DESIGNING FOR CHILDREN'S PLAY GROUND, A SOCIAL SKILLS IMPROVEMENT APPROACH

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Abstract

Many children learn how to communicate by playing. The objective of this research is to identify a suitable method to improve children's social interactions, by designing a toy, according to children's needs. To achieve this objective, some necessary information about children's play and social interaction environment, children's favorite plays, and social skills which improve social interaction were obtained by literature review, interview and a questionnaire. Then a toy was designed, considering the research results and was evaluated by experts. The selected concept which is usable at park and school is a balance base type for maze and marble which is suitable for both solitary and social plays. It stimulates children to social interaction in a physical process and improves their social skills.

Keywords: Children play, Requirements, Communication, Social skills, Human behaviour in design

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1 INTRODUCTION

The lack of outdoor activities may not only result in health risks but may also have negative consequences for children's social skills and social life (Bekker et al. 2010a). Children also communicate via game play (Mueller et al. 2010). At the age of 7 to12, children are interest in social plays (Mahmud et al. 2010). At this stage, they go to primary school and their social relations have a great importance (Engaji and Asgari, 2007). Social skills can create positive and successful results in human communication with others (Cartledge and Milburn, 2006). Skills which provide child's adaptation to the society such as: initiating a conversation in any subject, demanding help or information, thanking, apologizing, expression of opinion, respect for others, asking for permission, responsibility, and following the rules (Aksoy and Baran, 2010; Cartledge and Milburn, 2006; Gonen, Aydos, and Erturk, 2012). Skills which have been identified as important to overall social competence such as: effective initiation of interactive social play, offering help, empathy, friendship formation, negotiation and compromise (such as negotiating a turn in a game or negotiating game rules), sharing limited resources (to share the preferred toys or activities), cooperation during competitive play with limited resources, and turn-taking (Green and Rechis, 2006; Rusby, et al. 2008). Other skills which make and maintain friendships such as: influencing others, leadership, cooperation and collaboration, team working, self-control (Green and Rechis, 2006; Ishak et al. 2014). And yet skills that provides the context for the selection of proper behaviour such as: non-verbal communication, listening, exchanging information, expressing and recognizing intentions and emotions, attracting the other's attention, sympathy, social patterning (observation and imitation), joint attention, and shared gaze (Bekker et al. 2010b; Cartledge and Milburn, 2006; Moreno Manso, 2009). All these factors contribute to their communication with others.

A review of studies of bringing social skills for children in preschool period showed that social skills are changeable and perfectible skills (Aksoy and Baran, 2010). Actually, play is a means of enhancing social skill-related activities and stimulates children to cooperate (Cartledge and Milburn, 2006). The implementation of physical education activities for preschool-aged children can cause social skill improvement as well (Tsangaridou et al. 2013). Concerning social interaction improvement in children, Mahmud et al. (2010) designed an augmented tabletop game for children aimed at promoting social interaction between participating players. Their results indicated that social interaction occurred in the form of cooperation and competition within and between the teams. Penados et al. (2010) designed an interactive cuddly toy. Fantasy and responsibility toward the toy stimulated children to social interaction. Bekker et al. (2010a) in order to design playful interactions creates opportunities for players to define their own game goals and rules. Also they designed various opportunities for players to collaborate and compete with each other. They concluded that game goals and rules stimulate players to social interaction. Open-endedness of game provided opportunities for social interaction during play, because it required negotiation about game goals and rules. In open-ended plays, children played games in groups with different social interaction patterns. The structure of interaction between a player, the game, and other players is a so called player interaction pattern. For example; single player versus game, multiple individual players versus game, cooperative play, player versus player, unilateral competition, multilateral competition, and team competition (Fullerton, et al. 2004). Liebal et al. (2008) studied helping and cooperation in children with autism by using some entertaining apparatuses which have been designed such a way that being played individually is impossible. Team G Man, the winner of core77 (2012), also designed an interactive toy consists of a moving body and three controllers. Each user takes ownership of one controller and points it in a direction. The body moves in the combined direction of the active controllers. When users point their remotes in similar directions, the body will actually go faster (a form of positive feedback for good performance).

