product adopts the theme of astronomy as its main concept. Introduction to outer space from an early age to children will be very useful for stimulating children's reasoning and imagination. Besides that, it can also stimulate children to be more sensitive and concerned about technological advances. An astronaut from Indonesia who is currently deceased, Director of Research at the University of Indonesia, Dr. Pratiwi Puji Lestari Sudarmo Ph.D. (Republika, 2004), said that the purpose of introducing astronomy to children from an early age is to stimulate children's interest in science, as well as hone children's reasoning. It is hoped that the theme raised can help children's interest in astronomy, so that their imagination and reasoning are well honed.

#### 4.4 Ergonomics Concept

The average length or height of children aged 1–5 years or in anthropometry aged 12–60 months have been obtained from anthropometric data. The data are used as a reference in determining the dimensions needed for children aged 1–5 years. Anthropometric measurements are based on a boy's height reference, where the male standard size can still accommodate girls' height standards.

From the anthropometric data obtained, Table 1 becomes a reference in measuring this design. Table 2 is a reference for standard body length for boys aged 12–24 months. Table 3. Standard body length for boys aged 24–60 months. Here is a table view:

From these data, the measurement must be considered not to be less than or more than the standard. The following is the final result of product measurement:



41

**Table 1** Anthropometric data for children aged 4–6 years

Number	Information	95th %tile
8	Fist high up in a standing position upright	149.83
10	Head height in sitting position	68.17
18	Thigh length from the buttocks to the tip of the knee	45.84
19	Length from buttocks to toes in a sitting position	39.77
22	The length of the reach of the hands forward from the back up to the fist	29.70
26	Total body width including arms from left to right	8.72
27	Hip width from left to right	42.12
34	Palm width	55.70

Source Herawati and Pawitra (2013)

**Table 2** Standard body length for boys aged 12–24 months

Number	Information	Median
12	12 months or 1 year old	75.7
24	24 months or 2 years old	87.8

Source Kemenkes (2020)

**Table 3** Standard body length for boys aged 24–60 months

Number	Information	Median
36	36 months or 3 years old	75.7
48	48 months or 4 years old	87.8
60	60 months or 5 years old	110.0

Source Kemenkes (2020)

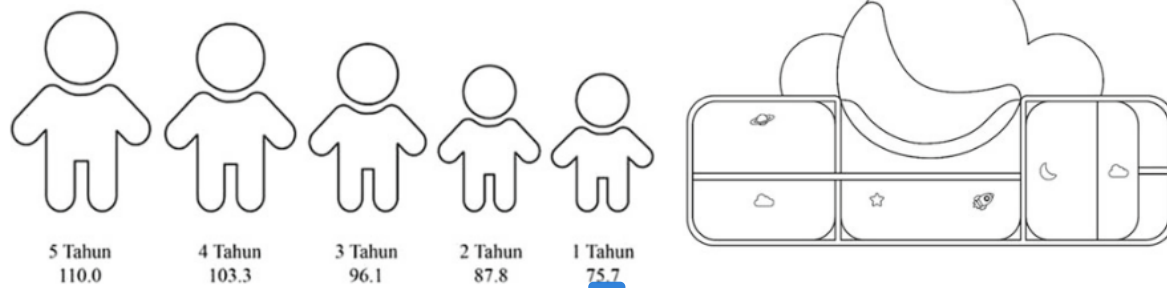
### 4.5 Furniture Body (A)

The body of furniture is provided according to the size of the target user so that it is safe and easy for the target to use. Figure 2 is a comparison of the size of the child with the dimensions of the Joyspace furniture. Figure 3 describes the details of the size of the furniture. Figure 4 explains the detailed features of this rack furniture design.

The following is a detailed explanation of the rack features:

