DESIGNING A CREATIVE PLAYGROUND BY KANSEI ENGINEERING METHOD

Nazanin MOHAMMADPOUR[*a], Yassaman KHODADADEH[b] and Masoodeh MOHAMMAD ESMAEIL[a]

a Kish International campus, University of Tehran, Iran
b University of Tehran, Iran
Institute of Science and Technology in Medicine (ISTM), Keele University, UK

ABSTRACT

This study is concerned with redesigning a playground with creativity considerations. One of the most important types of creative activities for children is playing. Playing and learning are very closely connected. Playgrounds are the common space for children to express their emotions and experience collaborative and creative games. At this moment, the available playgrounds in Iran are not equipped with creative games to satisfy children's creativity and learning needs. For this study Kansei Engineering method was used. Kansei Engineering is one of the useful methodologies that help the designers to provide users' emotional needs. Users' emotional needs have a great influence on their enjoyment of using products. Twenty five children, thirteen girls and twelve boys between 4 to 12 years old were selected randomly among the children in a playground. They were asked to describe their feelings about their favorite playground. In addition, twenty children were asked to draw paintings about their preferred playground. Sixty seven kansei words were collected. "Seven point scale rating" was used and kansei words were reduced to 30. Then Kansei Engineering was employed to design a creative playground, considering children emotional aspects. The final concept has been selected and was evaluated by Kansei method. In order to evaluate the children's satisfaction regarding the form, color and attractiveness of the final concept, another study was carried out with 25 children. Due to the satisfaction of these 25 children, it was concluded that the concept could meet the majority of emotional needs of them.

Keywords: Creativity, Kansei Engineering, Emotion, Playground

[*]**Nazanin Mohammadpour:** Kish International Campus, Mirmohanna BLVD, Kish Island, Iran Postcode: 79416-55665 Email: lalune_fenetre@yahoo.com

1. INTRODUCTION

Creativity is the freest form of self-expression. Being creative means to create something from personal feelings and experiences. For children there is nothing more satisfying and fulfilling than being able to express themselves openly and without judgment. The ability to be creative can reflect and nurture children's emotional health. Creativity also fosters mental growth in children by providing opportunities for trying out new ideas, and new ways of thinking and problem-solving [1].

One of the most important types of creative activity for young children is playing. Play is so important to optimize child development that has been recognized by the United Nations High Commission for Human Rights as a right of every child. Playing is integral to children's enjoyment of their lives, their health and their development [2]. Play is a generic term applied to a wide range of activities and behaviors that are satisfying to the child. Through play and the repetition of basic physical skills, children complete their abilities and become capable at hard physical tasks. Play promotes mental development and new ways of thinking and problem solving. For example, through block play, children are confronted with many mental challenges such as measurement, equality, balance, shape, spatial relationships and physical properties. Children's play is something serious. They are in fact practicing real life through these activities [3]. One of the strongest benefits of play is the way it enhances social development. Through cooperative games, children gradually learn to take each other's needs into account, and appreciate different values and perspectives. A collaborative game leads not only to positive social values, but also helps children to develop individual skills and creativity [4].

Playing and learning are very closely connected. Imagination of the world is essential to play, and it has great power to support thinking and learning. Play develops imagination and creativity. Children try out some of the very basic things such as giving, taking, sharing, getting along with others, listening, planning, and feeling out how others are receiving their ideas through playing [5].

A child does not only use self experiences to understand the world, but also can use others experiences, such as education. All these experiences help the child's creativity to develop. Every new experience is linked with a special feeling for the child. Increasing experiences help children to express themselves easier. The critical role of imagination, discovery and creativity in a child's education is recently begun to realize by educational communities [6].

Children need plenty of opportunities for creative play and creative thinking. It starts by providing activities that are based on the children's interests and ideas. This means learning how to listen intently to what children say. Apart from drawing and painting, there are many other ways for developing children's creativity, such as photography, music, field trips, working with wire, clay, paper, wood, water or shadows. The possibilities are endless. It's important to provide children lots of time to experiment different materials and pursue their ideas. [7].