Although, nowadays, there are many products for team games, the effect of these products on social skills improvement was not founded in previous studies. In addition, children's play varies across countries, cities, cultures and seasons (Ergler et al. 2013). This study was done in the north of Tehran (capital of Iran). Having 4 seasons influences outdoor plays. Also Iranian Islamic clothing culture for girls older than 9 years causes some special requirements for play grounds. Therefore, the objective of this qualitative applied research is designing a toy that stimulates 7 to 12-year-old children to social interaction and improves their social skills via fun while playing. Improvement of social skills can promote collaborative behaviours in children. To achieve the objective, the main research questions of

this study are: “What are children’s requirements about toy and play?”, and “Is it possible to improve social skills by designing a special toy?”

2 METHOD

In order to improve children’s social skills first they should be encouraged to play together. Therefore, children’s favourite plays identified rely on a qualitative field study. It provides some situations for children to interact with each other in play. A questionnaire about children’s social interaction identified essential social skills that cause social interaction improvement. This field study identified some toy design specifications. In order to select appropriate concept, superior concepts were evaluated by experts based on design specifications. The field study of this research included qualitative interview with experts, and a questionnaire which consisted of open-ended and closed-ended questions. The questionnaire was developed based upon results of literature review. As the objective of this research is designing a toy that improves children’s social skills, this study focused on major information about children’s requirements. Also some necessary information was gained by an interview with the chairmen of beatification department in Tehran city hall.

Sample description: The field study of this research was conducted in a number of parks and schools in the north of Tehran. Asking parents provides valuable information easily and quickly. They have precise information about children’s requirements because most mothers spend most of the day with their children. In this study, mothers work outside averagely 2:30 hours a day. Therefore they were asked about their children’s favourite plays, social skills and conflicts. Moreover, according to Fisher et al. (2008), mothers might encourage certain forms of play activities. Considering cultural factors in this study, mothers play a curtail role in selection of a toy. If children choose a toy to play, it must be allowed by their parents. Even in public places, parents might encourage or discourage their children to play with some/certain playground equipments. Therefore parents were asked about the type of the toy they prefer for their children. Information about child-product interaction were obtained through some interview with mothers, 2 chairmen of beatification department in Tehran city hall, and designer’s field observations at park environment. Some information about children’s favourite plays, interactions and conflicts, parent’s requirements of children’s toys, and important social skills were obtained from a questionnaire. For this qualitative research questionnaires were filled by 30 parents who have at least one 7 to12- year- old child. The sample group included 15 girls and 15 boys with an average age of 9 years.

Social skills questionnaire development: A list of social skills was extracted from literature review. It should be noted that some of these social skills can be developed just via a game and game rules (for example: asking for permission, thanking, or apologizing). For that reason, 8 industrial designers were asked to select 5-10 of social skills (from the whole list) that can be developed via a toy. Results suggested 14 social skills that can be developed via a toy. These 14 skills arranged in 5-point Likert scale questionnaire (Babbie, 2009) are: effective initiation of interactive social play , sharing limited resources, offering and demanding help, social patterning, exchanging information, non-verbal communication, self-control, team working, negotiation and compromise, cooperation during competitive play with limited resources, following the rules, turn-taking, responsibility, and leadership.

Questionnaire analysis: Parent’s answers to closed-ended questions which were arranged in 5-point Likert scale and were analyzed for their mean scores. Also, parents’ qualitative answers to open-ended questions were categorized by experts. For example: the causes of toys destruction were categorized by a child psychologist and an industrial designer to recognize the main causes of toy vandalism. Conflict issues were categorized by a child psychologist to recognize children’s poor social skills (from the 14 selected skills).