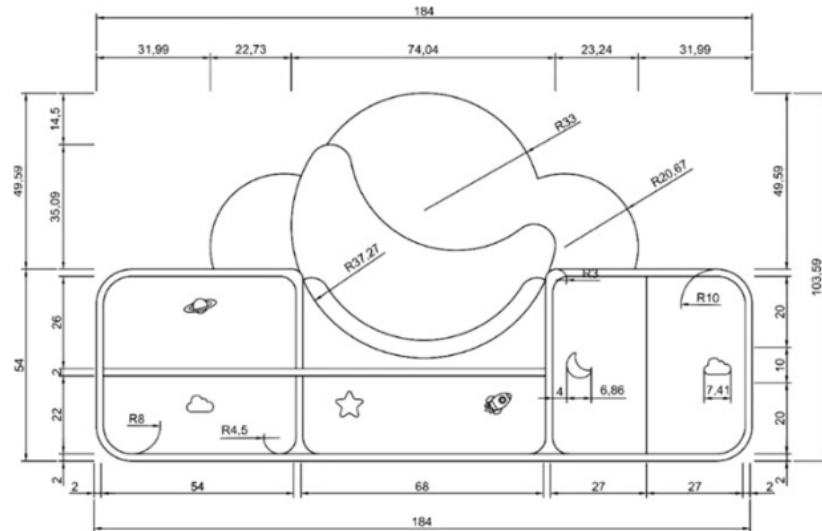
- Furniture Body (A-Comb 01)  
Furniture body is part of the main frame of furniture.
- Cloud Board (A-Comb 02)  
Cloud board is a support board for the back of the cloud.
- Cloud Sofa Backrest (A-Comb 03)  
The cloud backrest is a foam backrest for a child who sits on the sofa and leans back.
- Moon Section (A-Comb 04)  
The front can be affixed with magnetic objects and can be scribbled on.
- Sofa (A-Comb 05)  
Small sofa for children to just sit back and relax.
- Drawer Slide Shelf (A-Comb 06)  
The bulkhead for the slider drawer; this part can be removed according to the user's requirements.
- Handle Grip (for children aged 1 year) (A-Comb 07)  
A handle that acts as a pedestal for a 1-year-old child whose walking ability is not yet smooth.

The design of shelf furniture designs now uses several types of materials. The selected material is of course safe for

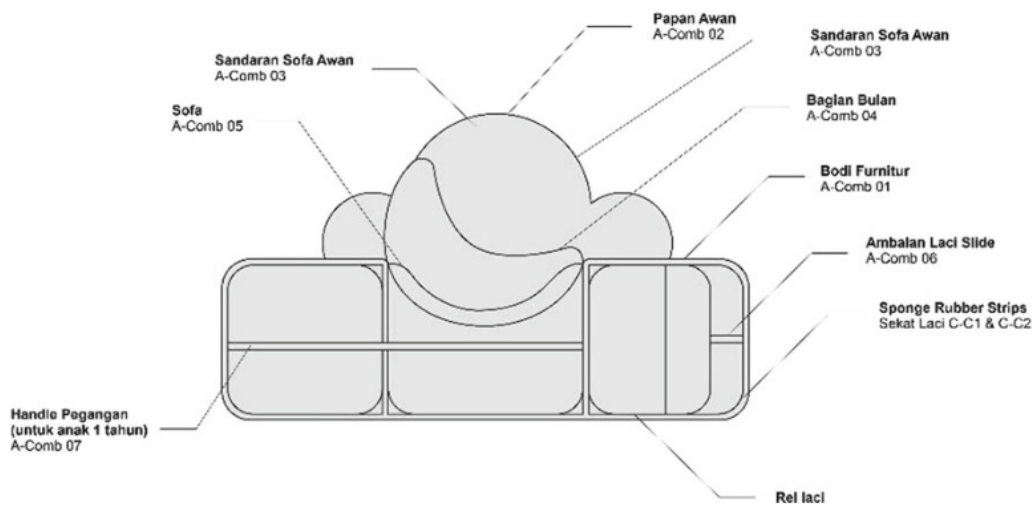


**Fig. 2** Comparison of child sizes with Joyspace furniture dimensions. Source personal documentation





**Fig. 3** Product size. *Source* personal documentation



**Fig. 4** Furniture body. *Source* personal documentation

use by the target and in accordance with the needs of the design concept regarding the concept of astronomy. Table 4 describes the details of the parts in the furniture racks along with the materials used and their sizes.

#### 4.6 3-D Digital Storage Rack Design

This design process uses SketchUp software to realize the product into 3-D digital. Before being made in the form of a

prototype, the selected design is realized in 3-D digital form first to find out the 3-D visuals. Figure 5 shows the results of the 3-D digital design of the furniture rack.

