

IMPLEMENTATION OF HEALTH PROTOCOL SOCIAL DISTANCING ON CHILDREN EDUCATIONAL TOY

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Abstract. Nearing the end of 2019 a virus broke out causing the world to be in the state of a pandemic. With the virus spreading easily through droplets, the government of Indonesia issued the people to wear masks and keep a distance minimum of 1 meter. Public places such as schools, restaurants and religious places are to be closed and to operate through online media. Through 2 years of the pandemic the virus spreading decreased and the government allowed for public places to open again with a strict health protocol. Schools also begin the education onsite but this raises a new problem for the schools and children to face, especially children of 4-6 years old. These ages are where children begin to socialize with their peers. With the limitations of online meeting, children can not interact with their peers resulting in their social skills not developing optimally. Even when schools started onsite again the interaction period is limited by the health protocol such as wearing masks and social distancing. The method used in this study is a mixed method, combining both qualitative and quantitative to gather data both descriptive and number in order to produce the design. The design process uses SCAMPER (Substitute, Combine, Adapt, Modify, Put to Other Use, Eliminate, Reverse) method to adapt and combine two toys into a new one. This study hopes to design educational toys which encourage the interaction of children while abiding the health protocol.

Keywords: Toys Design, Educational Toys, Group Play, Social Distancing, SCAMPER

Introduction

The implementation of Limited Face to Face Learning from the government of Indonesia (Direktorat Sekolah Dasar, 2021) according to the pandemic, there are some challenges that arise in the social development of young kids, primarily 4-6 years old. The social distancing and wearing masks regulation in the health protocol restricts the children from playing and interacting with their peers. The development of 4-6 years old is considered to be in the phase of the golden age (Zaini, 2015) where children learn and develop their skills optimally. This period of age is also where the development of children is greatly impacted by playing games both individually and in groups. According to Rahmadiani (2020) playing is a chance or source for children to socialize, express themselves, explore, interact, and enjoy the learning time. Educational toys are a means to support one of the development aspects, such as cognitive, language, imagination, creativity, social, emotional, and spiritual (Fadillah 2017).

The design of educational toys will implement the Montessori method. Montessori has a basic principle that aims to teach children to be independent, confident, and respect others (Hartanto & Yohana, 2020), where these aspects are important when socializing in society. This

design will also implement the health protocol social distancing through space provided within players or dividers. This research uses a mixed method, both qualitative and quantitative to gather data both descriptive and numbers, also information in society. This research also uses the SCAMPER (*Substitute, Combine, Adapt, Modify, Put to Other Use, Eliminate, Reverse*) method to design the educational toys.

Methods

This research uses a mixed method, both qualitative and quantitative to gather information and data both descriptive and numbers to maximize the result. According to (Anggara & Abdillah, 2019) qualitative research is a research method aimed to search, reveal, and describe in detail and specific about a phenomenon or symptoms without the process of measurement whereas quantitative research is a measurable research which is analyzed with statistics, description, or inferential that produces numbers. The mixed method is a research method combining the approach of qualitative and quantitative to reveal and describe in specific and in detail about a phenomenon or symptoms in society which are backed with statistics.

This research focuses on children from the age of 4 to 6 years old that start their education back in school with face to face learning. In the process of finding sufficient data, the writers gather data from journals, articles, and books. The writers also held a questionnaire and interview with four experts in toy design. The questionnaire and interview are held in January and March 2022 respectively. The questionnaire is done through google form with 11 respondents while the interviews is done through video calls and whatsapp chats.

The design process uses the SCAMPER method. S stands for Substitute, to change a component or steps with a few alternatives which is more effective and efficient. C stands for Combine, to join or combine two innovative ideas that creates a new product with a more superior concept. A stands for Adapt, to resolve a new problem in an old or traditional way, to change an existing idea to match with the current problem. M stands for Modify or Magnify, to enlarge. P stands for Put to Other Use, to implement an existing idea or product for another problem. E stands for Eliminate, to erase or reduce a component or steps that is unnecessary. R stands for Reverse, to rearrange a few components or elements of a problem (Affde.com 2021).

The beginning phase of SCAMPER is choosing existing products and proposing questions according to the seven steps. The answers of those questions are then categorized as useful, useless, and a bit useful. The answers given will then be examined and researched more thoroughly (Mulber 2018).

