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The effects of interaction and learning styles on children's experiences in exhibition spaces

Seniye Banu GARİP[1], Gökçe EVREN[2]
[1] baseskici@itu.edu.tr • Department of Interior Architecture, Faculty of Architecture, Istanbul Technical University, Istanbul, Turkey
[2] gokcevren@gmail.com • Interior Architectural Design Program, Institute of Social Sciences, Istanbul Technical University, Istanbul, Turkey

Abstract
The 'didacticism' oriented exhibition spaces first seen in 20th Century that begun with the idea of modern museums have led the new design understanding to be influential and also enabled the visitors actively participate in exhibitions. Today, interaction design is used extensively in exhibition spaces and in-depth studies are required to provide interaction most particularly for children. This article examines the contribution of interaction design and methods to spatial experience and learning process of children in exhibition spaces. In this context it is investigated how the processes of learning, experience, communication and interaction can be coordinated by means of emotions, senses, activities and play. A research which includes an exhibition design for primary school children and an experiment which is done with 121 children that experienced the exhibition is conducted. The exhibition is designed to give information about the story of the novel 'My Sweet Orange Tree' of Jose Mauro de Vasconcelos to children via generated spatial experiences. Students' experiences and behaviors are observed, and a questionnaire is done in order to understand the children's evaluations and to test their understanding of the story. As a result, some clues related with interaction design were highlighted for future applications. Basicly, it is experienced that, in exhibition spaces for children, interactivity can be ensured not only by use of digital technicques, but also various methods as well.

1. Introduction

The archetypes of exhibition spaces used for preservation and exhibition within the historic process go back to Paleolithic Era (Hein, 2000). However, the exhibition spaces described as the first ones in history are 'cabinets of curiosities'. These spaces from 16th Century have become the places where the intriguing objects found during geographical explorations are exhibited (Bayar, 2011). The museums which have opened to public in time have become public places for learning, investigating, meeting with people and entertaining (Hooper-Greenhill, 1991). Especially the 'didacticism' oriented exhibition spaces first seen in 20th Century that begun with the idea of modern museums have led the new design understanding to be influential and also enabled the visitors actively participate in exhibitions. The 'Deustches Museum' (Ahlamo, 2013) which was opened in the early 20th Century in Munich can be qualified as a transition period during which the visitors have become 'active'. In time, exhibition spaces have become places appealing to senses where the objects are not only exhibited but presented together with different experiences. The physical activities of visitors when they visit an exhibition space such as pressing buttons have gained acceptance as a communication tool for information transfer and a factor arousing the awareness of visitors (Henning, 2006). In 1960s and 1970s learning in museums has become an 'exploration' with the theories of professional psychologists like Jean Piaget, LV Vigotsky and Jerome Bruner (Hein, 2000). At the end of the 20th Century, the museums have adopted the idea that all visitors should take an active role in a museum and establish a mutual communication with museums (Hein, 2000). Under the influence of political, economic and social developments in that period, the museums have become places where the public would exchange opinions and the visitors have gained an active role due to these developments. This active role has become more concrete in time and underlay the interactive exhibitions at the present time. For this reason, it is necessary to study the designs of interactive exhibition spaces extensively and examine the experiences thoroughly.

This article examines the contribution of interaction design and methods in exhibition spaces to spatial experience and learning process of children. Within the scope of the study, it is aimed to investigate, reveal and practically test the required methods to provide interaction for children in exhibition spaces. It is investigated how the processes of learning, experience, communication and interaction can be coordinated by means of emotions, senses, activities and play. When studying on the concepts of interaction and communication for children in exhibition spaces, particularly experience and learning processes gain importance. In this context, it is considered that studies investigating learning and behaviors of children such as behavioral, cognitive, social and humanistic theories should be taken as a reference in design of interactive spaces for children. In addition to this, the relationship of play was investigated along with spatial experience and learning activity and it is discussed on the basis of play theories.

