

## Children's social interaction and play environment: an approach to user-centered design

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### Abstract

Social interaction is of great importance for 7 to 12 age group. In order to design user-centred play equipment for different environments which improve children's social interaction, this study aims to identify the role of play environment in players' interactions. To achieve the objective mothers were asked to fill in a questionnaire. Results indicated that children usually play with their peers at home, park, and school. Comparison of these 3 major environments identified girls prefer to play at home with their peers while boys prefer to play at school. Besides, the most effective conflict issue between players in park and home environments is the authority, but choosing and sharing in the school environment. Considering assignment of conflict issues and social skills, the negotiation skill is the most important skill which should be improved in order to decrease the conflicts in all environments. These results can lead to different design strategies.

**Keywords:** Play environment; Social interaction; User-centred design; 7 to 12 age group

### Introduction

At the age of 7 to 12, children are interested in social plays (Al Mahmud, Mubin, Shahid, & Martens, 2010) and communicating via game play (Mueller, Gibbs, & Vetere, 2010). At this stage, children's social interaction is of great importance as they go to primary school and enter the society (Engaji & Asgari, 2007). Interpersonal communications is the process of interaction between humans (Wood, 2000), and Social skills provide the context for the selection of proper behaviour and communication (Cartledge & Milburn, 2006). Previous studies showed that social skills are changeable and perfectible skills (Aksoy & Baran, 2010). For example, the implementation of physical education activities can cause social skill improvement (Tsangaridou, Zachopoulou, Liukkonen, Gråstén, & Kokkonen, 2013). Play as well is a means of enhancing social skill-related activities and stimulates children to cooperate (Cartledge & Milburn, 2006). There are some 14 social skills for instance, that can be improved via an analogue toy 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, following the rules, turn-taking, responsibility, and leadership (Sepahpour, Shahabi Haghighi, & choopankareh, 2015).

### Design and Environment

It is clear that play environment affects children's play type and their interaction with other children and play devices (King & Howard, 2014; Czalczyńska-Podolska, 2014) as children's plays vary across countries, cities, cultures and seasons (Ergler, Kearns, & Witten, 2013). Destination, social interaction, and proximity to home are reasons for playing in a place, whereas risk of traffic and strangers, low air quality, and unfamiliarity were perceived as barriers (Zhou & Larsen, 2015). It should be considered that different play environments like park and school playgrounds as well as

homes can lead to children's different activities. Choice varied across contexts according to the number of children involved and whether or not an adult was present (King & Howard, 2014). Adventure playgrounds can offer an abundance of developmental opportunities for children to grow emotionally, socially, and physically (Staempfli, 2009). Playgrounds should be in harmony with the site's topography and climatic conditions (Sabri & Abbaspourasadolah, 2014), and follows universal design principles (Torkaman & Shahabi, 2015). However, parents believed that parks play equipments are boring for older children (Veitch, Bagley, Ball, & Salmon, 2005). School playgrounds are also valuable on children's health in terms of physical activity, cognitive and social outcomes (Broekhuizen, Scholten, & Vries, 2014; Smith, Kipps, Aggio, & others, 2014). Therefore, schools should have social environment of break times, facilitating walk and talk routes for girls and sporting opportunities for boys (Powell, Woodfield, & Nevill 2015). As conflict on play dates (a play session at home) is an important area to target in social skills training programs (Frankel & Mintz, 2010), school playgrounds provide everyday opportunities for children to learn about conflict and its resolution (Doll, & Sarver, 2014).