Play and creativity are universal as they are important needs for all children in all socio-cultural surroundings. If the child's needs getting recognized and they have chance to

creatively play, they will be able to create, and form the ability to contribute to the cultural area in life [8].

Playgrounds are the common space for children to express their emotions and experience collaborative and creative games. It would be useful to learn how to create a creative playground by asking the children comments and desires [9].

At this moment, the available playgrounds in Iran are not equipped with creative games to satisfy children's creativity and learning needs. In order to find out the Iranian children's desires and design a creative playground, two studies were carried out. The aim of the first study was to recognize the children comments about their favorite playground. Based on children's interests a new creative playground was designed. The second study performed to evaluate newly developed concept. For both studies Kansei Engineering method was employed.

2. KANSEI ENGINEERING

Emotional design is a knowledge that relates to the users' emotions and the effects of products on the users. Since the emotions appear unconsciously to the users and it is related to users' experiences, figuring out the emotions is not easy [10]. One of the design methods which are able to capture the customer's considerations and feelings and translate these emotional aspects into concrete design is Kansei Engineering [11]. In design based on Kansei, qualitative information which is gained by interview and observation will be translated to quantitative information. This information can be used as image icons in design. Words are useful tools in understanding users' desire in Kansei Engineering. In this methodology, emotion can be expressed by psychological function such as behavior, facial and body language, physiological response such as heart rate. There are different methods to measure Kansei but the most common way of measuring the Kansei in Kansei Engineering is through the words [12].

3. FIRST STUDY

The aim of the first study was to find out the children's desires and design a new creative playground for Iranian children who live in Kish Island. Kish Island is a coral island in Persian Gulf which is located in south of the country. It has a tropical climate with very hot and humid weather. The available playgrounds in Kish are equipped just with the combination of basic playing equipments like swings and slides. They are made of poly propylene in white, blue, purple, yellow, green, orange and red colors (Figure 1).

Figure 1: An available playground in Kish Island

Girls and boys between 4 to 12 years old who live in Kish were selected as a target group. For applying Kansei engineering method to design a new creative playground, words from different resources about playgrounds, collaborative games, creativity and other related titles were investigated and collected. Also the role of words for describing Iranian children emotions was considered. Twenty five children, thirteen girls and twelve boys form target group were selected randomly in a playground in Kish Island. The children and their parents were interviewed and then twenty of children were asked to paint their desired playground on a paper. After that, they were asked to explain their paintings and emotions. Figure 2 shows some of children's paintings about their favorite playgrounds. It was tried to get help from children to translate their messages in the paining to the words. For example water that has seen in most of the paintings, which named "water" by children, was translated as a need for a colder environments. Helicopter, clouds, flight, flip-flop, light, dance and some other words obtained as children kansei words during painting and chatting.

Figure 2: Some of children's paintings about their favorite playground

In this way Kansei words were obtained, which were sixty seven adjectives. For structuring the Kansei words, these collected adjectives were analyzed and categorized. Then, from each category a word or a group of words were chosen as a representative. So the number of the words reduced to 30. These words were investigated again and finally 16 words were selected as higher-level kansei words. Table1 shows these chosen higher-level Kansei words.

Table 1: The chosen higher-level Kansei words

Higher-Level Kansei Words	
Short	Attractive
Soft	Educational
Cool	Funny
Hard	Safe
Clean	Flip-flop
Soppy	Fluid
Collaborative	Physical
Dynamic	Simple

In next step according to the product domain, playground properties and details identified. Furthermore, some design elements like color variations, forms and textures were investigated by Conjoint Trend Analysis. In order to perform CTA method, a Trend Board was prepared. The images of Iranian children's favorite toys, cartoons, games, meals, animated characters, books, and illustrations and so on in Kish island were collected and formed as a board that is shown in Figure 3.

