

Original Research Paper

## Snakes and Ladders Board Game Table Design to Develop Cognitive, Social and Tactual Perception Skills in Blind Children

Choirul Anam<sup>1</sup>, Muria Ilham Priharto<sup>1</sup>

<sup>1</sup> *Fakultas Teknik Sipil dan Perencanaan, Jurusan Desain Produk. Institut Teknologi Adhi Tama Surabaya, Indonesia.*

### Article History

**Received:**  
17.08.2021

**Revised:**  
10.09.2021

**Accepted:**  
14.09.2021

### \*Corresponding Author:

Choirul Anam  
Email:  
choirul.despro@itats.ac.id

This is an open access article,  
licensed under: [CC-BY-SA](https://creativecommons.org/licenses/by-sa/4.0/)



**Abstract:** This study aims to overcome what is experienced by blind children and to invite blind children to take part in playing and not forgetting to put forward special design aesthetics for blind children. The results found result from primary data collection from observations of the daily activities of the subject and interviews with the subject, teacher, and subject's parents and secondary data got from literacy results from related research sources. The research subjects were taken from students of SDLB-A YPAB SURABAYA. The research method used is design thinking by approaching the subject. In the ultimate result, an innovative traditional snake and ladder game was found which was changed in such a way as to be accessible so that it was friendlier for blind children to use.

---

Keywords: Blind, Cognitive, Game, Snakes and Ladders.

---



## 1. Introduction

Game is an activity that aims to eliminate boredom or just as fun. Games are often done by children to fill their spare time in their daily life [1]. It is said that the game has an important role in the process of child development. The game itself has an influence on children's development because the game can stimulate motor aspects, mindset, social, emotional, and children's [2]. It is seen that many parents educate their children through the media they like, games. This education has long been carried out by parents through traditional games. Traditional games themselves can be said to be folk games because they have the nature of entertaining themselves and can create recreational effects and social comfort [3].

The visuals of the game presented make users feel more interested in playing. Visual form is information that is accepted by the brain, about 75% to 87% of information got by a person is got through visuals, the eyes, the remaining 13% to 25% is channeled from other senses [4]. It is said that the return of traditional games that have attractive visuals is expected to overcome problems in children, but if the main visual function is more highlighted, then the game is still not said to be friendly for all circles. It is said not yet friendly because this visual function is difficult and cannot even be felt by children or someone with special needs, such as blind people.

Blind people are individuals who do not function, whose sense of sight (both) serves as a channel for receiving information in daily activities and sighted people. It is said to be blind if the visual acuity is less than 6/21 (can only read letters from a distance of 6 meters which can be read from a distance of 21 meters by normal people). Therefore, the blind are divided into two. First blind, if not at all able to receive stimuli from outside his vision. Second, low vision, if the visual acuity is less than 6/2, according to Camalia [5], a person who has blind needs will find it difficult to carry out daily activities, there needs to be orientation and mobility so that blind people do these activities. Orientation itself is the ability of other senses to adjust body movements in carrying out activities, while mobility is the smoothness of a blind person in moving to carry out their activities [6]. A person who is blind uses touch as the primary sense to recognize shapes and textures, but low vision still relies on his vision through visuals from light colors [7]. In this situation, a person who is impaired at the time of orientation and mobility relies on other senses to understand activities or the environment. These senses include smell, hearing, and also touch [8].

The sense of touch is the sense that is most actively used by the blind because the blind can know the concept of physical objects - is that blind children develop their concepts through tactile experience. perceive them one by one or part by part before being able to integrate them into a single concept. The sense of touch only functions when it is used for cognitive purposes, while vision is active and functions as long as the eyes are open. Therefore, to enrich their cognition, blind children should often be encouraged to use their sense of touch for cognitive purposes. However, in our society, where certain objects are taboo to be touched, the urge to use the sense of touch often has to be limited in order to avoid behavior that is contrary to social norms [9].