#### 4.7 Drawer Handle Details

The drawer handles on the furniture are made according to the design theme, namely the astronomy theme. Through digital access, the drawer handles are designed with

**Table 4** List of materials

Number	Type	Size (cm)	Information
1	Furniture body A-Comb 01	2	Multiplex wood
2	Cloud board A-Comb 02	2	Multiplex wood
3	Cloud sofa backrest A-Comb 03	2	Sponge foam
4	Moon part A-Comb 04	3	Multiplex wood, magnet strip, and melamine coating
5	Sofa A-Comb 05	4	Foam coated with cloth Oscar
6	Drawer slide A-Comb 06	2	Multiplex wood
7	Handle (for children aged 1 year) A-Comb 07	190	Multiplex wood
8	Drawer rail	45 × 25	Slow motion drawer rail
9	Drawer block C-C1 & C-C2	0.5	Sponge rubber strips
10	Astronomy magnets (B1)	1	Balsa sheet
11	Number magnets (B2)	1	Balsa sheet
12	Storage box Star (B3)	25 × 15	Duplex cardboard
13	Furniture drawer Part C	2	Multiplex
14	Drawer door	2	Magnetic strip and coating Melamine
15	Drawer handle	1.5	Multiplex

Source personal documentation

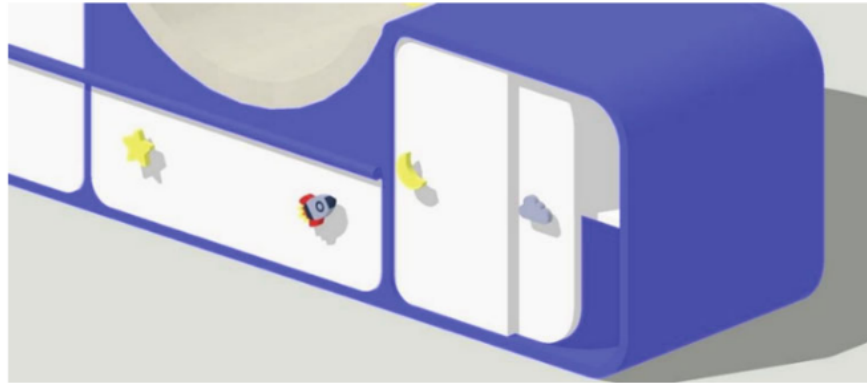
**Fig. 5** 3-D digital. Source personal documentation

astronomical shapes. The size of the drawer handles ranges from 6 to 8 cm depending on the shape of the handle made. Figure 6 shows the shape of the drawer handle, its size, and placement position. Figure 7 shows the perspective of digital 3-D space and a comparison of the user's size with the objects.

#### 4.8 Prototype

The prototype is made of balsa laminate, balsa sheet, and balsa stick. Figure 8 shows a complete prototype of the furniture rack design with coloring. Figure 9 shows a prototype with a diorama with the feel of a children's playroom

**Fig. 6** Handle details. *Source* personal documentation



**Fig. 7** Digital 3-D perspective of space. *Source* personal documentation

which of course is adjusted to the size of the comparison scale between the target and the design.

#### 4.9 Magnet Games

In this designed furniture, there is a drawer door section and a moon shape section that can be attached to a magnetic game. This magnet game has two types of shapes; the first is the shape of astronomical objects according to the design theme.

**Fig. 8** Prototype 1. *Source* personal documentation



The second form is the form of numbers with simple addition signs that can help children aged 3 to 5 years learn to count. Use bright colors for odd numbers and use dark colors for even numbers. Figure 10 shows 3-D magnet game with the formation of numbers 0 to 9 and a sum sign. Figure 11 shows the astronomy-themed magnetic game.

#### 4.10 Magnet Game Storage Box

Magnetic toy storage box is intended to make it easier for children to store magnetic toys. This storage media is designed in a star shape with a size of about  $25 \times 15$  cm. This storage box is made of duplex cardboard, so it is not too heavy and safe for children. But currently, this supporting media is made in the form of a prototype with a scale of 1:5. Figure 12 shows the design of a magnetic toy storage media with a star shape and yellow color.

#### 4.11 Whiteboard Markers and Eraser

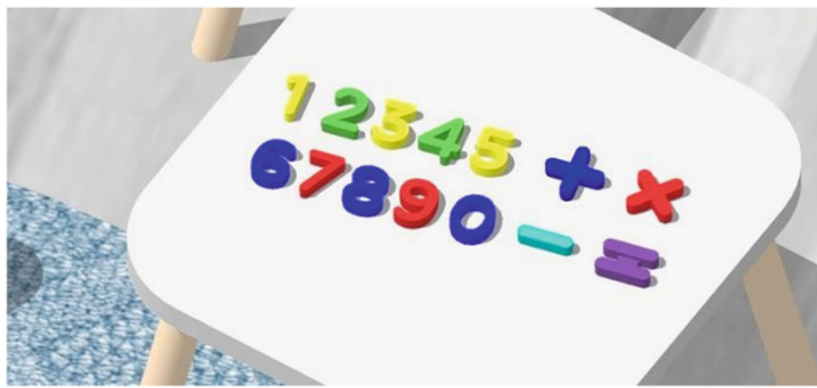
The supporting media for this marker set plays a role in supporting the whiteboard feature on the furniture