2.1 Type of play

Play pleasure is achieved by occurrence of desirable feeling and gaining a predicted result (movasseghi, 2001). Children’s favourite plays encourage them to play and thus to interact with each others. Parent indicated their children’s favourite plays. If their child was interested more in solitary plays they scored 1, and if the child was interested more in social plays they scored 5. If the child was interested in both types of plays the same they score 3. They scored 1 to 5 and the mean score were

gained. Mean score 3.1 for measure of children's interest in solitary or social plays indicated that children are almost interested in solitary plays as social plays.
There are same educational values of competitive and cooperative plays. Children would exhibit cooperative behaviour in the midst of competition because they must agree to the rules and abide by the rules, all of which requires cooperation in order to compete (Zan and Hildebrandt, 2005). Mean score 2.8 for measure of children's interest in competitive or cooperative plays indicated that children are almost interested in cooperative plays as competitive plays, because the score is near 3. (Parents scored 1 to 5; if a child was interested more in competitive plays parent scored 1, and if the child was interested more in cooperative plays they scored 5.).
Parents mentioned one or more important issues about children toys. The most important issue were the type of play that child deals with it (For example: intellectual play or active play.); 17 parents out of 30 mentioned it. Also 5 parents out of 30 mentioned product's high quality and durability, 7 parents mentioned design (being washable and understandable), and 7 parents mentioned child entertainment. Furthermore parents mentioned some types of play they prefer for their children (more than one). Actually parents preferred intellectual and creative, as well as physical and active toys to other types. Because 24 parents out of 30 mentioned the intellectual and creative toys, also 23 parents out of 30 mentioned physical and active toys (While 7 parents mentioned analogue toys and just one person mentioned digital toys.).

2.2 Social skills

Conflict on play dates is an important area to target in social skills training programs. Social skills intervention programs have begun to focus upon decreasing conflict on play dates as a means to improve peer relationships (Frankel and Mintz, 2010).
According to parents, conflicts among children happen due to problems such as difference in power and leadership style, using other children's toys without permission, sharing toys, choosing play and toys, turn-taking, game rules and cheating, giving role-play to team individuals, and losing or winning in competition. These problems were categorized by a child psychologist to recognize children's poor social skills (For example: the child psychologist was asked to identify some social skills from the 14 selected skills that should be improved to decrease conflicts over choosing play and toy.). Results indicated just 6 social skills out of 14 have important role to decrease conflicts. Because some parent mentioned more than one problem and also more than one poor social skill can make a problem, results were reported in percentage considering the frequency of each skill. Conflicts among children happen due to weak social skills that include 41% negotiation and compromise, 16% sharing limited resources, 14% turn-taking, 14% doing team work, 11% following the game rules, and 4% self-control. The most important factor that creates conflict among children is a lack of negotiation and compromise skill which results in conflicts over power and authority, choosing play and toy, and giving role play to team individuals.
The analysis of questionnaires showed that, according to parents, importance of all 14 social skills is more than average. Since the mean scores were not so scattered, social skills such as effective initiation of interactive social play, doing team work, negotiation and compromise, following the game rules, and responsibility have the priority than other skills, because they had the mean score over 4, and their importance was very high for parents.

2.3 User-product interaction

Children on average attend 2.7 times per month in parks and entertainment places (Standard deviation 1.3). However, seasons play an important role in children's attendance at these places. Therefore children rarely attend in the parks in winter, but they do 3-4 times a week in summer. According to chairmen of Tehran city hall a toy shouldn't occupy more than 10 square meter area. Also it should follow safety standards of Iran. Toys safety prevents the probable hurts and injuries to children. Toy designers, use the anthropometric dimensions in order to assure that using of the product is easy and safe, and the product is easily controllable by children. In all types of children's toys, spaces that some part of body may stick in them are dangerous, and should be considered very carefully (Lueder and Rice, 2008; Pheasant, 2012). It is essential to avoid sharp edges of metals and plastics in toys or playing equipments. Also, some other obligation should be considered such as being washable, having the drainage holes, easy assembly, and maintainability (standard IAIRI 6204). Islamic clothing for girls older than 9 years at parks affected play grounds and child-product interaction. Also their long