These sensory existence of abilities that can be trained, then someone who is impaired in playing activities even needs orientation and mobility skills, one game that is suitable for training orientation and mobility skills is a board game type game. Board game is a type of game in which tools or game parts are placed, moved, or moved on a surface that has been marked or divided according to a set of rules. Games may be based on pure strategy, chance, or a mixture of the two and have goals to be achieved [10]. Board games are said to be one medium that data is used for learning, because board games can stimulate auditory abilities, which can be seen from the game explanation of rules and kinesthetics where someone will understand more easily because there is help to touch the form of the board game, as well as direct interaction so that certain information is easy to understand and remembered [11]. There are several types of board games, one of which is snakes and ladders. Snakes and ladders board game is a type of competition game that can foster collaboration skills between students to engineer children's social and moral experiences. Any decisions on design might include or exclude users. In its role, the researcher uses the concept of accessible or referred to as inclusive design, emphasizing the contribution to better understand the diversity of users so that a design can accommodate as many users as possible. The diversity of users includes their capacities, needs, and aspirations [12]. Therefore, this study will discuss how to design a table snake and ladder board game to develop cognitive, social and tactual perception abilities in the blind.

## 2. Literature Review

According to Hidayat and Suwandi in [13] Blind people are those who have a central acuity of 20/200 feet or their visual acuity can see only at a distance of 20 feet or 6 meters or fewer, even with glasses, or whose viewing area is narrow in such a way. The angular distance does not have over 20 degrees, whereas in people with normal vision they can see up to a distance of 60 meters or 200 feet. Based on the level of blindness, the blind are divided into 2 groups, total blindness and low vision. Meanwhile, based on the age of blindness, it is divided into blind from birth and blind from birth (had the experience to see and then went blind) [14].

According to Hallahan in [15] blindness can cause three kinds of limitations: limitations in understanding concepts and meanings, limitations in the ability to move places and limitations in controlling and interacting with the environment. As an effort to deal with the obstacles experienced, they are often accompanied by alert people. Meanwhile, to understand the concept of various information, a blind person is forced to do verbal descriptions from other people as well as understand shapes and colors.

## 3. Metodologi

The research method used is the design thinking method, which is a problem-solving method that focuses on the user or users, while the stages of design thinking are as follows [16]:

1. Emphasize, the first stage is to get an empathic understanding of the problem to be solved. At this stage, an approach is made to the respondents. Here, the researchers went to the field to make observations and interviews with respondents.
2. Define, At this stage, the researcher defines the desires and needs of the respondents in order to get results that are under the wishes and needs of the respondents
3. Ideate Researchers carry out making ideas, ideas or design designs from the define a process that has been carried out as a support in creating the expected product
4. Prototype, loading the initial model of the idea or ideas that have been made in the ideate process
5. Test, This is the last stage of a series of design thinking processes, testing the product on the expert or subject concerned in order to assess the product.

## 4. Development

### 4.1. Emphatize

Researchers have carried out the empathy stage by observing, observing and interviewing blind children, teachers and guardians or parents of SDLB-A YPAB Surabaya, at this stage researchers got the results that the level of understanding of the blind varies depending on the ability of each orientation, as well as level of association or socialization, this proves that the blind are also the same as normal people but with limited vision.

Blind people need time to understand a visual concept by shifting the sense function of sight to another sense so that it can replace the lost function. This process is called compensatory by shifting sight to touch or tactile. The problems and solutions identification offered by researchers listed in Table 1.