After the design is done to the prototype phase, the design is then discussed with an expert to validate it. The validation speaks of the material, size, safety, weight, etc to determine whether it has achieved the term of reference and is suitable for children aged 4-6 years old.

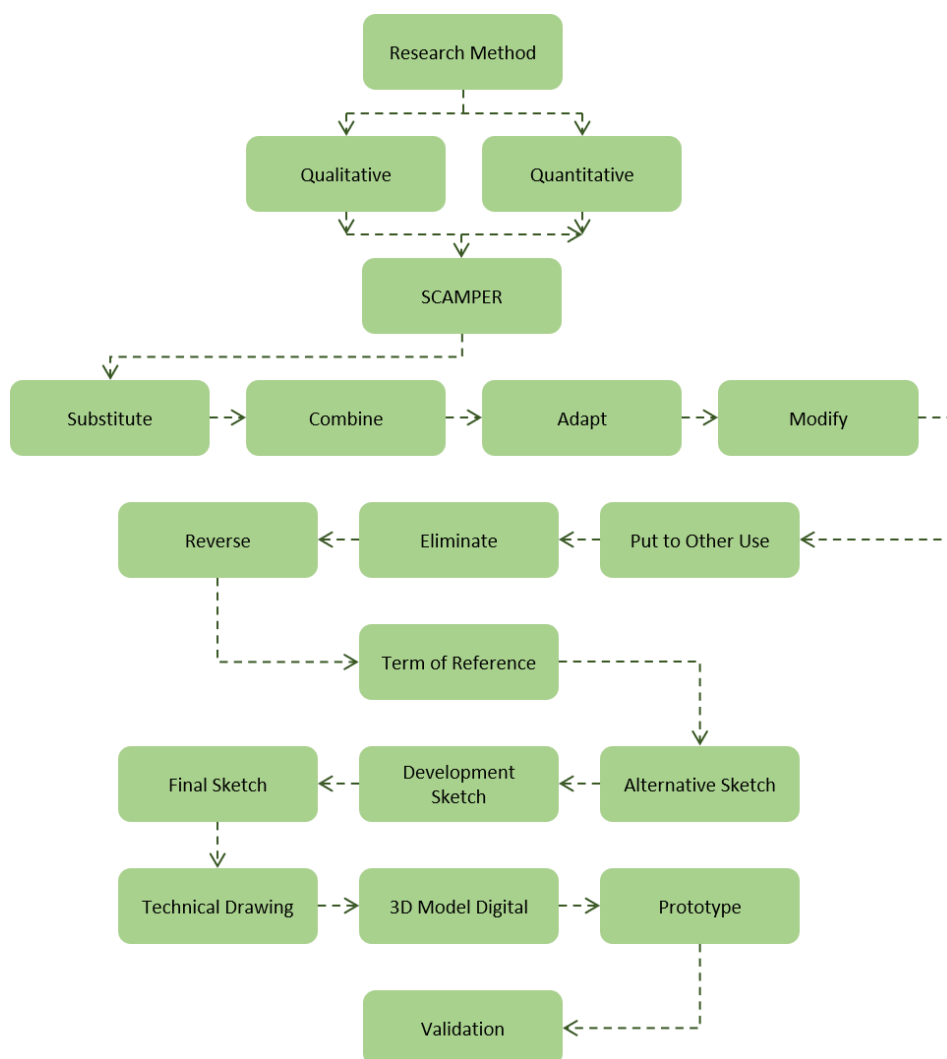


Fig. 1 Methods

Result and Discussion

Children Social Development

Children of age 4-6 years old are categorized in the golden age phase which is a phase where children must absorb and develop their capabilities. The development in this phase is greatly influenced by playing with themselves or others. According to (Jahja 2011) children's psychosocial development happens in the early phase through playing. Playing is a source or chance for children to socialize, express, explore, interact, and enjoy their learning time (Rahmadiani 2020).

Therefore, children's activity is crucial in their self-development. Their social, emotional, language, physical-motoric, and creativity is developed greatly in this phase mostly through playing with themselves or with their peers.

