Child Education Journal

Journal homepage: http://journal2.unusa.ac.id/index.php/CEJ

The Role of Analog and Digital Media as a Playground to Support Children's Development

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10.33086/cej.v4i2.2988

Submission : May 25, 2022
Revision : June 10, 2022
Accepted : September 5, 2022

Keywords

analog media, video mapping, play facility, child's development, affordance

Abstract

Exploration of play in childhood is very important in child development. One of the environments that can support children's development is the play environment. So far, many children's play environment uses analog playing media. However, with the development of space and technology, the formation of space is increasingly diverse. One of them is a combination of space with video mapping. Video mapping is implemented in the playroom so that it can open new exploratory interactions for children. Children with an age range of 5–7 years become the subject of this study as a development of previous research and at that age, children begin to recognize and understand the physical environment around them so that they can form a behavior. This study aims to determine the role of analog media and video mapping in play facilities that can stimulate children aged 5–7 years to explore play to encourage child development. This research method uses Spatial Affordances in Childcare Interior Design (SACID) as the instrument for calculating the breadth and depth of affordance exploration with the basic theory of Gibson's observation, perception-action affordance. The results show that there is more variation in the spatial components of analog media than in video mapping media. However, in terms of depth, video mapping is stronger. While the breadth of the two media shows a fairly high exploration. This study shows that both media can support children's development with the different potential of each exploration that occurs between analog media space and video mapping. Based on these findings, this research can be considered in choosing the use of analog media or video mapping in the early childhood playroom.

Kata kunci

media analog, video mapping, sarana bermain, perkembangan anak, affordance

Abstrak

Eksplorasi bermain pada masa anak-anak merupakan hal yang sangat penting dalam perkembangan anak. Salah satu lingkungan yang dapat mendukung perkembangan anak yaitu melalui lingkungan bermain. Selama ini lingkungan bermain anak banyak menggunakan media bermain analog. Namun, seiring berkembang ruang dan teknologi, bentukan ruang semakin bermacam-macam. Salah satunya perpaduan ruang dengan video mapping. Video mapping yang diimplementasikan pada ruang bermain sehingga dapat membuka interaksi eksplorasi yang baru pada anak. Anak dengan rentang usia 5–7 tahun menjadi subjek pada penelitian ini sebagai pengembangan dari penelitian terdahulu dan pada usia tersebut anak mulai mengenal dan mengerti lingkungan fisik yang berada di sekitarnya sehingga dapat membentuk suatu perilaku. Penelitian ini bertujuan untuk mengetahui peran media analog dan video mapping dalam sarana bermain yang dapat merangsang anak-anak usia 5–7 tahun untuk eksplorasi bermain sehingga mendorong perkembangan anak. Metode penelitian ini menggunakan Spatial Affordances in Childcare Interior Design (SACID) untuk instrumen perhitungan breadth dan depth eksplorasi affordance dengan teori dasar observasi Gibson, persepsi-aksi affordance. Hasil menunjukkan bahwa terdapat variasi komponen spasial yang lebih pada media analog dibandingkan media video mapping. Namun dari segi depth video mapping lebih kuat. Sedangkan breadth kedua media menunjukkan eksplorasi yang cukup tinggi. Studi ini menunjukkan kedua media dapat menunjang perkembangan anak dengan perbedaan potensi masing-masing eksplorasi yang terjadi antara ruang media analog dengan video mapping. Berdasarkan penemuan tersebut, penelitian ini bisa menjadi pertimbangan dalam pemilihan penggunaan antara media analog ataupun video mapping pada ruang bermain anak usia dini.

A. Introduction

Early childhood is a group of children who are at the peak of the growth and development process (Bronson, 2001; Kamilah et al., 2020). Early age is called the golden age (Golden Age) which only occurs once in the development of human life and is the stage that will determine their future later. (Fitri, 2020; Susanto, 2021). Children this age have an amazing ability to absorb everything around them (Yulianingsih et al., 2020). At this age too, children are most sensitive, have curiosity, and have the potential to learn something very high (Isnawati, 2020; Wiyani, 2014). One that can support early childhood development is through play (Suminar, 2019; Susanto, 2015). According to Santrock in Hazizah (2018) states that playing is a fun activity carried out for the sake of the activity itself. Playing experience is a very important role for children to grow, develop, know themselves, and know the world (Gordon & Browne, 2016; Hazizah, 2018). Yuriansa & Kurniawati (2021) stated that play provides opportunities for children to practice social and emotional skills, use increasingly complex cognitive processes, and strengthen bonds with caregivers and peers.

Playing and moving are also preferences that are preferred by children (Bariyyah et al., 2021). When playing, children in the playroom will respond to all forms of stimulus given as a form of exploration (Gordon & Browne, 2016; Susanto, 2011). Exploration is defined as a type of play behavior directed at investigating a space object or person (van Liempd et al., 2018). Exploratory behavior will also occur more often in clear space-delimited settings than in unclear settings (Moore, 1986). A study conducted by McLaren and colleagues (2012) regarding behavioral responses to classrooms and children's playgrounds by describing children's explorations that occur, such as walking forward or backward, running, crawling, jumping interacting with spatial component stimuli, or with their playmates. Based on this, the response to the spatial/spatial component is an important form of the play process for children.