In the field of design, there are some researches on social interaction of children during playing with some new products. One study showed that fantasy and responsibility toward a cuddly toy stimulated children to interact with the toy or with other children (Penados, Gielen, Stappers, & Jongert, 2010). Another one indicated that social interaction occurred in the form of cooperation and competition within and between the teams while children are playing with a tabletop game (Al Mahmud et al. 2010). It is worth noticing that an analysis of first graders' social behavior showed that children's play of cooperative games and competitive games appears to be equally cooperative (Zan & Hildebrand, 2005). Sometimes designers used some limitation that made it difficult to get the game goals individually so children were encouraged to work and listen together, and help each other in order to gain better result (G Man, 2012; Liebal, Colombi, Rogers, Warneken, & Tomasello, 2008; Sepahpour et al. 2015). Besides, designing various opportunities for players to collaborate and compete with each other by using players' interaction patterns stimulated children to social interaction (Sepahpour et al. 2015) since open-endedness of play required negotiation about game goals and rules which stimulated players to social interaction like cooperation to get the game goals. (Bekker, Sturm, & Eggen, 2010). Furthermore, an analysis of children's play behaviour in open-ended play environment demonstrated that the predominant types of social interaction change from solitary to parallel to group play as players move from the invitation stage to the exploration stage and on to the immersion stage (Valk, Bekker, & Eggen, 2015).

All in all, previous research indicated some essential features of park and school playground, but they didn't concentrate on the effects of each environment on children's interaction. Many play devices also, have been designed to improve children's interaction. However, there is lack of information about children's various behaviour in different play environments where the devices would be used. This study concentrates on players interactions in different play environment to design user-centred play equipment (which improves children's social interaction.).

This qualitative research is done in a populous city where growing apartment made some problems for peers to play together in the neighbourhood. Increasing the number of one-child families and decreasing visiting the relatives decrease the number of home play mates. Also, having 4 seasons influences outdoor plays. The objective of the research is identifying the role of different play environments in social interaction of 7 to12-year-old children. Consequently, this information leads to identify some factors in designing user-centred play devices for each environment. To achieve the objective, the main research questions of this study are: "what are dominant environments where children play together?", "does play environment affect children's social

interaction?”, and “how does play environment affect children’s interaction with each other and with play devices?”

### **Research Method**

In order to answer the research questions, some information about children’s play were identified relying on mothers’ point of view, based on a qualitative field study. The field study of this research included a questionnaire which consisted of open-ended and closed-ended questions (Babbie, 2009). The questionnaire was developed based upon results of literature review.

The field study of this research was conducted in the parks and schools of region 3 of Tehran. Mothers were asked for filling a questionnaire about children’s social plays because they spend almost all day with their children and have precise information about their plays at home and park. The questionnaire obtained some necessary information about children’s social play environment, their social interaction and play types, peers relations in different places and the reason of conflict between them, as well as interaction of children with play devices in different environment. As parents cannot supervise their children at school, 4 physical training teachers of primary schools answered the 3 questions about the play type, user-product interaction, and the reason of conflict between students at school.

The questionnaires were filled by 30 mothers who have at least one 7 to12- year- old child waiting to pick up their children from school. The sample group included 15 girls and 15 boys with an average age of 9 years, whose mothers work outside 2:30 hours a day in average.

Mother’s answers to closed-ended questions and questions designed in Likert scale were analyzed by software. Their qualitative answers of open-ended questions were categorized by information obtained from literature review and 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. Furthermore, since lack of proper social skills is one of the causes of conflict in children’s play (Frankel & Mintz, 2010), conflict issues were categorized by a child psychologist to assign to children’s poor social skills.

#### ***Dominant environments***

Children’s favourite plays and proper environment for playing with peers provides suitable situations for them to interact with each other.

Mothers stated that their children (7-12) play with peers usually in park, school and home environments. Figure 1 indicates that only 4 children out of 30 play in streets and house gardens which is negligible number.

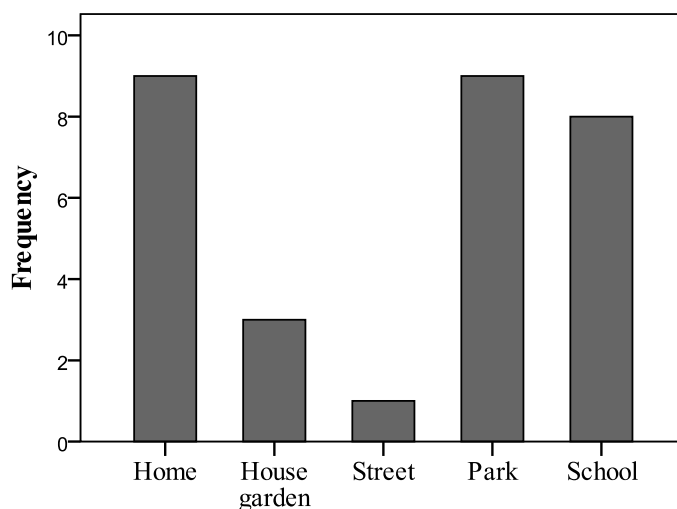
The fact that how many times children attend in each environment as well as the number of playmates in these places affected children’s social play at home, school, and park environment.