Educational Game Tools

Educational toys or educational game tools are a medium to support children's development such as cognitive, language, imagination, creativity, social, emotional, and spiritual (Fadillah 2017). According to Direktorat PAUD (2003) educational game tools is a supporting



means or medium that optimizes children's capabilities which include educational value through playing. In an educational toy, there are a few requirements for it before giving them to children to play. Those requirements according to (Mukhtar, 2018) are:

1. Safe to use
2. Dimension and weight according to children age
3. Clear design
4. Able to develop child capabilities
5. Shape and colors that picked children interest
6. Acceptable by all cultures
7. Have playing variation
8. Durable
9. Environmentally friendly materials, recyclable, and doesn't contain toxic chemicals

There are also a few requirements according to Anis (2021) that support the requirements above. These are:

1. Educational requirement
Educational toys needs to able to stimulate children development in many aspect, following the current curriculum, and increase children creativity
2. Technical requirement
This requirement includes the materials and colors used. The materials and colors have to ensure its quality (Durable, safe to use, strength, weight) and match its purpose or function.
3. Aesthetic requirement
Educational toys need to have an aesthetic of beauty that can attract children's attention. This can be achieved by its shape, weight, and colors.

From these requirements above, it can be said that the design of educational toys needs to have an attractive shape and color, durable and safe, and according to children development progress.

Montessori

Montessori (Elytasari 2017) is a learning method for children at an early age by Maria Montessori through her interest in idiots children. Damayanti (2019) In her journal about 'Increasing Children Independency through Montessori Learning Method' disclose that Montessori method creates an orderly and structural environment teaching children thoroughly and freely. The Montessori method gives a chance for children to dig their potential in full so the expected educational goals are achieved.

Montessori has a few basic principles which is to create an environment where teacher or a supervisor respect the children wishes and children also respect them back, understanding that children is affected by their environment, teachers, and their experience, children also able to discipline themselves (Permana & Djatmiko 2021). This principle is supported by (Hartanto & Yohana 2020) as they also include that montessori has a few principle which is seeing each children as their own individuals therefore if parents can understand this they won't be comparing their child, creating a confident, independent, and respectful individuals, focus on each child needs and learning speeds, involves every senses and body movement through self-Corrected Didactic Materials, each child has his/her own freedom, and implement vertical grouping of different ages. This period of age (4-6 years old) is where children are in their best condition to develop their capabilities and skills.

Therefore, if the Montessori method is applicable in educational toys then children are able to play independently and develop their best skills and capabilities through playing with Montessori educational toys.

Health Protocol

These are the health protocol implemented by the government of Indonesia also known as The 5M Health Protokol (Fadli, 2021):

1. Wash Hands
2. Wear a Mask
3. Social Distancing
4. Avoid crowded places
5. Reduced mobility

Through the implementation of health protocol, the design of the educational toy will implement social distancing.

Anthropometric Studies

The design of the educational toy has to be safe and comfortable to use by children as said in the educational game toys section. Therefore, this design will use anthropometric as a reference and limits to determine the measurement or dimension of the product. Widely anthropometric is about the interaction of humans through ergonomics consideration (Swandhani et al 2020). According to (Hutabarat 2017) anthropometric is one of ergonomic studies that is associated with human body dimension to be used as a reference in the process of tools or facilities design. Anthropometric is a collection of data that is associated with human body characteristics including its shapes, and strength in numbers (Hasimjaya et al., 2017). Thus through these definitions above it can be said that anthropometric is a field in ergonomics that studies human body characteristics and presents its data through numbers or dimension.

The anthropometric in this design will use the human body dimension of children aged 4-6 years old. This data is collected from (Herawati & Pawitra 2013) in their journal about 'Anthropometric Evaluation Of Children Age 4-6 Years Old in East Java and Their Application in School Learning Facilities'. The data listed is related to their standing and sitting position.

Table 1 Anthropometric Data in Standing Position

Dimension	Description	Boys	Girls
1	Distance from head to feet when standing tall	111.42	109.60
4	Distance from elbow to feet when standing tall	67.43	67.10
5	Distance from hip to feet when standing tall	60.09	59.48
20	Chest thickness in a puffed state	15.68	14.84
21	Belly thickness	16.37	15.75
24	Distance of the hand forward from the shoulder to the fingertips of the hand	48.06	46.68
25	Distance of the clenched hand forward from the back	46.49	45.19
32	Overall body width including arms from left to right	33.03	32.06
36	Distance of the reach from the fingertips of the hand in a stretched manner	108.87	107.64