Table 1. Problem Identification

No	Problems Encountered
1	The low social interaction of blind children with peers
2	The low level of self-confidence of blind children
3	Various cognitive abilities of blind children
4	Lack of tactile perception ability
5	The high level of discrimination against the blind
6	There is still a lack of fun learning media for blind children

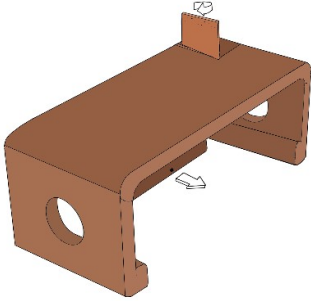
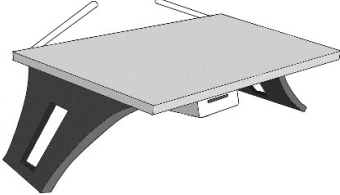
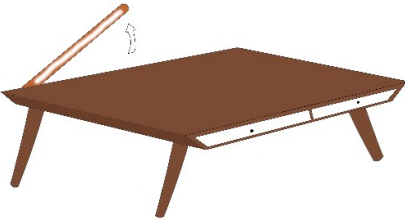
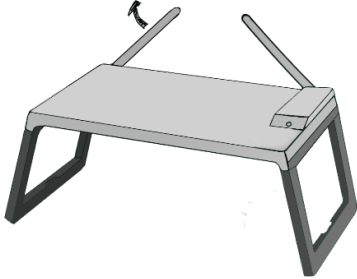
#### 4.1. Define

At this stage, the researcher analyzes the data that has collected from the previous chapter, both literature data and field studies. From the results of observations and interviews with blind interviewees, it can be concluded that the blind can recognize forms that have been studied long ago, to recognize new forms of blind people need more understanding so that it takes time to create a media by developing simple games that are already known by the public, Researchers are trying to develop a game of snakes and ladders which will later be changed in such a way as to be friendly to the impaired by changing some parts that will facilitate and develop the orientation skills of blind children.

#### 4.3. Ideate

Researchers carry out making ideas, ideas or design designs from the define process or analysis that has been carried out starting from shapes, colors, materials, and so on. The designs shown in Table 2.

Table 2. Alternative Table Design

Alternative Desk Design	
	
	

From the design alternatives as show in Table 2, a design was chosen and it will be developed into a final design. Figure 1 shows the ultimate design of the table/desk.

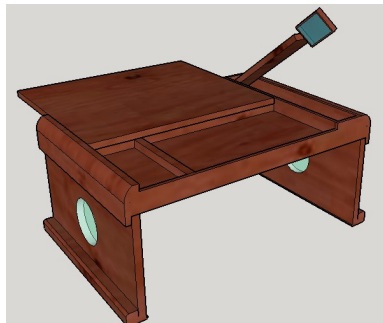


Figure 1. Tabel Design

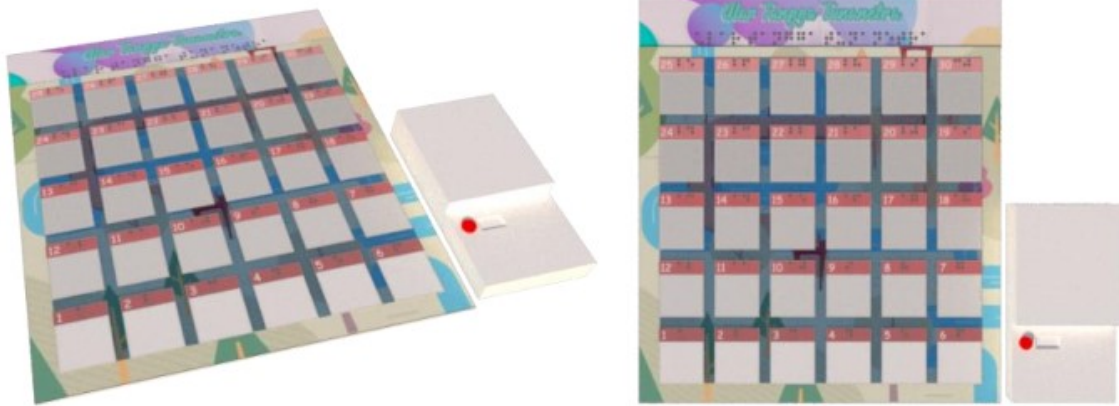


Figure 2. Blind Snakes Ladders Board Game Design

#### 4.4. Prototype and Test

At this stage, the researcher chose a design that had been made to be used as a prototype which would later be carried out in a trial or simulation stage for blind students and also carried out a validation process for teachers from SDLB-A YPAB Surabaya.