#### ***Home***

Figure 1 shows 9 children out of 30 usually play with their peers at home. Home environment has not time limitation for children’s attendance. However there is significantly space limitation and play mate limitation. The average numbers of children who are simultaneously at home and interact with each other are 3.

#### ***School***

As figure 1 shows 8 children out of 30 usually play with their peers at school, especially in spacious school yard. Although schools are closed in summer, there is a high opportunity for social plays in the school environment. This could be due to the large number of students and some physical training teachers who encourage the students to do social plays.



**Figure 1. Social play places**

#### *Park*

Figure 1 shows 9 children of 30 choose to play with their peers at limitless space of park. 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 their attendance at these places. Consequently, children rarely attend in the parks in winter but they do 3-4 times a week in summer.

#### Comparison of different play environments

Children's behaviour is affected by the number of players and their familiarity, as well as, whether or not an adult is present during the play time (Green & Rechis, 2006; King & Howard, 2014). Research on the foundations of social trust mainly concentrates on the evaluation of one's social environment (Freitag & Bauer, 2016). Research on the foundations of social trust mainly concentrates on the evaluation of one's social environment (Freitag & Bauer, 2016). In this study also the number of children, their interaction with playmates, and their attendance in these three places were different. Children on average attend 2.7 times per month in parks. Although they rarely attend in the parks in winter, they do 3-4 times a week in summer. In contrast to parks, schools are closed in summer, so parks and schools probably complete each other. Although home environment has not limitation for children's attendance, the number of children who are simultaneously at home and interact with each other is fewer than that of parks and schools.

Different play environments influenced children's play types and gender differences, play mates' interactions and conflict issues between them, as well as play device and player's interaction.

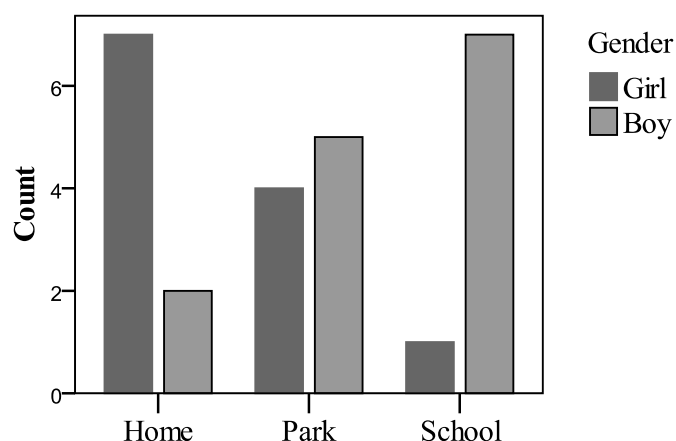
#### *Play mate and play type*

Each play environment leads to various play types as well as play mates. Children's behaviour changes as a consequence of how well they know their playmates. For example unfamiliar playmates operate under the distributive justice norm of equity and each participant in the interaction only receives as much as they give (Green & Rechis, 2006). The skills and motivation to engage in complex forms of collaboration and cooperation seem to emerge early on during infancy and childhood (Amici, 2015). Playmates at home are more familiar together than at schools and they are often unfamiliar at parks. In the home environment children work well together in not only cooperative but also competitive plays as they are familiar together. Children in the school

environment work well together as they are almost friend, while their familiarity is less than home play mates. Also, in the park environment as children are often unfamiliar, each participant in the interaction only receives as much as they give.