**Fig. 9** Prototype with diorama.  
*Source* personal documentation



**Fig. 10** 3-D number magnet game.  
*Source* personal documentation



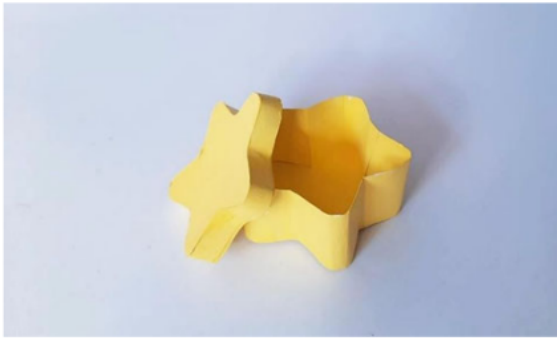
**Fig. 11** 3-D astronomy magnet game.  
*Source* personal documentation



section. The marker set is designed with the packaging so that it is easier to store it. Figure 13 shows a mock-up set of markers with a theme according to the shelf furniture concept, namely the concept of astronomy, by displaying images of astronauts and shades of dark blue in space.

## 5 Conclusion

The design of a storage shelf furniture is a solution to the problem of the need for play as a supporting medium for children's play activities in the stage of growth and



**Fig. 12** Magnet game storage prototype 3. *Source* personal documentation



**Fig. 13** Mock-up set marker. *Source* personal documentation

development. In the age range of 1–5 years, children will be faced with the development of motoric, cognitive, and creative aspects. This design creates a media design that can support children's play activities in the growth and development stages of children aged 1–5 years in the form of storage racks. Racks are an option for storage and can be used as a multifunctional medium for children's play activities. The features in the racks can be developed with various innovations to meet the needs of children's growth and development at every stage of their age. The features selected include: (1) features to help a 1-year-old child's walking ability, (2) features to help a 2-year-old child's visual ability, (3) features that can help a 3-year-old child's numeracy skills, (4) features to help the ability to write or draw children aged 4 years, and (5) features to store various

collections of children's games and features for children who are active at the age of 5 years.