Figure 3. Trial and Validation for Blind Children and Teachers



Figure 4. Result of Board Game Table Products for Blind Social Interaction

## 5. Evaluation

The statistics used in the assessment are descriptive statistics in which all the data got have been analyzed using Microsoft Excel. The measuring tool in this analysis is the user experience form. This form contains several things such as board game design, function of the table, ease of play, interaction between players, education contained. These points will be tested on the respondents, the respondents consist of teachers and students with visual impairments.

Tabel 3. Questionnaire for User Experience

<i>Questionnaire User Experience</i>							
1	2	3	4	5			
<i>Very Disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Completely</i>			
<b>Board Game Design</b>			<i>Scale</i>				
			1	2	3	4	5
1.	<i>The shape of the board game has no acute angles</i>						
2.	<i>The dimensions of the board game are suitable for children</i>						
3.	<i>The Braille according to standard size</i>						
4.	<i>Pawns can be distinguished from one another</i>						
5.	<i>Pawns can stick to the board</i>						
6.	<i>The sound of the dice is clear</i>						
<b>Table Function</b>			<i>Scale</i>				
			1	2	3	4	5
1.	<i>The comfortable shape of the table to use</i>						
2.	<i>The dimensions of the table are suitable for children</i>						
3.	<i>The table weight is light to lift</i>						
4.	<i>Desk storage is enough to load stationery</i>						
<b>Game Ease</b>			<i>Scale</i>				
			1	2	3	4	5
1.	<i>Easy to understand game rules</i>						
2.	<i>3D design can make the game easier</i>						
3.	<i>The braille is legible</i>						
4.	<i>Digital dice can help in playing snake and ladder</i>						
<b>Player Interaction</b>			<i>Scale</i>				
			1	2	3	4	5
1.	<i>Players can find out the opponent's pawn position</i>						
2.	<i>Players know the information on the dice numbers got by the component</i>						
3.	<i>Players are fair throughout the game</i>						
4.	<i>Alpha player (player who dominates the game)</i>						