Sample group children had in average 3 toys of 10 for social plays. However, they engaged more in imitating plays with their peers at home. For example, they prefer playing with dolls, Lego, and car toys which are sedentary plays suitable for limited space of an apartment. Most of these children are girls (7 children of 9). Usually the play type in the school relies on the physical training teachers who encourage students to special plays, like football, during sport time. A comparison of children's play at parks and schools showed that the opportunities for social plays in the school environment are higher than parks. This could be due to presence of familiar peers and physical training teachers as an adult who motivate the students to social plays at schools in comparison to absence of familiar peers and teachers at parks. That's why, just a suitable play devices can encourage unfamiliar children to interact with each other in the park environment. On the other hand, there are fewer opportunities for social plays in parks because of the absence of familiar peers and leader teachers. Besides, there was not only the lack of public toys in the park play grounds but also lack of appropriate toys for 9 to 12- year- old children. Therefore, children aged 9 or over, are rarely interested in playing in the park playgrounds. Yet, older children were interested in playing with their unfamiliar peers, and prefer to play with their own personal play devices such as bicycle, skate, and scooter.

Generally in all environments, the sample group are almost as interested in solitary plays as social plays and they enjoy both types of competitive and cooperative plays with their peers. In fact parents gave score for children's interest from 1 to 5 (1 for solitary and 5 for social plays, and 1 for competitive and 5 for cooperative plays). However, children who play in home environment with their peers in average have a little tendency to solitary plays (mean score: 2.5), and children who choose to play at park in average showed a little tendency to social plays (mean score: 3.3).



**Figure 2. Gender differences in different environments**

#### *Gender differences*

Boys and girls showed different interest in an environment for playing with their peers. Pearson Chi-Square test showed a meaningful difference between girls' and boys' social play

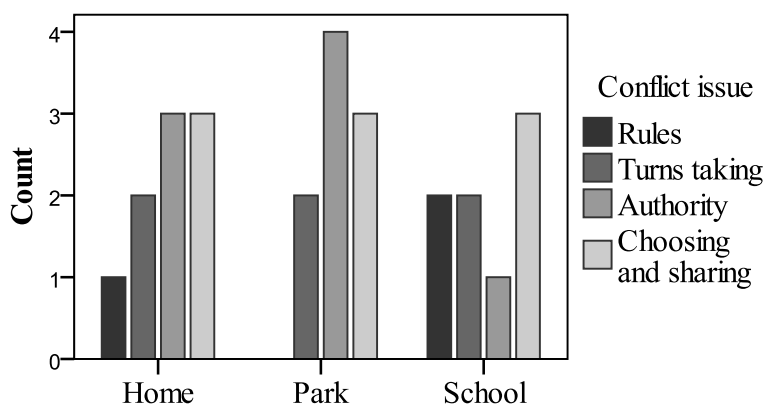
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environment (p-value: 0.026). Figure 2 indicates almost all children who choose school environment to play with their peers are boys (only 1 girl chose school for social plays) as they prefer more active social play in spacious school garden. On the other hand, 7 children out of 9 who play at home with their peers are girls because the home space limits boys' active social plays. Yet, there is almost a same interest in playing with playmates in park environment for both genders, because there is unlimited space for active plays which are not gender stereotypes.

#### *Conflict issues*

Conflict among children were categorised in 5 major groups: turns taking, winning and losing in a competition, rules (game rules and cheating), authority (power and leadership), as well as choosing and sharing (sharing limited resources like play devices, choosing team members, giving role-play to team individuals, ownership of a toy, and choosing a play type).

As play type and playmates were varied in different environments, conflict issues were various too. However, there is not a meaningful difference between children's conflict issues in different play environments. In the home environment, conflicts between playmates are mainly over authority, choosing play, and sharing and choosing toys. In the park environment, children's conflicts are mainly over authority and leader ship, choosing and sharing play devices, and turns taking. Even though school playground conflict is not necessarily destructive (Doll, & Sarver, 2014), students' conflicts in this environment are mainly over choosing play and giving role-play to team individuals, game rules, and turns taking. Figure 3 shows authority is the most important conflict issues in the park and home environments, but not in the schools. Then choosing and sharing is important issue in all 3 environments. Also, the less important issue could be following the game roles which do not happen at parks at all. As conflicts over winning and losing happens in house garden environment which is mentioned only by one mother, it did not appear in the bar chart.