Source: Herawati & Pawitra (2013)



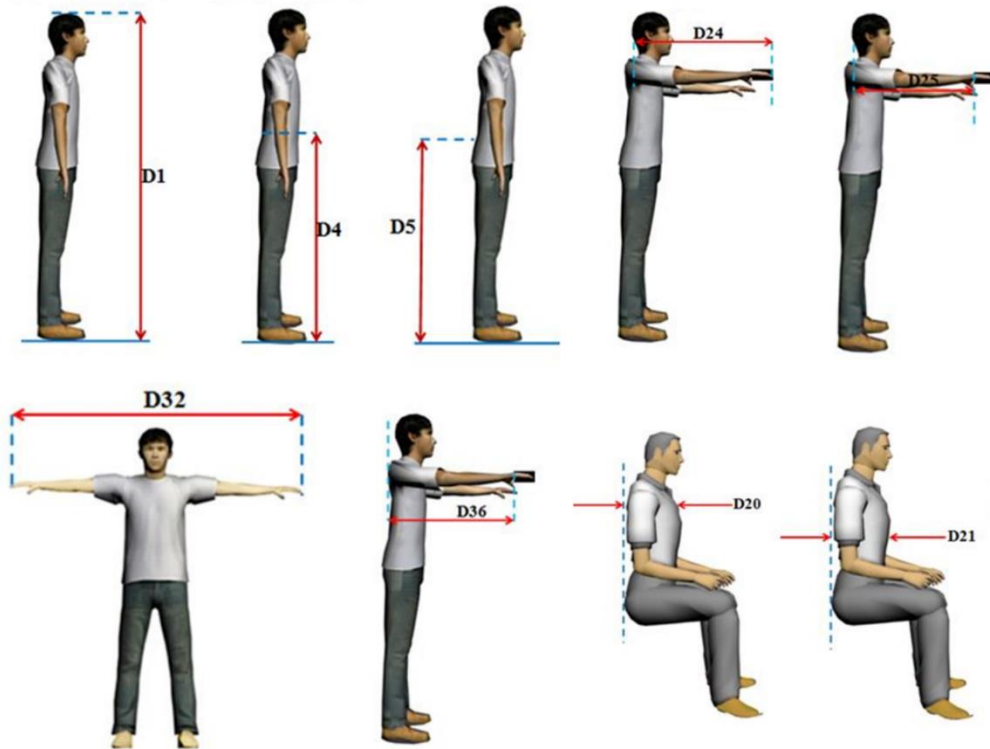


Fig 2. Anthropometric Standing Position

Table 2 Anthropometric Data in Sitting Position

Dimension	Description	Boys	Girls
8	Head height in a sitting position	59.48	58.56
10	Shoulder height in a sitting position	37.61	36.62
11	Elbow height in a sitting position	15.86	15.54
16	Height of the back thighs in a sitting position	29.98	29.27
20	Chest thickness in a puffed state	15.68	14.84
21	Belly thickness	16.37	15.75
24	Distance of the hand forward from the shoulder to the fingertips of the hand	48.06	46.68
25	Distance of the clenched hand forward from the back	46.49	45.19
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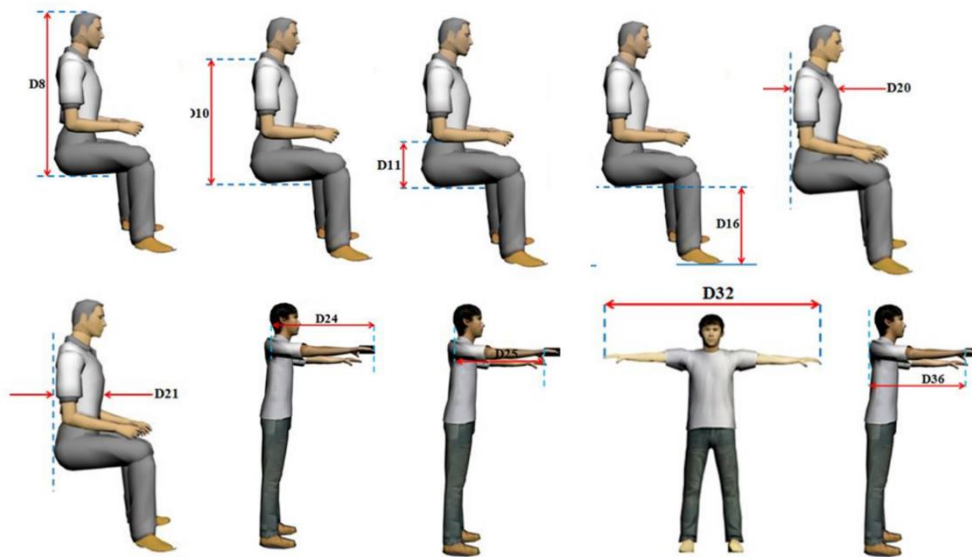