Figure 3: The Trend Board of children in Kish Island

The forms, textures and colors of images in Trend board were determined and analyzed. The most repetitive elements were defined as the design palette and presented as the CTA results. These results as a design data base are presented Figure 4. As Figure 4 shows curved lines and circles in forms, soft, glossy and stripy in texture and red, blue, green, orange, white and black in color were identified as design elements.

Regarding the Kansei words, playground specifications and design elements, many concepts were generated. Due to the design limitations such as children ability and technical considerations three concepts have been selected. These three concepts were evaluated by the same children. A showroom was prepared and all of the three concepts were presented in isometric perspectives on A3 papers. The three playground concepts have been shown step

by step on papers. Questionnaires were given to children and their parents and children were asked to explain their feelings (like and dislike) regarding the attractiveness of the concepts. The data were analyzed by Excel software. The results are shown in Figure 5.

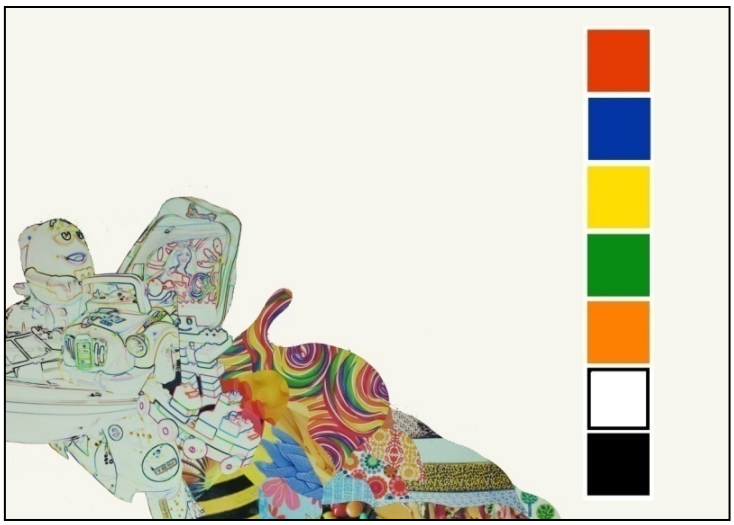

Figure 4: The CTA results

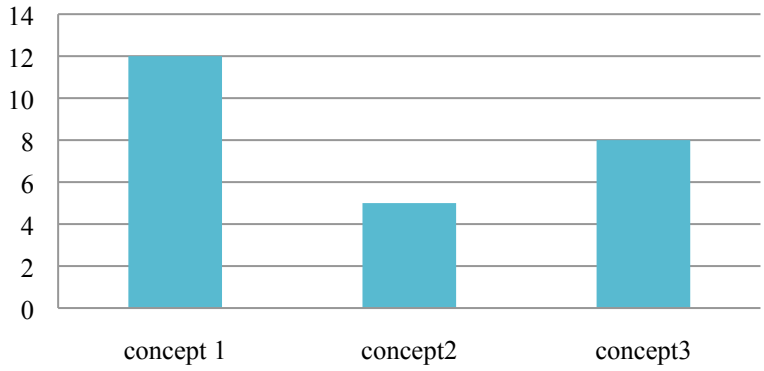

Figure 5: The results of evaluation of three concepts by 25 children

As figure 5 shows, 12 children among 25 participants preferred concept 1 for their favorite playground. Concept 2 which called Whale concept was selected by five children. The Whale concept used water and pressure from children's jumping to fill an empty plastic whale. The third concept that named Piano was chosen by 8 children. This concept employed pressure by jumping on an inflatable piano to circulate some water in transparent pipes. These water circulations led to make different sounds. Due to the number of children who preferred concept 1, it was selected as the final concept.

The final concept consists of 6 routs of pipe. All these pipes are connected to the final target, which is a plastic whale. These routs are curvy with some complications which have to be solved. This playground could be installed in a ground with approximate 5 meter length and 5 meter width with flexibility to be increased or decreased in different areas.