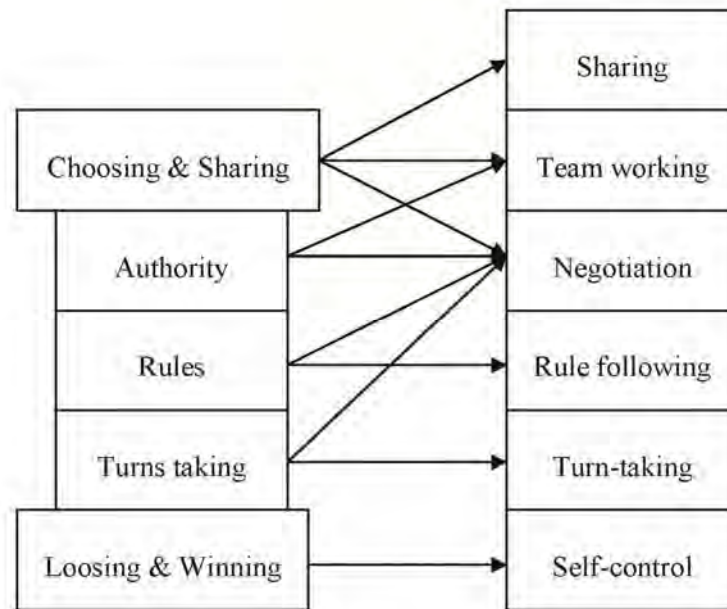


**Figure 3. Conflict issues in different environments**

Social skills intervention programs have begun to focus upon decreasing conflict on play dates as a means to improve peer relationships (Frankel & Mintz, 2010). According to Sepahpour et al. 2015, 14 social skills can be improved by an analogue toy. This study indicated that only 6 social skills out of the list of 14 skills have an impact on conflicts among children during play. These social skills are: negotiation and compromise, sharing limited resources, turn-taking, doing team work, following the game rules, and self-control.



Figure 4 indicates how conflict issues were assigned to social skills which should be strengthened in order to social interaction improvement. The left column of the figure shows conflict issues, and the right column shows assigned social skills.



**Figure 4. Assignment of conflict issues to social skills**

Generally, the most effective skill is negotiation and compromise skill, lack of which caused 41% of conflicts among children, such as conflicts over power and authority, choosing play and toy, and giving role play to team individuals. Also, self-control caused only 4% of conflicts which is not related to the 3 major environments.

Table 1 indicates the rate of conflict issues and their related social skills in regard to the frequency of conflict issue in each environment. The calculation of the percentages in each environment showed almost the same results about lack of negotiation and compromise which caused 42% of conflict issues in each environment. The next effective skill also is team working because lack of this skill caused 33% of conflict issues in parks, 28% in homes, and 21% in schools environments. Furthermore, following the rules is considered to be the least important skill because it didn't affect conflict issues in park environment although lack of this skill caused 4% of conflict issues at homes and 10% at schools.

#### *Play devices and players*

Improvement of players and play devices interaction results safety for users and durability for the product. In fact, different play environments require various safety standards, and cause different vandalism issues. According to mothers and physical training teachers, relation of players and play devices was different in different situations.

As toys safety prevents the probable hurts and injuries, 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 (Alison & Ilene, 2008; Pheasant, 2012). According to toy safety standards of Iran, it is essential for all play devices to avoid sharp edges of metal and plastic. On the other hand, some other obligation should be considered for public and outdoor play devices (which are used at park and school) such as being washable, having the drainage holes, easy assembly, and

maintainability (standard IAIRI, 1382; standard IAIRI 6204). All outdoor play devices should be maintained in cold snowy or rainy winters as well as hot sunny days of summer. Besides, since children's clothes vary in different environment, it can affect user-product interaction. For example, some school uniforms can cause difficulty or danger in controlling some active toys.