dress or scarf sometimes caused difficulty and danger in controlling active toys (such as climbing ladders or playing with ropes).
In parks environment there was a weak relationship between children and public toys. The product probably was unknown to them and they needed to experience it as result. Wrong or careless use of product may cause vandalism. According to chairmen of Tehran city hall, decreasing vandalism rate in public play grounds is economically important; the presence of some responsible observer decreases the vandalism rate. According to parents, the reasons of children's toy destruction were 16% in excessive uses and wear and tear, 10% in low quality product, 7% in wrong using, and 67% in vandalism due to children's creativity and curiosity such as aggressive plays, hitting the toy and taking apart toy parts in order to discover the product functions.

2.4 Design specifications

The analysis of information about play, toy, and children's social interactions identified children's requirements about play and toy. These results can be used as design specifications in designing process of a toy which improves children's social skills.
Mean scores of children's interest in solitary or social plays showed that children enjoy the solitary and social plays at the same rate. But social plays which include both competitive and collaborative activities provide an opportunity for social interaction and learning social skills. That's why, it is better to design a product which involve both kinds of plays, but, more attraction and stimulation to social plays to encourage children to interact each others. They are not forced to play together. Therefore, when a child has no play mate he/she can still the product. According to Zan and Hildebrandt (2005), there are similar educational values of competitive and cooperative plays. Children would exhibit collaborative behaviour in the midst of competition. Because, this study also showed children's same interest in both kinds of plays, the product could be appropriate to one of them or both. To achieve this purpose, design could focus on creating social player-interaction patterns by designing various opportunities for players to collaborate and compete with each other. Since, there is the possibility of performing both kinds of games in open-ended plays (Bekker et al. 2010a); designing open-ended play can be useful. Moreover, an analogue toy for intellectual and creative plays or physical and active plays has priority because parents pay more attention to the play types that children perform.
Improvement of social skills to provide parents desires and decrease conflicts among children causes social interaction improvement. Since the importance of all 14 social skills is more than average from parent's point of view, the skills with high importance to parents are in priority and should be made stronger as well. Also, according to 4% role of self-control skill in reduction of conflicts among children, more than 95% of conflicts can be decreased regardless of self-control skill by strengthening other social skills. Thus the essential skills which should be strengthened include: effective initiation of interactive social play, negotiation and compromise, doing team work, turn-taking, sharing limited resources, responsibility, and following the game rules.
Effective product is one that adequately is safe and encouraging for all boys and girls aged range of 7 to 12 to keep on playing, and it arouse the pleasant feeling of playing together in children. Moreover, design can prevent early deterioration of product through improving product quality, eliminating possibility of inappropriate use, and decreasing vandalism. Also, design can limit destructions, due to creativity and curiosity, in order to decrease vandalism.

2.5 Concept Design

Based on design specifications outcome of results of this research, four superior concepts are selected and 3D models are prepared by computer as follows:
Gold music box: It is a musical device which has 3 music machines inside. When a child rotates the handle of individual music machine, its sounds could be heard (Figure 1). Each of the machines creates one sound of a trio. When 3 children rotate 3 handles regularly and harmoniously, a complete music could be heard. Considering that children might not have an accurate diagnosis of a correct implementation, this operation was changed to objective by using 3 colour strips on the toy body. In this way, the rotation of each strip represents the implementation of each machine. Music implements correctly just when strips rotate regularly and similar colours are aligned while rotating. Just in this situation, there is no phase difference between 3 parts. This device is useful in solitary or social plays

and it is suitable just for cooperative plays. This concept used music to necessitate team group harmony.