Most components of the children's playroom are often filled with analog media. Analog according to Goldberg in Merriam-Webster, is a mechanism or set of information that is represented by a continuously variable physical quantity. According to Hamilton also in Merriam-Webster, analog not digital or computerized. Based on this definition, analog media relates to devices or physical components that are not digitized or computerized.

The use of media, which initially only relied on real physical media, then grew more and more along with technological developments and even became part of daily activities (Swartz, 1998) and part of children's learning (Gordon & Browne, 2016). A study by Hughes (2005) shows that digital technology is sometimes introduced by teachers as a substitute for analog predecessors (Nilsen et al., 2021). Starting to shift analog/physical media to digital technology too, with the reason for the limitations and some shortcomings of analog media. These negative impacts, such as some physical activities, have a high risk of accidents. Assisted by technology, certain activities can be simulated with digital visualizations to increase security and reduce negative risks that may occur. For example, aircraft training uses virtual aircraft flight simulation technology, thereby reducing the risk of accidents (Dourado & Martin, 2013). In addition, analog media are limited in physical form, bound by location and time of occurrence, or large costs so that some experiences are difficult to be felt by everyone. With the help of technology, these physical experiences can be created in an unlimited number of places and times with the possibility of reducing costs, such as the study conducted Herbst and colleagues (2008) about the visualization experience of the German colonies that appeared in the past, as well as what it will look like in the future (Steffen et al., 2019). In addition, there are other examples, such as the visualization experience of exploring cultural heritage, the Temple of Hera II Paestum, and the Tomb of Diver slab on The ArkaeVision project through virtual reality and augmented reality (Bozzelli et al., 2019), and the use of an augmented reality-based application, the Planetarium Glass, for primary school learning media (Ayu et al., 2021).

Digital technology that is increasingly used has an impact on the implementation of space. One example of this technology is the use of video mapping media used in the playground. Video mapping is defined as a particular form of augmented reality (AR) that can transform any surface, a complex, flat, or irregular surface, into a dynamic surface capable of enriching human sensory perception (de Paolis et al., 2022; Schmitt et al., 2020). Based on the explanation of previous studies, it can be assumed that the role of analog media supports children's development because this media has been used more often and is common for children in the aspect of exploring the experience of playing in space for their development. Therefore, it is necessary to know in advance the study of the features/stimulus produced by each media to understand the role of both in the literature.

Analog media which is based on physical components has a principle similar to the reality of physical objects in general. One of the best stimuli/features of physical reality is its complete sensory richness. Human senses have evolved in the context of interacting with the physical world, not the virtual world. In addition, physical objects have stimuli that follow the laws of physics, such as following the linearity of time, restrictions on movement, gravity, size, and so on. The limitations of the laws of physics can create a structure for the human environment that allows reliable interaction. But then again, the laws of physics can also place restrictions on what can be achieved (Steffen et al., 2019). Some examples of spatial components/analog media stimuli in the children's room, such as relatively smooth flat surfaces/open paths, exercise balls, chairs, benches, mobility devices, and so on (McLaren et al., 2012). The study was later developed by van Liempd and colleagues (2018) which calculates breadth and depth of affordance exploration of the spatial component of children's play space. Affordance is defined as the relationship between the physical features of the environment and the ability of organisms to understand and act on them (Chemero, 2003; J. J. Gibson, 2014; van Liempd et al., 2018). The results show that different spatial components are associated with different uses. Moreover, in designing and equipping play spaces carefully following the findings in studies such as this one can stimulate children to expand the range of exploratory behaviors and thereby encourage their development.

Media video mapping is part of augmented reality (AR) technology. AR has the stimulus/feature of virtual and real objects side by side in the same space (R. Azuma et al., 2001; R. T. Azuma, 1997). AR aims to enhance the physical world or provide components that would not be possible without virtualization (Carmigniani et al., 2011; Zhou et al., 2008). Another virtual AR component is that this technology does not need to follow the laws of physics. This makes AR able to bring in imaginative objects and objects that are impossible to exist in the virtual physical world, such as bringing in historical figures. (Steffen et al., 2019) or dinosaurs, and so on. However, AIR interactions will be less effective when virtual and physical objects "collision" and occupy the same space (Kim et al., 2017; Steffen et al., 2019). Therefore, it is necessary to understand the context of the needs in implementing technology in space.