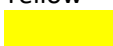


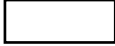
Fig 3. Anthropometric Sitting Position

Colors Studies

In the process of designing toys, colors also play an important part in attracting children's attention. Colors can affect the atmosphere and mood of an individual (Andrianto & Chalik 2021). The colors used in this design have to follow the children's development phase. Children characteristic at ages 4-6 years old tend to be bright and cheerful so the colors appropriate are bright colors such as red, blue, green, white, and yellow. Below are the psychology impact of colors according to (Utami 2020):

Table 3 Colors Analysis for Children Toys

Colors	Positive and Negative impact	Reason
Red 	Positive: Passion, energy, enthusiasm, strength Negative: aggressive, irritability, cruel, impolite	Red can increase children passion and spirit in playing and engage children enthusiasm
Blue 	Positive: Knowledge, fresh, peace, loyal Negative: Cold, tired, depression	Blue can give a fresh atmosphere and support a sportive playing
Green 	Positive: Growth, healing, success, natural, truthful, youth Negative: Jealous, inexperience, greedy	Green represent growth that can help children growth
Yellow 	Positive: energy, creativity, unique, social, healthy, activity Negative: crazy, noisy	Yellow like red can give passion and spirit when playing and engage creativity

White 	Positive: Perfect, clean, truthful, soft, holy, simple Negative: Fragile, isolation	White as a background or main color so other colors can be used without overwhelming the children
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Materials Studies

In designing an educational toy, the materials need to be cared for. Material is a raw material that is processed by industrial companies, can be retrieved from local, import, or self processing. In product design, the chosen materials play an important role. With the right materials, the output will be better (Pratondo et al 2022). The materials used should consider its characteristics and according to the functions and needs, its safety, and its durability. Below are the materials used in this educational toy with its characteristics:

Table 4 Material Analysis

Name	Characteristics	Picture
Eva Foam	Soft, Waterproof, easy to clean, smooth surface (Priadi et al., 2017)	 <p>Fig 4. Eva Foam (Sumber: hurtowniasportowa.eu)</p>
Hard Foam	Waterproof, light weight, slightly changed when there is pressure but returns to its original shape (Chamberlain, 2022)	 <p>Fig 5. Hard Foam (Sumber: Indiamart.com)</p>
Multiplex	Pliable, wide surface (Kalampung et al., 2020)	 <p>Fig 6. Multiplex (Sumber: Dekoruma.com)</p>

Teak Wood	Light weight, easy to process and shaped, fine fibers (Kalampung et al., 2020)	 <p>Fig 7. Teak Wood (Sumber: Bukalapak.com)</p>
PVC Plastic	Non-recyclable, durable, mostly used for pipe	 <p>Fig 8. PVC Pipe (Sumber: pvcindustrialproducts.com)</p>
Wool Fibers	After being processed by needle felting, the final result has the characteristics of a dense, smooth surface, not easy to return to its original shape (Perieberg, 2022)	 <p>Fig 9. Wool Fibers (Sumber: greyfoxfelting.com)</p>

SCAMPER

The design process of this educational toy is SCAMPER (Substitute, Combine, Adapt, Modify, Put to Other Use, Eliminate, Reverse). More specifically this design used to combine and adapt by combining stackable or puzzle toys with cooking toys also adapting the combined toys with the health protocol social distancing criteria of minimal 1 meter or having dividers. The design will have a main table where children could roleplay as the chef plating the food. There are also four guesser tables for other players to guess the name of the dish. This game will also have a guide book in case children want to imitate the dish inside but children could also make and name their own dish. The players with the most guesses won. The dimension will follow the anthropometric data with a few differences in centimeters to ensure comfort and safety. The edges of the table will be rounded and have a gap tolerance of 2-3mm.