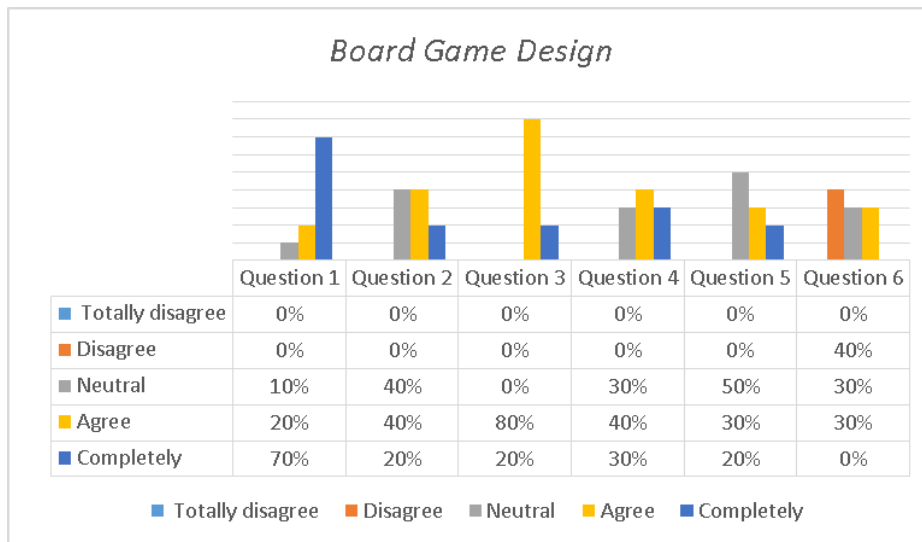


Figure 5. Board Game Design

Figure 5 shows the graph for the questions about the design of the snake and ladder board game, there are 5 questions that will be asked to respondents, and the following result from the questionnaire; for the first question 70% of respondents agree with the design of the board game that does not have an acute angle, this will protect players or minimize injury while playing; the second question 40% answered, respondents were still confused about the dimensions of the board game that were suitable for children; the third question gets 80% agree, respondents agree on the standard size of braille; the fourth question 40% of respondents agree, so respondents can distinguish the shape of one piece from another; fifth question 50% of respondents chose neutral, this means the pawns are not strong enough to stick to the board; the last question 40% of respondents chose not to agree, this is because the sound produced by the dice cannot be heard by the respondent.

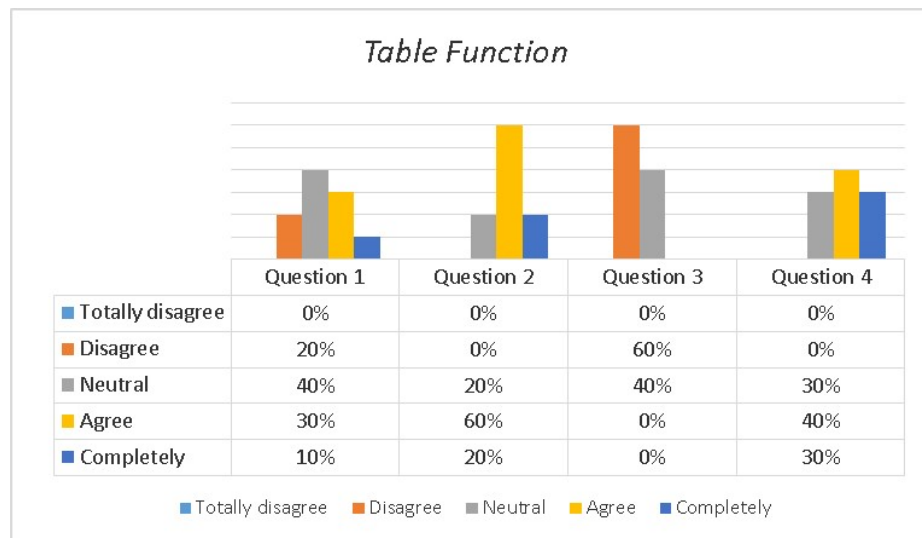


Figure 6. Table Function

Figure 6 shows the graph for the questions about the table function, there are 4 questions that will be asked to respondents, here result from the questionnaire; for the first question, 40% of respondents chose neutral, this means that respondents have not felt comfortable when using the table; the second question 60% of respondents agreed, so the dimensions of the table are under the child's anthropometry; the third question 60% choose not agree, the weight of the table is too heavy for

children to lift; In the last question, 40% of respondents agreed with a table storage area that can contain stationery.