The use of video mapping is now increasingly being used and studied. One such example is the immersion study on NRMO Lzy Visual at the Jogjakarta Video mapping Festival 2018 conducted by Pahrulroji, Mutiaz, dan Grahita (2021) shows that for the appreciator or viewer, the presence of characters, the appearance of familiar objects such as clothes, hands, and rain will help to digest the information properly and make people more interested. The tendency of interest in this common thing also occurs in children. This is indicated by the fact that many young children will respond to requests for characters on the screen that are familiar to children and socially meaningful, even though the standard video displayed is not responsive to audience behavior (Huber et al., 2016). Other research also states that there is an increase in engagement and attractiveness so that students are more motivated to learn when a material is presented using AR technology (di Serio et al., 2013). In addition, video mapping with a short duration at the NRMO Lzy Visual in Jogjakarta Video mapping Festival 2018 was able to convey messages well, from the theoretical construct of video mapping which has narrative, visual, audio, and projection elements.

There is much debate about the increasing use of digital technology. According to Amani and Siegler (2008), rule-based analog games are traditionally considered useful in supporting and promoting children's learning and development. Whereas in the statement of rebuttal Yelland (2011), regarding the well-established idea that requires children to engage in traditional play with real-world objects, Yelland instead urges researchers and teachers to re-conceptualize play to include fun exploration mediated by digital technology in addition to traditional ones. In connection with that, nowadays children's games most likely consist of digital and analog elements because the boundary between digital and analog games is getting thinner (Stephen & Edwards, 2017). Especially in the video mapping media room which is increasingly integrated with the children's environment, including playgrounds, it is still often studied from the perspective of people in general and has not been specifically focused on children. (e.g., Huang et al., 2014; Jung et al., 2015; Pahrulroji et al., 2021; Rovirosa & Casas, 2020; Watier, 2018). According to Nilsen and colleagues (2021), most studies focus on analog or digital games only. Studies covering both types of games are scarce. Seeing the strong interest from previous studies, it is necessary to study the role between the two analog media and video mapping media on child development.

Based on all these explanations, this study aims to analyze the role of analog media and video mapping media in playing facilities so that they can trigger children to explore space for their development. Early childhood that will be studied is the age of 5-7 years because the previous study was conducted only at the age below that and considering their independent ability to explore. Furthermore, this study will look at the exploration of the playing space from the perception-action aspect of affordance proposed by the basic theory by J. J. Gibson (2014) and the exploratory framework study of affordance by E. J. Gibson (1988). This exploratory consideration of the affordance aspect is appropriate to be used in studying two different environmental conditions, such as analog and video mapping. Based on previous studies, this study can contribute to initial considerations regarding the role of the two media descriptively regarding space exploration with analog media stimuli and video mapping media in the scope of early childhood.

B. Methodology

1. Participant

The participants who will be taken are 5 children (see Table 1), girls and boys with an age range of 5–7 years in the City/Regency of Bandung. Description of the number of participants with a ratio of 2 children from the age of 5 years, 1 child from the age of 6 years, and 2 children from the age of 7 years. The age was taken because the focus of this research is seen on the exploration of affordance in space. The exploration will be observed maximally without any influence from other aspects because children can do independent exploration (van Liempd et al., 2018).

Table 1 Demographic Characteristics of 5 Children

No.	Code	Gender *(M/F)	Age
1	A1	M	5
2	A2	M	5
3	A3	M	6
4	A4	M	7
5	A5	F	7

Notes: *M=Male F=Female

2. Procedure

Five children were invited to the playroom for analog media and video mapping media to observe their playing activities. Determination of the first observation place, the selected analog media playroom is a public commercial playground that applies Montessori-based games located in Bandung City. Then the general commercial video mapping media playroom in Bandung was chosen because the video mapping vehicle was showing the content of one of the popular animated films among children. The video mapping content also implements a first-person perspective so that users are made as if they are in an animated film environment/space experience. Although this vehicle is a space, the video mapping content is equipped with a motion tracking device so that the visual content can respond to the user's movements in it. The response from the motion tracking will affect the visual video mapping on the walls and floors.

Observations were made twice, one day to play in the analog media room. Two days later, they played again in the video-mapping media room. Observations of playing in both rooms were carried out during the day. The work on research observations was carried out using general commercial playgrounds and natural conditions. This will affect the behavior and range of observations made. This study observes children when doing the free-time play in two different playrooms, namely analog media and video mapping. The free-time play is a time of free choice for children and is about the belief that children have goodness and the ability to choose what they need to learn (de Haan et al., 2014; Gordon & Browne, 2016). Free-time play was chosen because it avoids the intervention of caregivers or others that can obscure exploration with a spatial component (van Liempd et al., 2018). Free play is also an activity that is quite dominant in children's daily activities (de Haan et al., 2014; Slot et al., 2015; van Liempd et al., 2018). Observation time was carried out for 30 minutes. Approximately the first 10 minutes for children to adapt. Then 20 minutes later, observations were made to collect data. Furthermore, each room will be filled directly by 5 children who are the same as the limit of the room area ±8–10m^2.