Figure 1. Gold music box

Stick-Ball: It is a play table with some sticks which children hit a ball (Figure 2) to score a goal. When the ball meets the noisy surface of the table wall, it results deflection of simple path and unexpected movement. This play has different social player-interaction patterns. For example, group members cooperate and try to beat the opposing team (team competition). Also, if one side is considered as imaginary opponent gate, an individual tries to goal (single player versus game), or group members cooperate to score. They can close opposite sticks to obstruct the ball return to their gate (cooperative play).

Figure 2. Stick-Ball

Foot-Balance: It is a bouncy balance base toy. When children stand on its podium, they make it out of balance and move some marbles. When they descend the podium, its balance board returns to basic horizontal position (Figure 3). There is possibility for both social and solitary plays, competitive and cooperative plays. In solitary play, a single child leads the marbles by pressing on podium, descending one side and ascending other side. In social play, children cooperate to direct marbles, and also they can compete with each other. For example, the winner is the one whose marble reaches his/her goal. The product's rounded shape encourages the children to share it and interact with each other. Children cannot put their foot on the transparent spherical cap and walk on it, because of its spherical shape.

Figure 3. Foot-Balance

Hand-Balance: This concept is similar to Foot-Balance in most respects (Figure 4), but its balance board is not bouncy and it is in unstable equilibrium. Thus, it can be pushed from every point with a little force. Consequently, it goes down and stays in the same state, where there is no access to lift it from same point again. Game implementation is difficult individually because, to change the direction of its balance board, it should first lie in horizontal mode. Thus children need cooperation to tilt the board, and move the marbles. Cap convexity of this concept is less than Foot-Balance because it would be controlled by hand and its balance board is located in a high level that is less open to vandalism.

Figure 4. Hand-Balance

2.6 Concept Evaluation

Considering design specifications, selection criteria were gained. Selection criteria consisted of psychological criteria like improving child's social skills, encouraging to social play, and so forth, as well as some essential design criteria like safety, being washable, and so forth. Therefore two evaluation questionnaires for industrial designers and psychologists were designed. Since the concepts are not manufactured, 4 superior concepts were explained in detail to experts. 11 industrial designers and 19 educational psychologists with MA or PhD degree evaluated superior concepts. Each concept was given a score of 1 to 5, considering design specifications. The weight of each selection criteria was considered equal to 1, and the mean scores were calculated because in 3 authors' opinion there is no priority between selection criteria (Ulrich and Eppinger, 2004); all psychological criteria are essential to research objectives also all design criteria are critical for outdoor play ground. The reliability of the questionnaire was tested by the Cronbach's Alpha method and was rated 0.872 for design questionnaire and 0.862 for Psychological questionnaire which are acceptable.

The results of evaluation showed that Stick-Ball is weak in improving team work and Gold music box is not suitable for competitive plays and open ended plays. Comparing scores of Foot-Balance

and Hand-Balance indicated that Foot-Balance is superior to Hand-Balance because of psychological criteria and activity of the toy. However, it is weaker in the ergonomics and safety, and vandalism resistance. Accordingly, Hand-Balance was selected. Considering results, the selected concept gained 93 scores out of 110; for industrial design criteria it gained 30 scores out of 35 and for psychological criteria 63 out of 75. It indicated that the selected concept can encourage children to social play and improve their social skills.

2.7 Features of Selected Concept

The final concept usable at park and school is a balance base type for maze and marble. It is in unstable equilibrium and controllable by hand (Figure 4). When a child pushes any point of the toy top, with a little force, the same side of the body goes down and moves some marbles. Eventually, it stays in the same state in 7 degree angle. There is no access to lift it from the same point again because of a limiting hoop that encircles the body side. Scalloped edge of body and limiting hoop prevents changing the direction of balance board. Therefore, tilting the board in any direction is difficult individually, and it is easier for children to help each other. First they should gently turn the board back to horizontal mode (so that the balls do not move). Then they can lower the intended side (Figure 5). In solitary play, a single child directs the marbles. In order to play easily and quickly, a single player needs others help that can provides demanding or offering help and effective initiation of interactive social play. In social play, children cooperate to direct marbles, and also they can compete to direct the marbles to the goal. The competitive play also needs players' cooperation. All players are responsible for their roles. Also, they may need a leader for proper team working and negotiation.