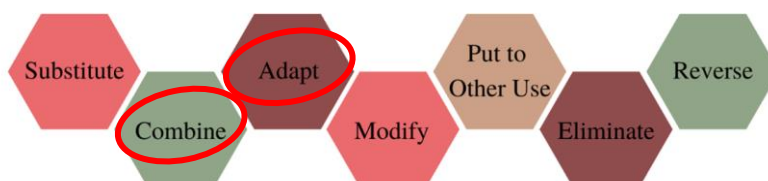


Fig 10. SCAMPER



Alternative Sketch

After the design process is done, next are a few of the alternative sketches.

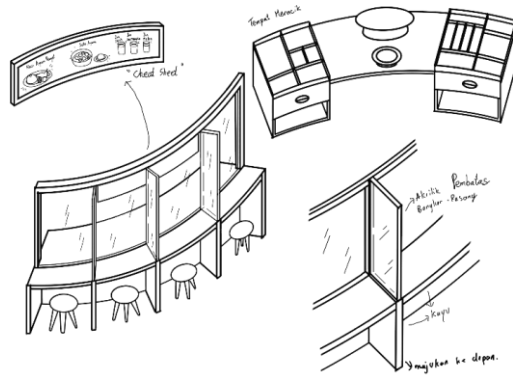


Fig 11. First Alternative Sketch

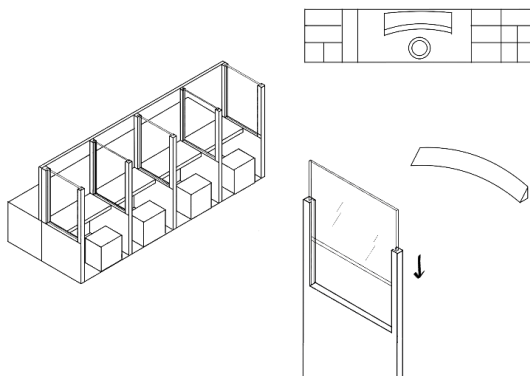


Fig 12. Second Alternative Sketch

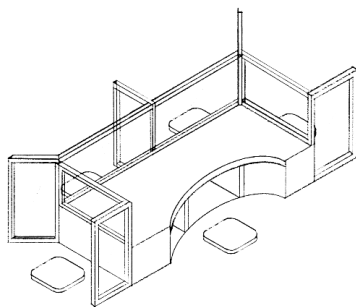


Fig 13. Third Alternative Sketch

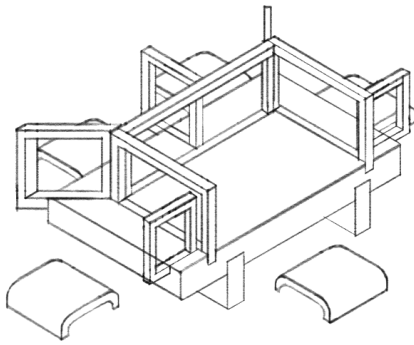


Fig 14. Fourth Alternative Sketch

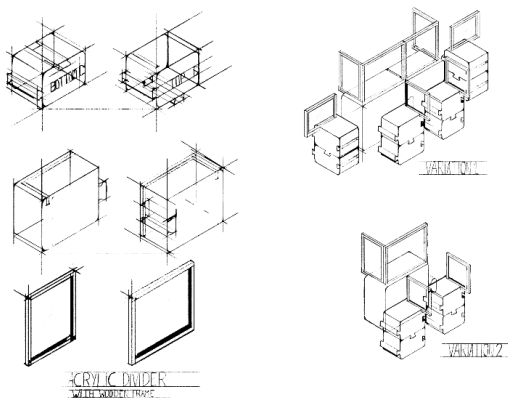
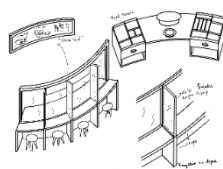
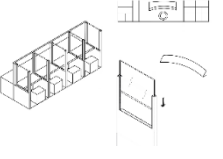
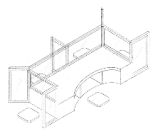
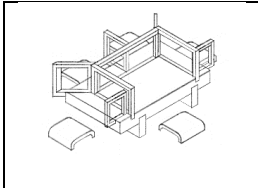
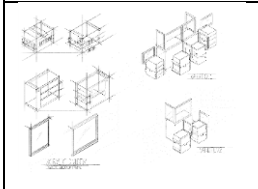


Fig 15. Fifth Alternative Sketch

From five alternative sketches, the writers create a comparison to choose the best sketch. Below are the comparisons regarding safety, comfort, space between players, number of players, product flexibility.