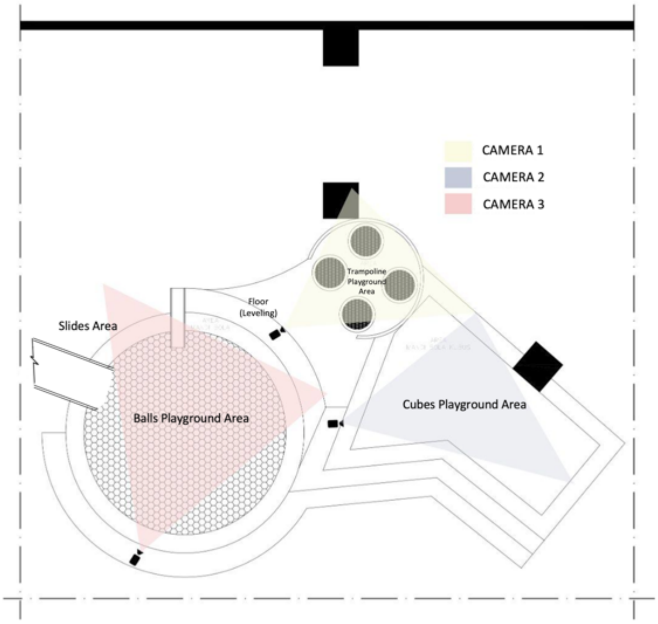

Figure 1 Analog Media Playroom Floor Plan

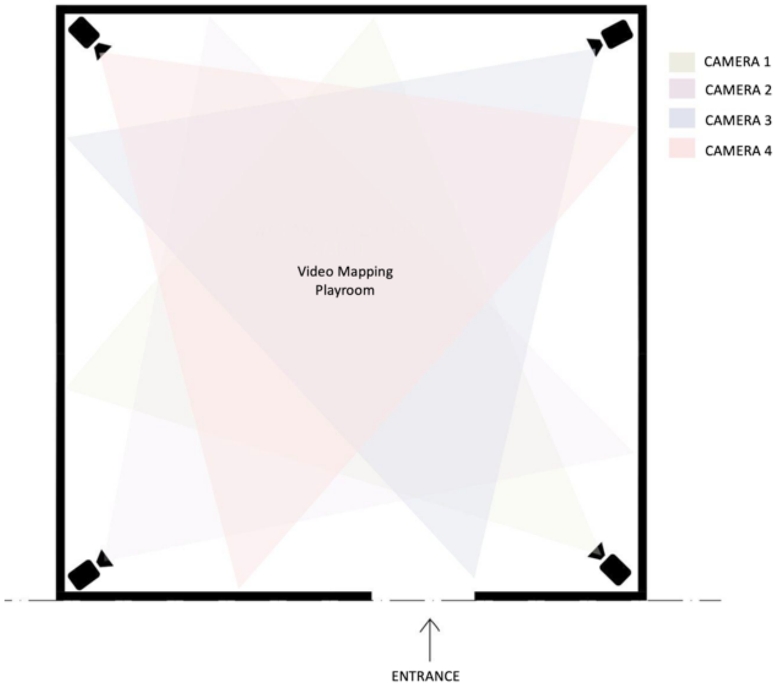

Figure 2 Video Mapping Media Playroom Floor Plan

3. Measurement Using Spatial Affordance

Spatial Affordances in Childcare Interior Design (SACID) is used as a measuring instrument of observation to code the use of children's spatial components and playrooms in detail. This measuring tool was developed by Heft (1988) on the aspect of the child's exterior space. Then McLaren and colleagues (2012) develop the children's indoor playroom. The two studies will be used as a measuring tool to collect detailed data on children's behavior regarding spatial exploitation. There are two categories of coding with this tool. The first category is the spatial component that often exists in children's playgrounds, especially analog playing media. This component can be objects that are moved, such as balls, chairs, or fixed objects, such as slides, or climbing ropes.

Calculation of quantity, breadth and depth exploration in space is determined from the level of episodes with each episode consisting of 30 intervals, every 10 seconds. Based on each component, the total number of affordances used is calculated as the number of intervals in which at least one spatial component affordance is used during one interval (10 seconds) in one five-minute episode (maximum 30 intervals). Breadth exploration was defined as the number of various types of affordance actions performed by children per five-minute episode. Exploratory depth is defined in terms of the average number of uses per affordance type during this episode and is calculated by dividing the total number of affordance intervals used by the breadth of usage (Caruso, 1993; Power et al., 1985; Schuetze et al., 1999). Then at the end, the total number of explored affordances, breadth exploration, and depth are added up for all components (van Liempd et al., 2018). For example, in one episode (5 minutes) two spatial components are explored. The floor was explored at 25 intervals in one episode with variations in the affordance of running and sitting. While the walls are explored as many as 5 intervals in one period with the type of affordance, touching. The breadth for the floor and walls are 2 and 1. Furthermore, the floor and wall depths are 12,5 and 5.