## References

- 11 Doorley, S., Holcomb, S., Klebahn, P., Segovia, K., & Utley, J. (2018). Hasso Plattner Institute of Design at Stanford. In *Design thinking bootleg*.
- 25 Hainstock, E. G., & Lumley, B. (1999). *Metode pengajaran Montessori untuk sekolah anak dasar*. Pustaka Delapratasa.
- 20 Hariwijaya, M., & Sukaca, B. E. (2009). PAUD Melejitkan potensi anak dengan pendidikan sejak dini. Mahadhika Publishing, 14, 58–72.
- 3 Herawati, L., & Pawitra, T. A. (2013). *Evaluasi Data Antropometri Anak-Anak Usia 4–6 Tahun Di Jawa Timur Dan Aplikasi Pada Perancangan Fasilitas Belajar Di Sekolah*.
- 23 Hidayat, A. A. (2007). Seri Problem Solving tumbuh kembang anak siapa bilang anak sehat pasti cerdas. PT Elex Media.
- 18 Jalaludin, N. A. (2011). *Assessment on space and furniture's ergonomics for children in kindergarten*. Research Methods for the Built Environment.
- 17 Kemenkes, R. I. (2020). *Peraturan Menteri Kesehatan Republik Indonesia Nomor 2 Tahun 2020 Tentang Standar Antropometri Anak*. Menteri Kesehatan Republik Indonesia.
- Larastining Retno Wulandari. (2021). Perkembangan Balita Usia 34 Tahun yang Perlu Anda Ketahui. Retrieved May 19, 2023, from sehatq.com website: <https://www.sehatq.com/artikel/perkembangan-balita-usia-1-5-tahun>
- 3 Melani, F., & Sari, S. M. (2015). Penerapan Standar Fasilitas Ruang Belajar pada Taman Kanak-Kanak Katolik Santa Clara Surabaya. *Intra*, 3(2), 452–458.
- 29 Moeslichatoen, R. (2004). *Metode Pengajaran di Taman Kanak-kanak*. PT. Asdi Mahasatya.
- Nurlailis Saadah, S. K. M. K. Dr., Suparji, S. S. T. M. P., Suli, S. S. T. M. K., Budi Yulianto, M. K. Dr., & Pustaka, S. M. (2020). *STIMULASI PERKEMBANGAN OLEH IBU MELALUI BERMAIN DAN REKREASI PADA ANAK USIA DINI*. SCOPINDO MEDIA PUSTAKA. Retrieved from <https://books.google.co.id/books?id=4WABEAAAQI5>
- 5 Republika. (2004). *Kenalkan Anak dengan Science Fiction Redaksi Sebagai satu-satunya astronot terpilih dari Indonesia, kehidupan Dr Pratiwi Puji Lestari Sudarmono Phd*—PDF Free Download. Retrieved May 20, 2023, from <https://docplayer.info/56499036-kenalkan-anak-dengan-science-fiction-redaksi-sebagai-satu-satunya-astronot-terpilih-dari-indonesia-kehidupan-dr-pratiwi-puji-lestari-sudarmono-phd.html>
- 30 Sugiyono, P. (2015). *Metode penelitian kombinasi (mixed methods)*. Alfabeta, 28, 1–12.
- 22 Sujiono, Y. N. (2009). *Konsep dasar pendidikan anak usia dini*.
- 11 Indri, M. P. I. (2010). *Psikologi Belajar PAUD*. Pedagogia.
- Tarwaka, S., & Sudajeng, L. (2004). *Ergonomi untuk keselamatan, kesehatan kerja dan produktivitas*. Uniba Press.
- 28 Tjahjono, V. G. (2017). *Evaluasi desain furniture PAUD di tiwalankerto, Surabaya*. *Intra*, 5(2), 531–540.
- 31 Von Goethe, J. W. (1840). *Goethe's theory of colours*. J. Murray.

# Furniture Design in the Form of Storage Rack as a Stimulation Media for Development Aspects of Children Aged 1–5 Years

---

ORIGINALITY REPORT

---

14%

SIMILARITY INDEX

---

PRIMARY SOURCES

---

1	<a href="http://www.atlantis-press.com">www.atlantis-press.com</a> Internet	69 words — 1%
2	<a href="http://ijshr.com">ijshr.com</a> Internet	63 words — 1%
3	<a href="http://eprints.unisbank.ac.id">eprints.unisbank.ac.id</a> Internet	50 words — 1%
4	Hani Yulindrasari, Vina Adriany, Yeni Rahmawati, Fonny Demeaty Hutagalung, Sarita Gálvez, Ade Gafar Abdullah. "Early Childhood Education in the 21 Century", Routledge, 2019 Publications	49 words — 1%
5	<a href="http://docplayer.info">docplayer.info</a> Internet	40 words — 1%
6	<a href="http://rayyanjurnal.com">rayyanjurnal.com</a> Internet	40 words — 1%
7	Atie Rachmiate, Ike Junita Triwardhani, Alhamuddin, Cep Ubad Abdullah. "Islam, Media and Education in the Digital Era", Routledge, 2022 Publications	38 words — 1%



8	Evan Raditya Pratomo. "Chapter 12 The Actuality of Wooden Diorama: "Seni Liping Jopajapu" for Sustaining Indonesia's Traditional Culture", Springer Science and Business Media LLC, 2024 Crossref	37 words — 1%
9	<a href="http://www.idpublications.org">www.idpublications.org</a> Internet	36 words — 1%
10	<a href="http://assets.publishing.service.gov.uk">assets.publishing.service.gov.uk</a> Internet	35 words — 1%
11	<a href="http://dergipark.org.tr">dergipark.org.tr</a> Internet	35 words — 1%
12	"Designing Futures", Springer Science and Business Media LLC, 2025 Crossref	33 words — < 1%
13	<a href="http://bircu-journal.com">bircu-journal.com</a> Internet	31 words — < 1%
14	<a href="http://eprints.unipdu.ac.id">eprints.unipdu.ac.id</a> Internet	29 words — < 1%
15	<a href="http://eprints.umm.ac.id">eprints.umm.ac.id</a> Internet	23 words — < 1%
16	Muthmainah, Hanik Badriyah Hidayati, Budi Yanti. "Improving Health for Better Future Life: Strengthening from Basic Science to Clinical Research", CRC Press, 2023 Publications	22 words — < 1%
17	<a href="http://ouci.dntb.gov.ua">ouci.dntb.gov.ua</a> Internet	21 words — < 1%