Table 7. Alternative Sketches Comparison

Sketch	Safety	Comfort	Space	Number of Players	Flexibility	Total
	5	4	4	5	0	18
	5	4	4	5	0	18
	5	5	4	5	0	19

	5	5	4	5	0	19
	5	4	5	5	5	24

The numbers represented are such, 1 is the least while 5 is the most fulfilling the criteria. Based on table 7 the sketch that meets the criteria best is the fifth alternative sketch. The fifth sketch meets the safety, comfort, space, numbers of players, and flexibility the most earning 5 points for each except comfort earning 4 points.

Colors Development Sketch

After selecting one of the alternative sketches next are a few color variations.

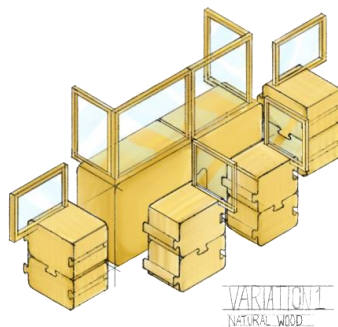


Fig 16. First Varian (Natural Wood)

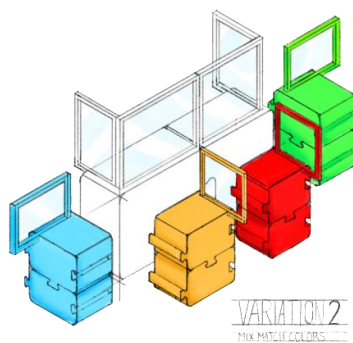


Fig 17. Second Variation

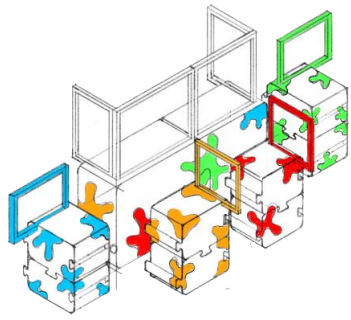


Fig 18. Third Variation

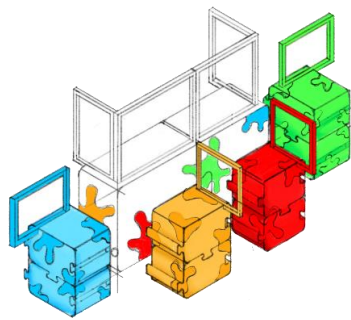


Fig 19. Fourth Variation

Final Sketch

After the colors variation below are the final sketch with the chosen color variation and component of dishes that children will play.

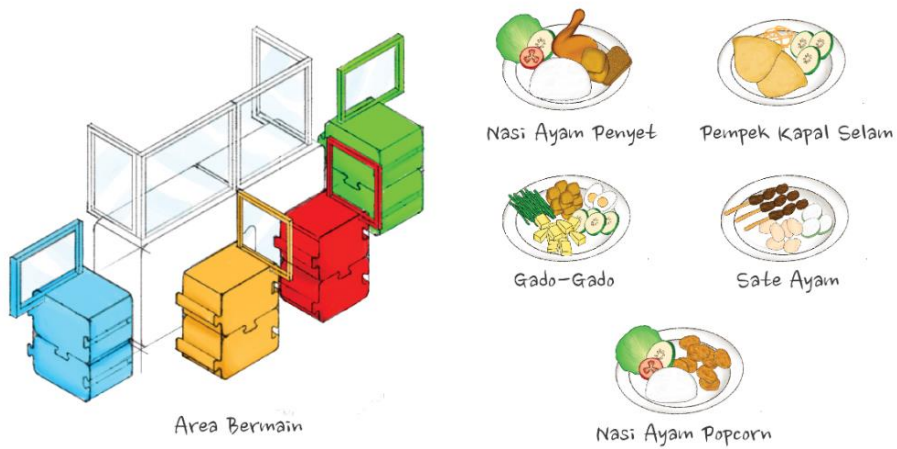


Fig 20. Final Sketch



3D Digital Model

Below is the 3D digital model of the educational toy.