**Table 1. The rate of conflict issues and their related social skills**

Play environment		Home	Park	School
Conflict issue	Related social skill	Frequency	Frequency	Frequency
Rules	Negotiation	1	0	2
	Rule following			
Turns taking	Negotiation	2	2	2
	Turn-taking			
Authority	Negotiation	3	4	1
	Team working			
Choosing & Sharing	Negotiation	3	3	3
	Team working			
	Sharing			

Children try to find out what the system of a toy is while exploring it. In the step of discovering, users interpret how the system works (Valk et al. 2015). In this step most vandalism issues happen. According to mothers, children's personal toys in different environments were destructed due to excessive uses and wear and tear (16%), low quality product (10%), wrong using (7%), and vandalism (67%). Vandalism was caused by children's creativity and curiosity such as aggressive plays, hitting the toy and taking apart toy parts in order to discover the product functions. However, toy owners had nearly a close relationship with the product and protected it. The toy also was a recognized item for owners so they used them easily. In contrast, there was a weaker relationship between children and public toys in the park and school environments. The product probably was unknown for users and consequently they needed to experience it. Although wrong or careless use of product may cause vandalism, the presence of some responsible observer decrease the vandalism rate in park play grounds. The vandalism rate in schools was less than parks, because there were some teachers who are supervisor and responsible to save the toys, and responsible or dominant students who behave to some extent as the owner of the toy.

### Design strategies

There would be different design strategies in regard to difference of 3 major environments. Table 2 identifies the summary of this comparison. The right column shows some compared factors, and other 3 columns show differences of the mentioned factors which should be considered in each environment.

Design strategy, here, is depended on designer's taste or design approach. For example, since boys usually play with their peers at school but they seldom play at home, designers can have 2 different strategies. On one hand designers can design play devices to encourage boys to social plays in limited home environment. On the other hand they can just concentrate on designing girlish play devices for home environment and boyish play devices for school environments. Another example of designer's taste is related to time limitation of schools and park. Designers can utilize time limitation. They can design play devices for school environment which doesn't have to resist summer heath as school play devices won't be used in summers. In contrast, they can consider



reasons of these limitations in order to design play devices which encourage children to attend in the parks in winters or attend in the schools in summers.

**Table 2. Comparison of play environments**

Environment Compared factor	Home	Park	School
limitation	Space The number of peers	Time	Time
Gender of players	Girl	Girl & Boy	Boy
Players familiarity	Familiar	Unfamiliar	Familiar
Conflict issue	Authority Choosing & sharing	Authority Choosing & sharing	Choosing & sharing
Necessary social skill	Negotiation Team working	Negotiation Team working	Negotiation
Vandalism reason	Creativity Low quality	Creativity	Creativity

Furthermore, according to players familiarity in each environment, new concepts can eliminate some situations of conflict issues or can decrease them by improvement of necessary social skills. New products which are to design for park environment can be more persuasive for unfamiliar children to interact with each other. Also, designers can consider the main factor of toy destruction (creativity and curiosity), and user-product interaction in order to increase product's durability, and child's security in different environments.

### Conclusion

This study compared the user experiences in 3 major play environments where children often play with their playmates. Analysis of a questionnaire indicated that children prefer to play with their peers in home, park, and school environments. To design any user-centred play devices, it is essential to have a great knowledge about product's environment and its impact on players' interactions and user-product interactions. As public products in park environment probably was unknown for users and needed to be experienced, wrong or careless use of product may cause vandalism. However the most important reason of vandalism in all 3 environments is child's creativity. Play environment significantly affects players' interactions. The parks and the schools can completely gather the children together in one year duration. That is summer plays in the parks and school time plays in the school. Although there is no time limitation in the home environment, the limitation of the space and the number of players exists in a house. Results of the study showed a meaningful difference between girls' and boys' social play environment as girls are interested in imitative social plays in home environment while boys prefer school yards for more active plays. In park environment main conflict issue of unfamiliar play mates is the "authority" while in the home or school environment familiar playmates have conflict over "choosing and sharing". These conflict issues could be restricted by new design or decreased by improvement of children's social skills. The assignment of social skills and conflict issues indicated that most conflict issues, in each environment, are related to the "negotiation" skill. This study discussed social interaction of children in 3 major environments and designers can have different strategies to design some user-centred play devices. Next studies can explore psychological effects of weather factors like temperature and

light on the user's moods and behaviour which could be an effective factor in human interpersonal behaviours consequently.

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