The Game that designed for this playground is a collaborative game that six children can play with it at the same time. It is made of polypropylene pipes with 300 centimeters length, 30cm diameter and 2cm thickness. These pipes are transparent with 0.4 densities to be soft, flexible and safe for children (Isotactic polymers). There is some colorful water flowing in pipes. The colors are blue, green, yellow, orange, red and natural water. There is a big water bed with 200cm diameter. In order to start the game, children need to jump on it to flow the water in the pipes. There are also eight small colored water beds, two for each valve. The diameter of each water bed is 40cm. The pipes are connected to each other. Four of these connections are gate-valves with colored lights. Each valve has two lights in different colors. One of the lights has the same color as the water flow, which is the right choice of the game. Other one has different color, which is the wrong choice. The light for the right choice starts to flash when water reach at the related gate. In order to open the gate, children should jump on the bed which has the same color as the light. That means the water would flow in other pipes and can reach to the destination. The target is the transparent polypropylene whale which must be filled with water. The whale has 200cm length, 80cm width and 100cm height. Since the whale is filled with water, 50cc water would splash from the whale head. The whale would empty gradually and the game would be finished. The different steps of the playground are shown in Figure 6.

If children jump on the wrong bed 50cc of cold natural water would splash from holes on the ground. This makes children wet and the gate of the valve wouldn't open. That means the game is over.

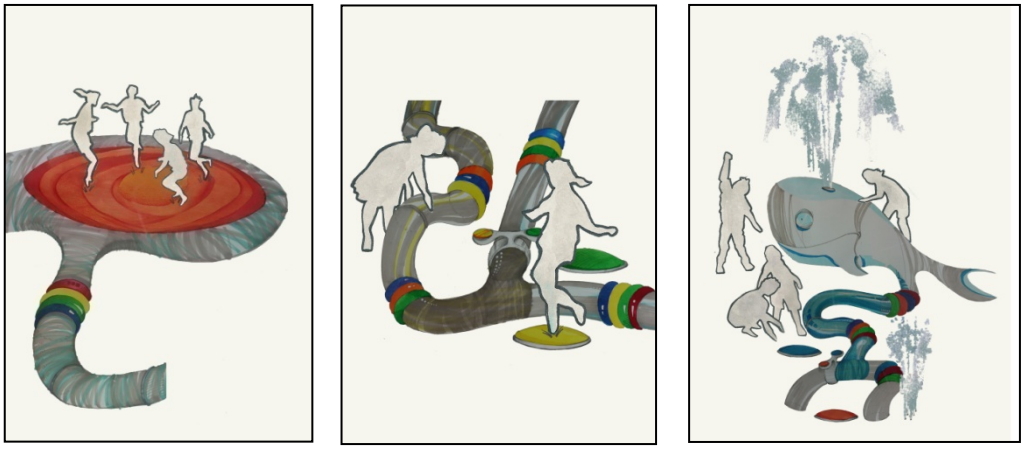

Figure 6: (left to right) Step 1- children must jump on big water bed Step 2- children follow the colorful water in pipes Step 3- the final target is to fill the plastic whale

Concept one, which was selected as the final concept, formed due to children's Kansei words. Therefore, the means of each Kansei word can be seen in the concept. The relation between different parts of the concept and Kansei words is presented in table 2. As table 2 shows each playground specification was designed due to the related kansei word. For example waterbed was designed in playground for jumping, which is related to Flip-Flop and Dynamic kansei words.

Table 2: The relationship between children's Kansei words and new playground specifications

Higher-Level Kansei Words	Playground Specifications
Short	Pipe with 30cm diameter
Soft, Safe, Unbreakable	Isotactic polymer pipe with 0.4 density
Fluid	Flowing water in transparent pipes
Attractive	Colorful flowing waters in transparent pipes
Flip-Flop, Dynamic	Water beds
Educational	Color notification and water navigation
Physical	Jumping on water beds
Soppy, Cool, Funny	Splashing water

4. SECOND STUDY

The aim of this study was to evaluate the final playground concept. In order to evaluate this concept Seven-Point Scale Rating was used and the roles of words were considered. Twenty five children from one of kindergarten in Kish Island were selected randomly. They were between 4 to 6 years age and various in genders. The final concept was presented on papers step by step to these children with some explanation. Then they were asked to rank the concept regard to each Higher-Level Kansei word obtained in the first study.