18	<a href="http://www.sorging.ro">www.sorging.ro</a> Internet	21 words — < 1%
19	<a href="http://ejournal.seaninstitute.or.id">ejournal.seaninstitute.or.id</a> Internet	19 words — < 1%
20	<a href="http://jurnal.medanresourcecenter.org">jurnal.medanresourcecenter.org</a> Internet	19 words — < 1%
21	<a href="http://repository.unimar-amni.ac.id">repository.unimar-amni.ac.id</a> Internet	19 words — < 1%
22	<a href="http://wnj.westscience-press.com">wnj.westscience-press.com</a> Internet	19 words — < 1%
23	<a href="http://digilib.esaunggul.ac.id">digilib.esaunggul.ac.id</a> Internet	18 words — < 1%
24	<a href="http://journal3.uad.ac.id">journal3.uad.ac.id</a> Internet	18 words — < 1%
25	<a href="http://journal.walisongo.ac.id">journal.walisongo.ac.id</a> Internet	15 words — < 1%
26	<a href="http://ejurnal.budiutomomalang.ac.id">ejurnal.budiutomomalang.ac.id</a> Internet	14 words — < 1%
27	<a href="http://furniture-ideas.soft112.com">furniture-ideas.soft112.com</a> Internet	14 words — < 1%
28	Rofian Rofian, Singgih Adhi Prasetyo, Gostsa Khusnun Naufal, Ari Eko Budiyanto. "Kursi Karakter Ergonomi Sebagai Pendorong Minat dan Kenyamanan Belajar Siswa Sekolah Madrasah Tarbiyatul Islamiyah", JGEN : Jurnal Pengabdian Kepada Masyarakat, 2024 Crossref	13 words — < 1%

29	<a href="https://123dok.com">123dok.com</a> Internet	12 words — < 1%
30	<a href="https://idr.uin-antasari.ac.id">idr.uin-antasari.ac.id</a> Internet	12 words — < 1%
31	<a href="https://scholarworks.unist.ac.kr">scholarworks.unist.ac.kr</a> Internet	12 words — < 1%
32	<a href="https://staffnew.uny.ac.id">staffnew.uny.ac.id</a> Internet	10 words — < 1%
33	<a href="https://jurnalkeperawatanglobal.com">jurnalkeperawatanglobal.com</a> Internet	9 words — < 1%
34	<a href="https://repository.umkla.ac.id">repository.umkla.ac.id</a> Internet	9 words — < 1%
35	<a href="https://www.gov.uk">www.gov.uk</a> Internet	9 words — < 1%
36	Arsa Widitarsa Utoyo, Yunida Sofiana. "Beevirale Multimedia Website for Distance Learning Introduction", E3S Web of Conferences, 2023 Crossref	8 words — < 1%
37	Bambang Widjanarko Otok, Puhadi, Riry Sriningsih, Dalbergia Septi Dila. "Segmentation of toddler nutritional status using REBUS and FIMIX partial least square in Southeast Sulawesi", MethodsX, 2024 Crossref	8 words — < 1%
38	Supatmi Hendra watiningsih. "UTILIZATION OF ENVIRONMENTAL MEDIA TO IMPROVE CHILDREN'S STORYLING ABILITY IN STUDENTS GROUP A AL FURQON MAESAN BONDOWOSO", Journal of Education Technology and Inovation, 2023	8 words — < 1%



---

39 [download.atlantispress.com](https://download.atlantispress.com) 8 words — < 1%  
Internet

---

40 [www.jurnal-umbuton.ac.id](http://www.jurnal-umbuton.ac.id) 8 words — < 1%  
Internet

---

41 B Setiawan, N Abdullah, A F Pratama. 7 words — < 1%  
"Anthropometry in furniture design for early  
childhood school in West Jakarta", IOP Conference Series: Earth  
and Environmental Science, 2021  
Crossref

---

42 Groark, Christina J.; McCarthy, Stephanie K.; Kirk,  
Afton R. . "Early Childhood Development: From  
Theory to Practice, Second Edition", UAGC, 2023 7 words — < 1%  
Publications

---

EXCLUDE QUOTES OFF

EXCLUDE SOURCES OFF

EXCLUDE BIBLIOGRAPHY OFF

EXCLUDE MATCHES OFF