Tabel 2 Example of Calculating Breadth and Depth for One Episode (N=30)

Calculation of one period (5 minutes)					
No.	**Component**	**Interval**	**Affordances**	**Breadth**	**Depth**
1	Floor	25	Running, sitting	2	12,5
2	Wall	5	Touching	1	5

Notes: N= the total interval for one episode. One interval equals 10 seconds.

C. Result and Discussion

1. Result

a. Descriptive Data

Children were observed based on affordance behavior that was carried out per interval. Depth exploration affordance is shown to be strong for the spatial component, balls, and slides with a score above 2. While for other spatial components, such as trampolines, cubes, and leveling floors, the depth shows less depth with a score below 2. The overall breadth and depth of analog media were negatively and not significant ($r = -.095$, $p<.879$).

The data results show that the balls are most often played from the affordances observation interval (see Table 3). Apart from being specifically a playing medium, balls (ball bath area) are used for mobilization paths between one spatial component and another or for resting (sitting and lying down). All types of affordance observations are included even though they only show activities that are carried out once to obtain comprehensive data for five children.

Table 3 Analog Media Playroom Exploration: Use of Spatial Components and Affordance per 5-Minute Episode (N = 20)

Spatial Component	Affordance #	Interval %	Breadth		Depth		Affords Activities*
			M	SD	M	SD	
Balls	13	41,2	6,1	2,45	2,77	0,68	Lying, throwing, sitting
Slide	8	22,8	2,65	1,36	2,27	1,12	Climb, slide, sit
Trampoline	4	5,5	0,5	0,71	0,6	0,59	Jump, walk, sit
Cubes	2	1,8	0,15	0,34	0,08	0,19	Take, arrange
Leveling floor	1	0,2	0,05	0,11	0,05	0,11	Leaning

Notes: Spatial components are sorted by frequency of use. N=20 of affordances. *Three most frequently performed activities.

Table 4 shows the behavior of children's exploration of affordance in the video mapping media space per episode. The depth score indicated by the two spatial components, floor, and wall, shows a strong exploration depth with a value above 2. Meanwhile, the overall breadth and depth of analog media are negatively and significantly related ($r = -.908$, $p > .033$).

The most frequently used spatial component is the floor. Affordance is dominant on the floor because it is a mobilization medium as well as a play object. The floors and walls have 18 different types of exploration. Specifically for video mapping, there are only two spatial components and no other additional components other than the addition of visual video mapping to the two components.

Table 4 Eksplorasi Ruang Bermain Media Video mapping: Penggunaan Komponen Spasial dan Affordance per Episode 5 Menit (N = 20)

Spatial component	Affordance #	Interval %	Breadth		Depth		Affords Activity*
			M	SD	M	SD	
Floor	14	75,3	3,7	0,67	6,64	0,87	Running, walking, jumping
Wall	4	23,5	1,55	0,6	5,37	3,8	Touching, leaning, observing

Notes: Spatial components are sorted by frequency of use. N=20 of affordances. *Three most frequently performed activities.

b. Observation Results of Children's Play Exploration on Analog Media

Exploration observations on analog media have five spatial components which are five different play areas. Children were observed for 5 minutes per episode for a total of four episodes (20 minutes). The first 10 minutes is an adaptation phase to children's play space and media. Then the children are allowed to play freely.

Observation of the first episode of children aged 5–7 years dominantly playing in the ball bath area. However, children aged 5 and 6 years tend to be more active in playing in the ball area such as jumping, drowning, walking, and throwing the ball to their playmates. Likewise in the slide area, such as climbing and skating. Then, children aged 6 and 7 years explored games in the cube area such as arranging and kicking it but it didn't last long, as was the case in the trampoline area.

In the second observation episode, children aged 5 and 6 years were dominant in exploring the ball playing area and slides only with the affordance of throwing a ball, sitting, walking, jumping, and climbing. Meanwhile, children aged 7 years tend to be more active in playing outside the observation area. In the third observation episode, children aged 5–7 years are still exploring the ball playing area. However, children aged 5 years tend to be more active in exploring the slide area, such as catching a ball, skating, climbing, and sitting.

In the fourth observation episode, children aged 5–7 years each explored the three spatial components, namely the ball playing area, slides, and trampoline. However, children aged 5 and 6 years tend to be more active in the trampoline play area such as sitting, jumping, lying down, and similarly in the ball playing area such as walking, jumping, and throwing the ball at their friends.