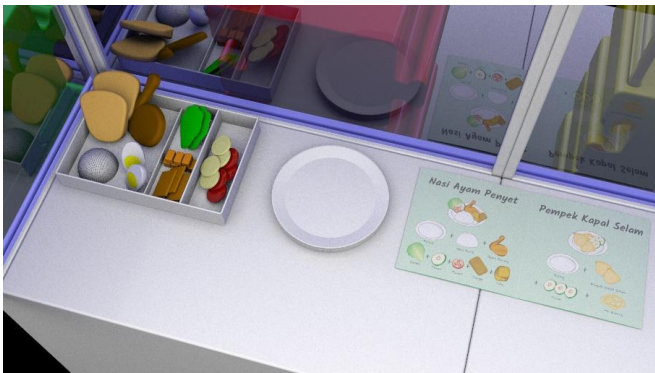
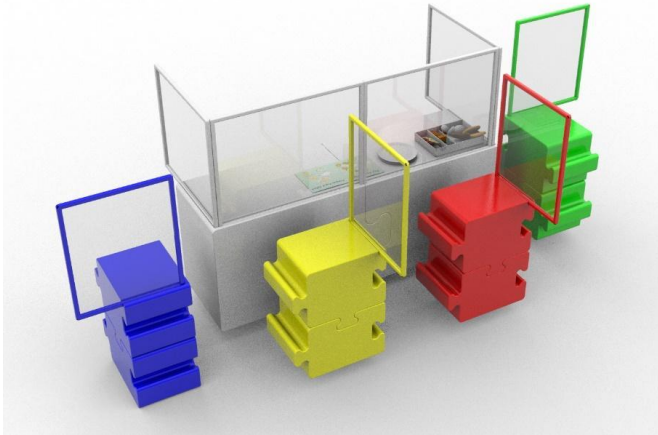


Fig 21. 3d Digital Model

Technical Drawing

This is the technical drawing of the main and guesser table of the educational toy. The dimension are as such:

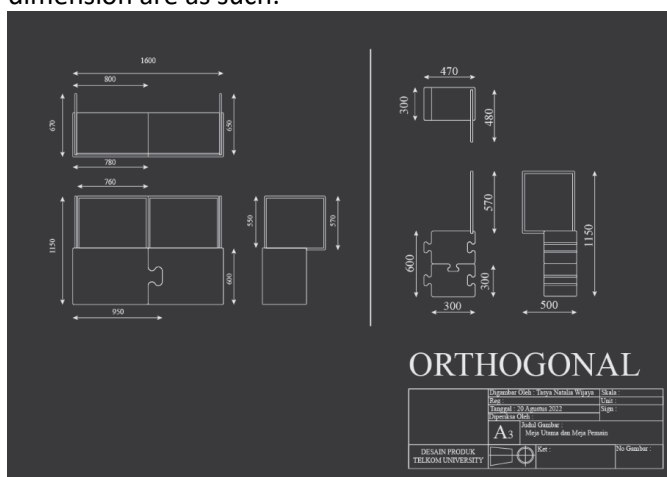


Fig 22. Technical Drawing

Prototype

After establishing the dimension, colors, and sketch, the final step is making the prototype. Below is the finished prototype.



Fig 23. Educational Toy Prototype

Conclusion

Based on the discussion of the previous chapters and the finished prototype and design it can be concluded as such. Children 4-6 years old began to interact and play with their peers. Thus in supporting this activity an education is helpful to increase development. The materials of the dish toys are from PVC plastics and wool fibers. This is so that children can feel the different textures and shapes that can develop sensory. The shapes of the furniture are adopted from puzzle shapes that can be mixed and matched by the children or teachers. The space between its players can also be adjusted to meet the social distancing requirements. If the space available is a bit tight then there are slots for dividers to place so the health protocol requirement is not breached and children still could interact with their peers.

From the design aside from the conclusion there are also a few suggestions so this design can be developed further. The target user can be widened for children of age 8 and up as the playing is considered a bit complex. The counter or tables can be modified with storage within to store the smaller toys as children could also learn about organizing. Lastly, the materials for the counter and dishes can be changed to more lightweight and safer materials.



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