4.1. Seven-Point Scale Rating

In order to evaluate the selected concept by Seven-Point Scale Rating, a questionnaire was used. It was tried to get help from the kindergarten preceptors to explain the playgrounds by pictures, stories and activities to children. Then children were asked to tell their ideas about each kansei word regarding the playground by numbers from one to seven. Each questionnaire was marked on papers by investigator. Each paper had seven scales from "Not at all" to "Very Much" for identifying the relationship of a Kansei word to the presented concept. Figure 7 shows the example of Seven-Point Scale Rating questionnaire.

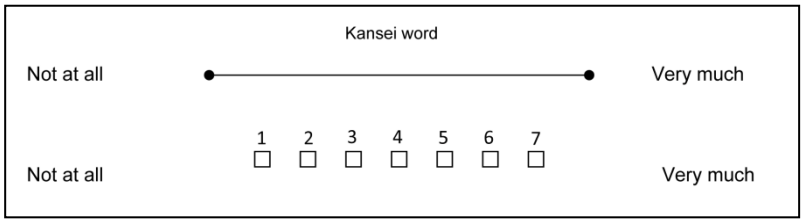

Figure 7: Seven-Point Scale Rating questionnaire

In this questionnaire the average score is scale four. The scale one indicates the minimum relationship and scale seven shows the maximum relation between each Kansei word and the selected concept.

4.2. Results

The results of the Seven-Point Scale Rating are summarized in Table 3. They are presented by percentage. The highest scores for each word are highlighted.

Table 3: The summery of seven-point scale rating analysis

Kansei words	Seven Point Scale Rating						
	1	2	3	4	5	6	7
Short	0%	0%	0%	0%	0%	20%	80%
Soft	0%	0%	0%	0%	10%	30%	60%
Cool	0%	0%	0%	0%	0%	30%	70%
Hard	0%	0%	0%	0%	40%	50%	10%
Clean	0%	0%	0%	10%	10%	20%	60%
Soppy	0%	0%	0%	0%	10%	20%	70%
Collaborative	0%	0%	0%	0%	10%	30%	60%
Dynamic	0%	0%	0%	10%	30%	30%	30%
Attractive	0%	0%	0%	0%	0%	30%	70%
Educational	0%	0%	0%	10%	50%	0%	40%
Funny	0%	0%	0%	0%	0%	20%	80%
Safe	0%	0%	0%	0%	0%	30%	70%
Flip-Flop	0%	0%	0%	0%	10%	20%	70%
Fluid	0%	0%	10%	10%	30%	30%	20%
Physical	0%	0%	0%	20%	50%	30%	0%
Simple	0%	0%	0%	0%	40%	40%	20%

As table 3 shows short and funny got the highest scores (80% in 7th scale), which means there is a very strong relationship between these Kansei words and the presented playground in the participators' perceptions. Also it shows children have felt strong relationship (70% in 7th scale) between the concept and Cool, Soppy, Attractive, Safe and Flip-Flop adjectives. The next high scored words are Soft, Clean and Collaborative (60%). The words which have got the average relationship are Hard, Physical and simple with fifty and forty percent scores. Dynamic is weakly related to new playground (30% in 7, 6 and 5th scale) and Fluid with its lowest score (10% in 3rd scale) and highest score (30% in 6th scale) is rarely related to the evaluated concept.

5. DISCUSSION

According to the first study, the collection of the Higher-Level Kansei words indicates that children like collaborative educational games in their playground. They also required short, soft, hard, clean and safe equipments in playgrounds. The Kansei words show that the children love wet, soppy and cool conditions for playing. They enjoy dynamic, physical and flip-flop games. The playground also requires being equipped with funny and simple games, which are attractive enough to play. According to CTA study in Iranian kids' trends, the curved lines, soft and noisy texture and a collection of red, orange, yellow, blue, green, black and white colors are the elements, which should be used as design data base.