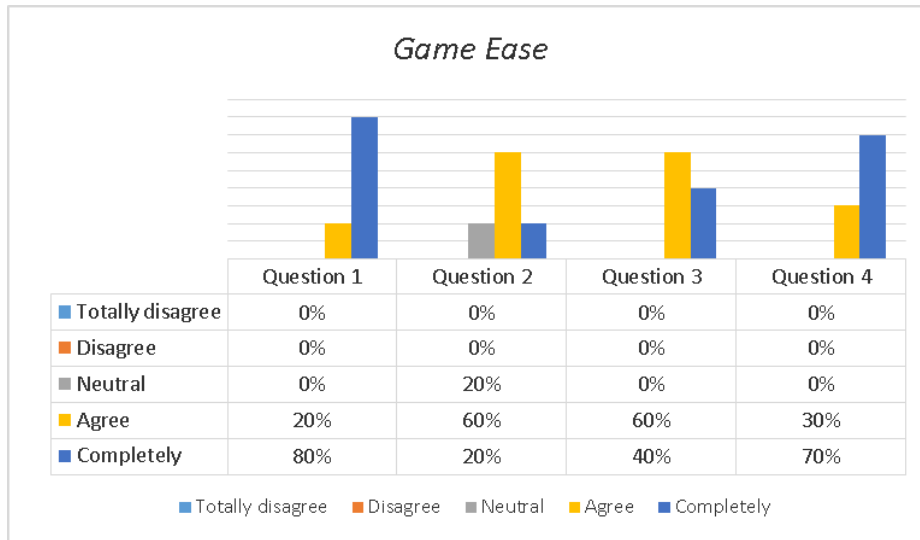


Figure 7. Game Ease

Figure 7 shows the graph for the questions about the ease of play, there are 4 questions that will be asked to respondents, here result from the questionnaire; the first question 80% of respondents answered agree so the rules of the game are easy for respondents to understand; the second question 60% of respondents answered agree, with 3d design respondents can distinguish the game area; the third question 60% answered agree, respondents can read the writing in the game; the last question 70% of respondents answered agree, digital dice are very helpful in playing than manual dice.

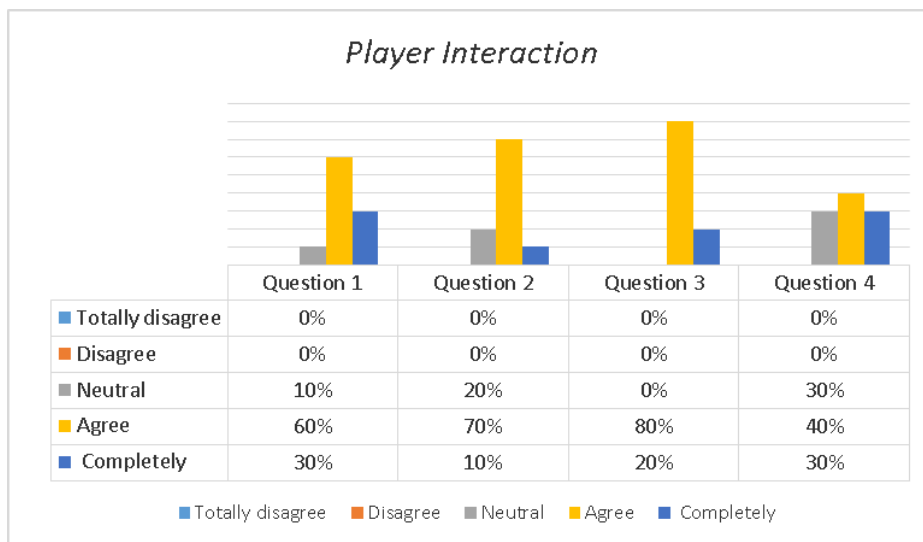


Figure 8. Player Interaction

Figure 8 shows the graph for the questions about player interaction, there are 4 questions that will be asked to respondents, here result from the questionnaire; the first question 60% of respondents answered agree, respondents can know the opponent's pawns position; the second question 70% of respondents answered agree, respondents know the information on the dice numbers got by the opponent; the third question 80% of respondents answered agree, which means the game runs; the last



question 40% of respondents answered agree, there is still an alpha player showing enthusiastic players but less able to respect other players..

## 6. Conclusion

In this study, it can be concluded that blind children have a lack of vision, but that does not mean that blind children cannot develop. Blind children can be trained in several stages and require more time and must be done or.

For this reason, researchers are trying to create a media so that later the blind can develop abilities, both from cognitive, social and tactual perceptions, so that children with visual impairments will develop better and can take part in learning in academic and non-academic environments.