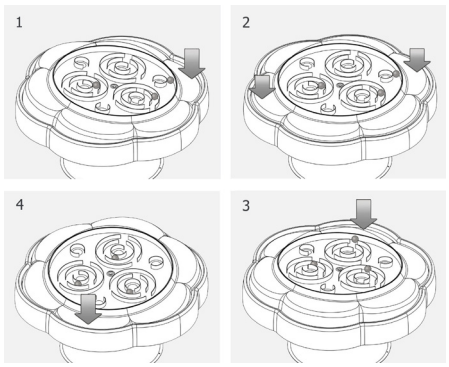

Figure 5. The process of transferring marbles from position 1 to 4

There can be various maze and marble games inside transparent case. But mazes should create opportunities for players to define their own game goals and rules. Also they should have no score for different levels. 3 types of mazes were designed for this concept (Figure 6). Colour categories, consecutive gates, and some holes, were used for open-endedness of the game. In some parts of the maze, there is a gate behind another one which leads to possibility of success or failure. Player's success, to get game goals, requires fine motor skills of player's hand, and fine control of balance board in less than 7 degree angle.

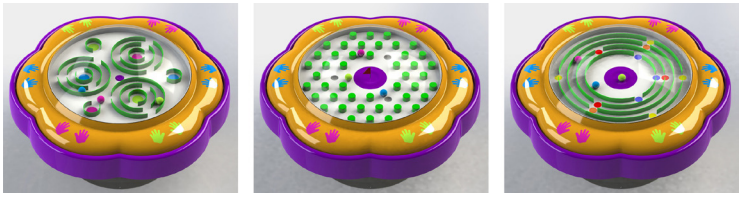

Figure 6. Various maze and marbles inside the transparent case

The transparent spherical cap protects maze and marbles from vandalism and atmosphere factors, and prevents any fraud and wrong use. The product gestalt is like a flower which is beautiful for 7 to 12-year-old children (Parsa, 2010). The product's rounded shape encourages children to share it (Bekker et al. 2010a). Scalloped edge of the toy shows children's standing position and pushing point. The body is formed of the three secondary colours (green, orange, violet) that are not gender stereotypes (Jalil et al. 2013) According to cognitive ergonomics, the connection of colour, form, and function was

considered beside colour psychology to choose the product colour (Boy, 2007). At these ages, children can classify objects, based on definable criteria (Ginsburg and Opper, 1992).Three mazes and three marbles in three colours (blue, pink, yellow) encourage children to grouping, and it creates situations for open-ended plays. These colours in shape of hands determine the best position for putting hands and pushing the toy body. The hand shape is encouraging for children and it indicates product performance.
Therefore, the selected toy which designed based on industrial design principles and toys standard assures the aesthetics, safety, and ergonomics. Also it provides both solitary and social plays; but, more attraction to social plays to grow children's social skills and promote their collaborative behaviour as a result.

3 CONCLUSION

Social skills improvement can be achieved, by encouraging children to social interaction; when a child can play solitarily, but would prefer to play with other children. Selected skills which provide parents desires and decrease conflicts among children in play are: effective initiation of interactive social play, negotiation and compromise, doing team work, turn-taking, sharing limited resources, responsibility, and following game rules.
Designed product is a balance base type for maze and marble which is controllable by hand. Although it is suitable for both solitary and social plays, it stimulates children to social interaction and improves their social skills. In this study, social player-interaction patterns were used to design various opportunities for players to collaborate and compete with each other. Also, children's interaction and conditions for negotiation and cooperation was emerged by creating opportunities for players to define game goals and rules. This physical toy not only encourages children to interact with each other but also it causes mobility and pleasure. This research, in order to design an analogue product, focused just on social skills improved by toy design. Future research can focus on skills such as asking for permission or thanking improving by game design or digital products design.

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