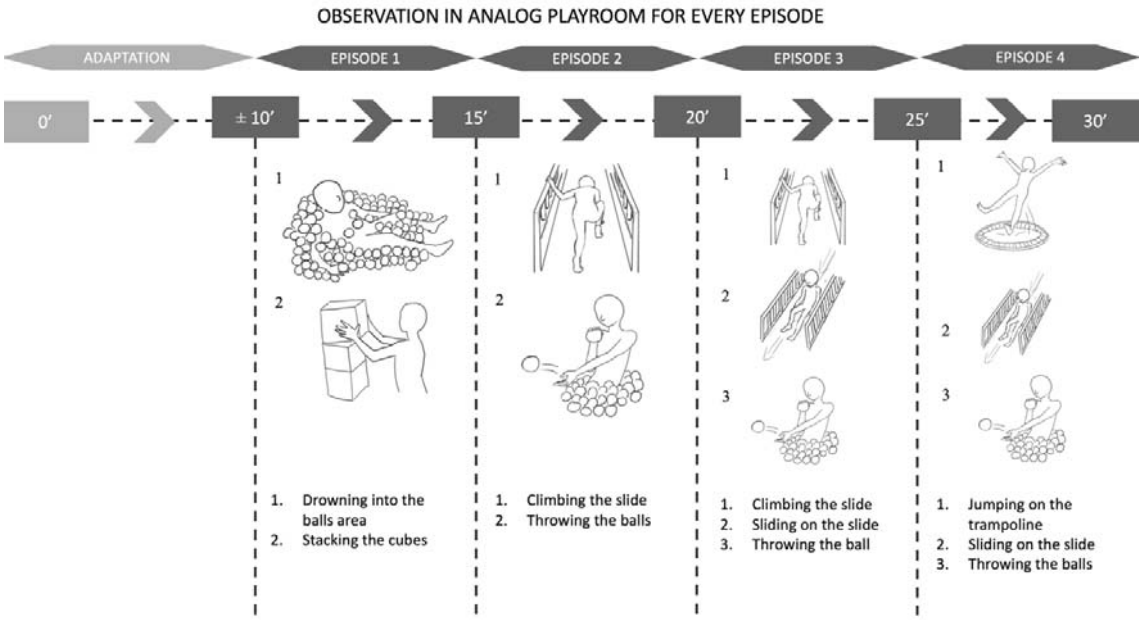

Figure 3 Analogue Media Room Observations per Episode
(Illustrated activities based on dominant affordance/unusual interactions that occur per episode)

c. Observation Result of Children's Playing Exploration on Video Mapping Media

Observations of children's exploration in the video mapping media room were carried out for four episodes (20 minutes). Each episode has a different sub-theme of video mapping. However, the video mapping response that occurs on the floor and wall elements created by motion tracking from the user's movement always has the same effect on every change in the theme of the video mapping atmosphere per episode. Visuals that appear, such as the current of aurora light waves (floor) and the effect of flickering light (walls). Based on the physical spatial component, video mapping is just an empty room with no other spatial components, other than wall and floor elements. While the digital stimulus is made from video mapping projections and user movement interactions captured by motion tracking.

Observations of the first episode carried out in the video-mapping playroom were carried out after the adaptation phase. Five children started playing with a lot of observing around. Children are seen observing the interaction of their movements with visuals that occur on the wall and floor elements. They seem to explore a lot by touching the two objects, either with their hands or with their feet (walking).

Children in the second observation period are getting used to the interactive interaction of visual video mapping created by capturing motion from motion tracking. 6-year-olds interact with walls more than 7-year-olds. As for the floor elements, ages 5–7 years have the same tendencies, such as running and jumping to avoid visuals on the floor elements that follow them.

The third observation episode, video mapping which visually depicts the interior of a spaceship with buttons whose height corresponds to the child's age, triggers the interaction of pressing the visual buttons. In addition, changes in the atmosphere in the interior of the spaceship, such as the occurrence of emergencies with red room conditions, and emergency audio such as in an airplane, as well as by showing an alien monster character eating a spaceship, can affect the atmosphere of the children so that