## References

- [1] U. F. Faturaman, "Perancangan Interior Pusat Permainan Tradisional Jawa Barat," Unpublished Thesis, Universitas Komputer, Bandung, Indonesia, 2019.
- [2] I. Khasanah, A. Prasetyo and E. Rakhmawati, "Permainan Tradisional Sebagai Media Stimulasi Aspek Perkembangan Anak Usia Dini," *Jurnal Penelitian PAUDIA*, vol. 1, no. 1, pp. 91-105, 2011.
- [3] U. Hasanah, "Pengembangan Kemampuan Fisik Motorik Melalui Permainan Tradisional Bagi Anak Usia Dini," *Jurnal Pendidikan Anak*, vol. 5, no. 1, pp. 717-733, 2016.
- [4] R. Wahyuni, "Buku Gizi Braille Sebagai Media Pendidikan Untuk Meningkatkan Pengetahuan Anak Tunanetra," *Journal of Public Health Research and Development*, vol. 1, no. 1, pp. 59-64, 2017.
- [5] F. Camalia, "Pengembangan Audiobook Dilengkapi Alat Peraga Materi Getaran dan Gelombang Untuk Tunanetra Kelas," Unpublished Thesis, Universitas Negeri Semarang, Semarang, Indonesia, 2019.
- [6] J. L. Cmar, "Orientation and Mobility Skills and Outcome Expectations as Predictors of Employment for Young Adults with Visual Impairments," *Journal of Visual Impairment & Blindness*, vol. 109, no. 2, pp. 95-106, 2015.
- [7] Itroty, R. P. Handajani and T. Laksmiwati, "Interior Ruang Kelas Pada Taman Kanak-Kanak Luar Biasa Tuna Netra di Malang Berdasarkan Pedoman Mobilitas dan Orientasi," *Jurnal Mahasiswa Jurusan Arsitektur*, vol. 2, no. 1, 2014.
- [8] R. Y. Rahmawati and A. Sunandar, "Peningkatan Keterampilan Orientasi dan Mobilitas melalui Penggunaan Tongkat bagi Penyandang Tunanetra," *Jurnal Ortopedagogi*, vol. 4, no. 2, 2018.
- [9] D. Tarsidi, "Dampak Ketunanetraan terhadap Fungsi Kognitif Anak," Unpublished Thesis, Universitas Komputer, Bandung, Indonesia, 2019.
- [10] U A. Mubarak, "Board Game Pahlawan Kemerdekaan Ksatria Mahardhika," Unpublished Text, Universitas UPI, Jakarta, Indonesia, 2019.
- [11] G. M. Romanica, "Board Game Bertema Pasar Tradisional Yogyakarta," Unpublished Text, Universitas UPI, Jakarta, Indonesia, 2018.
- [12] A. W. Pradipta, "Desain Jam Tangan Kayu Dengan Konsep Jujur Material dan Inklusif," *Jurnal Sains dan Seni ITS*, vol. 5, no. 2, 2016.
- [13] S. N. Wahid, "Media Permainan Ular Tangga Modifikasi Terhadap Pelajar pada Sekolah Luar Biasa," *Jurnal Qua Teknika*, vol. 7, no. 2, pp. 43-53, 2017.
- [14] R. N. Muthmainnah, "Pemahaman Siswa Tunanetra (Buta Total Sejak Lahir dan Sejak Waktu Tertentu) Terhadap Bangun Datar Segitiga," *Jurnal Pendidikan Matematika dan Matematika*, vol. 1, no. 1, pp. 15-27, 2015.
- [15] S. Masalah and T. Suharmini, "Pengaruh Aplikasi Color Detector for Blind on Based Android (Coda) terhadap Pengenalan Warna Bagi Penyandang Tunanetra di Yogyakarta," *Jurnal Pendidikan Khusus*, vol. 14, no. 1, pp. 35-45, 2018.
- [16] K. S. Dewi, K. Haryanto and S. De Yong, "Identifikasi Penerapan Design Thinking Dalam Pembelajaran Perancangan Desain Interior Kantor," in *Seminar Nasional Seni dan Desain: Konvergensi Keilmuan Seni Rupa dan Desain Era 4.0*, pp. 33-38, 2018.