By employing Kansei and design data base three different concepts were generated. The results of evaluating of these concepts show children were more interested in concept 1, which is more soppy and equipped with more educational and funny games. The selected playground is large and many children could play in it at the same time. It seems that it is not enough for children to see the fluid colorful water flowing in pipes and they love to touch the water and feel its coldness during the games. The color notification process to navigate the flowing water in different pipes helps children to learn and recognize different colors and cooperation to get the target. Contributing on a target at the end of the game in playground stimulates kids' ambitions and satisfactions.

The second study shows that kids like the new playground. Using the Isotactic pipe, which is soft, unbreakable, flexible and transparent helps to provide satisfaction for children. Transparency with flowing colorful waters makes the playground funny and attractive. Kids have to watch, jump, run, get wet and learn. They would experience the successful and obtain satisfaction feeling. According to Table 3, kids did not relate Fluid Kansei word with the new playground. It may be concern with the lack of conception about Fluidity in Iranian children's mind.

6. CONCLUSION

Playing is the most serious activity for children. Designing an appropriate playground has a very important role in developing children's creativity. In this study Kansei Engineering method was used to capture the Iranian children's desires to design a creative playground in Kish Island. Then the selected concept was evaluated by Kansei method to identify the kids' feelings about it. The results of the study show that children loved this new playground because of its different parts and attractive appearance. Employing different materials and textures, curved lines and colorful waters makes children excited. Furthermore, using flowing and splashing water makes the playground wet, cool and soppy, which fascinates children. It seems the children's interest in soppy games is result of the hot and tropical weather of Kish Island.

This study also showed that Kansei Engineering could be a very useful applied methodology. It captured the children's feelings and desires to design a playground, which excites them to play and experience happy moments.

REFERENCES

1. Singer, A. and Waguespack, A., Creativity in children: Information for parents. National Association of School Psychologists Center, pp: 21-23, 2004
2. Lekman-Hansen, C. and Pedersen, L., The Need for Play and Creativity in Children's Culture, Rehabilitation Process: a Field Study in the Philippines, Malmö University, The faculty of and Society: Department of Global Political Studies: Human Rights, 61-120 ECTS, Sweden, January 2009.
3. R. Gisburg, K., The Importance of Play in Promoting Healthy Child Development and Maintaining Strong Parent-Child Bonds, PEDIATRICS Journal, Vol. 119 No.1, ISSN 003-4005, pp. 182-191, 2007.
4. Decortis, F. and Lentini, L., A socio-cultural perspective of creativity for the design of educational environments. eLearning Papers, Nº 13 ISSN 1887-1542, 2009.
5. Hoyles, C. and Noss, R., Making rules in collaborative game design. Institute of Education University of London: EU Experimental Schools Environments program, pp 3- 32, 2002.
6. Vaira, D., More Than Just a Place to Play. Parks & Recreation, Vol.44, No. 4, pp. 33, April 2009.
7. CPC, Planning for Play. London: Children's Play Council, <http://www.playengland.org.uk>, 2006.
8. A. Hennessey, B., The Social Psychology of Creativity. Scandinavian Journal of Educational Research Carfex Publishing Taylor & Francis Group, Vol. 47, No. 3, ISSN 0031-3831, 2003.
9. DeKoven, B., Junkyard Games. III Congreso Estatal y Iberoamericano de Activitidades Fisicas Cooperativas, Gijon (Asturias), 30 June to 3 July, 2003.
10. Desmet, P., From disgust to desire: how products elicit emotions. In: Mcdonagh, D., Hekkert, P., Erp, P. and Gyi, D., Design and Emotion, Taylor and Francis press, London, pp. 8- 13, 2004.
11. Schutte, S., Designing Feelings into Products. M.S. Thesis, Linkoping University, Sweden, 2002.
12. Schutte, S., Engineering Emotional Values in Product Design. PhD Thesis, Linkoping University, Sweden, 2005.