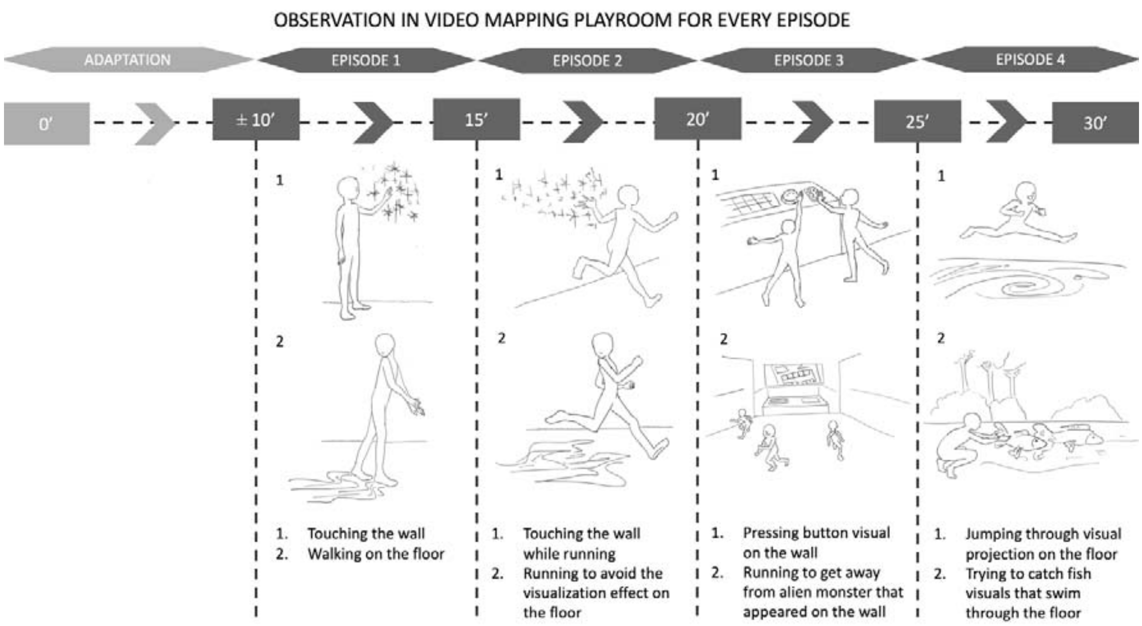

Figure 4 Observation of Media Room Video Mapping per Episode
(Illustrated activities based on dominant affordance/unusual interactions that occur per episode)

the atmosphere causes action. screams from children. One of the screams was like "Wow, a monster devoured it!" and ran away when he saw a picture of a monster on one side of the wall. In addition, the emergency can trigger the child to press the visual control buttons of the spacecraft projected on the wall with more intensity.

The fourth episode of the visual display is a forest atmosphere with the floor made as if it were a river. The floor visuals caused by motion tracking by the children were then ignored because other visuals appeared on the floor, such as the visual of a river with fish in it. These fish visuals trigger children to catch visuals of fish passing by on the floor. This is different from the visual response of the floor that follows the user's walking motion which is tracked by motion tracking. These visuals tend to be avoided by children, so they run away a lot from the visuals.

2. Discussion

This study aims to determine the role of analog media stimulus and video mapping media in the playroom in triggering the exploration of play for children's development. The exploration of play is seen from the interaction of spatial components and affordances that occur in each of these media spaces, which was originally brought by this theory of affordance by J. J. Gibson (2014) and affordance exploration by E. J. Gibson (1988). After that, the theory of spatial affordance in children's space was developed by Heft (1988) and McLaren and colleagues (2012).

The results show that the spatial components used by the two spaces have different variations of spatial components with various types of affordances. Spheres are the most frequently used spatial component in analog media. While the video mapping media that is most often used is the floor. The two spatial components, apart from being frequently used, also have the most variety of affordances. The ball-and-floor components show suggestions that fit the study McLaren and colleagues (2012) and van Liempd and colleagues (2018) that it is important to provide a large space to accommodate children mobilizing from one place to another and to accommodate various types of activities. But the interesting thing here McLaren and colleagues (2012) and van Liempd and colleagues (2018) stated that the large spatial component is flat and smooth while the ball area is not like that because it is filled with balls, but the area becomes an area for mobilization (walking and running) and resting (such as lying and sitting) which is quite often used.

The use of spatial components based on observations in analog media rooms, children aged 7 years are often out of the play area so the spatial components at several intervals in some parts of the episode are not fully explored. Meanwhile, in the video mapping room, the children fully explore the existing spatial components. This happens because, in the analog media room, the space partition boundary does not surround the observed spatial component. In contrast to the video mapping room, all sides are limited by a partition wall which is also the observed spatial component. It is related to the discovery by Moore (1986) A well-defined and well-defined setting will enhance a child's exploratory behavior. Also, the visual relationship used in research on spatial behavior regulation, such as spatial boundaries, influences on behavior-perception, as is the case with the law of perceived closure, or Pragnanz's principal Gestalt (Koffka, 2013).

Based on the results of breadth and depth for the two analog media components (balls and sliders) they have a strong depth and also varying breadth compared to the other 3 spatial components. Meanwhile, in the media space, video mapping has two spatial components, both of which produce varying breadths and strong depth scores. This is shown from the top two components of each media. Analog media scored above 2 and video mapping scored above 5. This is in line with the statement van Liempd and colleagues (2018) that a score from 2 to 30 indicates a strong depth of exploration affordance. This kind of exploration also shows that the spatial component can trigger children to get to know their environment better (Caruso, 1993; Schuetze et al., 1999).

Other results show that the two media can have different affordance effects on children. Children with analog media spaces have more choices of spatial component variations (five components) that can be explored compared to video mapping media spaces (two components). However, this also affects the type of affordance that children explore. This is shown from the results of a larger number of affordances on the floor in video mapping media compared to balls in analog media, although there is a slight difference. In this regard, the breadth defined by Caruso (1993) as several different exploratory behaviors (affordance) that are used, highlights the relationship with problem solving abilities in children. The study of exploratory behavior and problem-solving abilities also supports the findings of theoretical research by Piaget (1952) that the number of different exploratory behaviors is related to success and cognitive sophistication in problem-solving. In addition, exploratory breadth is the only dimension of exploratory behavior related to problem-solving ability (Caruso, 1993). However, it should be emphasized that the study conducted by Caruso (1993) and Piaget (1952) focuses on one-year-old babies. While the findings of this study add that even in early childhood, the results of exploration and abilities are still contextual, in harmony, and continue to occur and develop. Therefore, both media show a fairly high breadth, especially with the components of balls on analog media and floors on video mapping media. This shows that both media can support children's problem-solving abilities that can support children's development (Caruso, 1993), especially in this study where early childhood is 5–7 years.

Based on the results of observations showed differences in the response of age groups to the spatial component stimulus. The 5-year-old tendency to analog media is the slide component, the 6-year-old often plays on the trampoline, and the 7-year-old explores several times outside the area. As for the video mapping media, children aged 5 and 7 years interacted more with the floor. Children aged 6 years explore the walls more. The difference in the age response to these two media opens a view on the tendency of the response to the developmental stage of the child's age. The tendency of different interests in spatial exploration at each age stage is similar to the reflection of their previous successful behavioral experiences in the environment (Schlinger, 1995). As was done by Piaget, the results of the analysis of imitating behavior and play activities in the baby's life, which were detailed from the results of the description per month to month, showed various interactions (Piaget, 1999). Understanding stages as a unique developmental period with each stage is characterized by its own behavioral and cognitive characteristics (Lemish, 2014) so that this can be an understanding of the relationship between stages and their exploratory behavioral tendencies. Overall observations, not only at the age of infants, the early childhood stages above are in harmony with the development of children related to environmental influences (Caruso, 1993; Schlinger, 1995).

The two observed media have their special characteristics. Analog media use their physical form fully to accommodate potential affordances that occur so that variations in physical spatial components become important in providing potential affordance exploration options. For example, it is necessary to provide a variety of spatial components such as components of balls, slides, trampolines, and cubes. Whereas in the video mapping space, virtual objects in the form of images projected on a plane can be played so that it can provide more potential for variations in affordance on one spatial component, for example, the entire wall can be made like the interior of a spacecraft. Then with the same spatial components, the walls can be turned into forests, and so on. In addition, one floor can be made like a river, there are fish that pass or like there are light waves that follow, and other potentials. These common virtual objects (forests, fish, and spaceships) can trigger their behavior (interest) and this is in line with what was revealed in the study by Pahrulroji, Mutiaz, and Grahita (2021) and Huber and colleagues (2016). This incident is also supported by the statement by Steffen and colleagues (2019) that the advantages (AR), video mapping can hold virtual objects that are not limited by time linearity, or gravity, and there is no limit to the imagination in virtual stimuli. These events can be carried out in tandem with the physical environment so that variations in the shape of objects, such as lava, an atmosphere like in an airplane, and others can be presented directly to the only two existing components and trigger more variations in exploration activities. Based on this explanation, the two media, both those with special physical reality objects and or those enhanced with virtual reality, each have the potential for affordance features, whether this is an advantage or a disadvantage.

D. Conclusion and Recommendation

Based on the results of this study, it can be concluded that the role of analog media and video mapping in the playroom can both trigger children's breadth and depth exploration so that they support children's development even with different affordance approaches. There is a difference in the exploration of children's play between the analog media room and the video mapping media room in terms of the spatial components that are often used, the types of affordances that occur, or the behavioral responses of each media based on different age groups. Based on the spatial components used, analog media has five spatial components used, including balls, slides, trampolines, cubes, and leveling floors. Meanwhile, in the spatial component of video mapping, there are only two components, walls, and floors. Each medium has a strong depth of spatial component and a high amount of affordance. Each age also has a different tendency in each component explored in the two media. Children aged 5 years tend to explore with the slide component, age 6 years more often explore the trampoline component and age 7 years are more interested in exploring further with other areas on analog media. Then, in video mapping, children aged 5 and 7 years dominantly interacted on the floor element while children aged 6 years were on the wall element.

In addition, each media has a different potential for the possibility of exploring affordances that will occur. This is shown from the analog which has the advantage of real spatial component variations. Then the video mapping media plays a lot of affordance from the virtual aspect. However, this is also an interesting finding because, with a limited variety of components, the types of exploration activities that occur can exceed the variation in the number of activities on analogs. This can happen from virtual objects projected on wall and floor components that are more diverse and carry components that cannot happen physically real. Some of these examples include lava, spaceships, forests, rivers, and fish. Therefore, the differences that occur between the two media for children's exploration have their respective potential advantages and disadvantages that must be considered according to needs, answer the reasons why one or both media should be used in the activity, and consider the suitability of supporting media based on the stages. child's age development. Further research can sharpen the aspect of the method of comparing media space with the same spatial component of playing, but with different component actions, such as analog media space without video mapping. Then, compared to the analog media space with video mapping. It is hoped that research in this direction can deepen the study of the role of the two media in comparing children's play media with real reality and children's play media with additional virtual reality to support children's development.

E. Acknowledgement

We are grateful to all the respondents involved in this research project.

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