2. Learning, playing, and interaction in exhibition spaces for children

Exhibition spaces are communication platforms. According to Hooper-Greenhil (1991), communication is a fundamental function of museums which attracts the visitors to exhibition space, satisfy their needs and meets their intellectual needs. Communication in exhibition spaces has been examined and interpreted in terms of different dimensions. According to Witcomb (2003), this multi-dimensional communication between the space and the visitors can be examined in three basic forms; single acting, double acting and multi acting (mass) communications. Single acting com-

munication is the first and basic form of communication where the exhibition space plays the role of transmitter and visitors are recipients. As stated by Witcomb (2003), visitors are regarded only as recipients in this form of communication and stipulated as the last step of the production process but not as an active element of it. Double acting communication is a form of communication where the visitor mutually interacts with the space and contributes to the space. This definition generally accepts interactive exhibition forms, McKenna-Cress and Kamien (2013) ascribe this property to freedom and unlimitedness of exhibition spaces and even consider the at will back and forth circulation of visitors as a feedback of visitors provided to the space. Multi acting (mass) communication has emerged as the exhibition spaces have become places for social meeting and sharing. With this purpose, exhibition spaces had an important role as social meeting points. Multi acting communication form contributes both to this role and to educational purposes.

Hein (2000) states that the exhibition spaces have become places where senses and emotions of visitors are aimed to influence in the process of time, instead of where information are transferred by the exhibited objects. One of the components of experience is physical activity as well as senses and emotions. When considered in terms of learning, interpretation has relationships with senses of sight, hearing, smell, taste and touch, and kinetic movement. When physical activity unites with senses and emotions, the visitor has an experience and the information obtained as a result of this experience is imprinted onto visitor's brain.

The potential of the exhibition space in learning arises from the possibility of educating and actively stimulating the emotions and imagination (Hooper-Greenhill, 1991). The advantage of exhibition spaces compared to books is that they make the visitors, sort of readers, have a role in the activity and

this makes the exhibition spaces more productive (Locker, 2011). In addition, interactivity will encourage the visitors to make other visits as well as presenting an entertaining experience (Digger, 2002). The play factor in interactive activities provides an attractive learning style especially for children (Locker, 2011). Studies have shown that knowledge, thoughts and emotions acquired in interactive exhibitions can be remembered even after 6 months (Allen and Gutwill, 2004). According to a research made by Adams and Moussouri (2002), the visitors classify interactive exhibitions as entertaining, exciting, educating, memorable, appealing to different senses and activating the visitors compared to noninteractive exhibitions.

According to Bloom and Powell (1984), it will be appropriate to associate the activities in museums with the notion of 'learning' instead of 'education'. Defining the museums as learning places is a conscious and purposeful act and consequently the role of the museums in education will be understood better. Although very few theoretical studies related to "learning" in exhibition spaces are done and no conventional practices are available, numerous theories have been developed in respect of learning throughout the history. Behavioral theories which incorporate Pavlov's theory of classical conditioning (Watson, 2013), Skinner's operant conditioning theory and connectionism theory (Skinner, 1938) are focused on passive quality of learning and argued that learning is realized as a reaction to external stimuli. On the other hand, cognitive theories have emerged against the theories which exclude individuals from act of learning. These theories which are composed of Gestalt theory and constructivist theory dwell on the activities of individual and define the learning process with phases of perception and coding of stimuli, comparing them with the past data, committing them to memory and remembering them. Piaget's theory of constructivist learning has been

considerably influential on exhibition spaces. In the proceeded process, some social theories have been suggested. The social theories composed of Bandura's observational learning theory (Bandura, 1977) and Vygotsky's social constructivist theory (Vygotsky, 1978) have emphasized that being together in a place and communicating and interacting with each other affects the learning process of individuals. The prominent humanistic theories suggested are Montessori's experiential theory and Rogers' emotional learning theory. These theories suggest that children can learn more deeply by gaining experience (Mclnerney, 2007). Acquisition of emotions and experience is of capital importance for the knowledge have a realistic impact on the individual. When the studies in this field are examined, it is revealed that the concept of 'learning' is in connection with active acts, social interaction and emotional and kinesthetic activities of the individual.

When children's learning experience is examined, it is seen that 'playing' activities includes these processes at the most. Contribution of the concept of play to learning has been presented in time by means of different theories and different definitions. Play concept presents important specification for

designing exhibition spaces for children by providing both social and individual interaction and experience to children. Piaget, Smilansky and Parten introduces three important basic theories of play in this respect. Piaget classifies games in three categories; practice play includes plays that children repeat the actions of simple motor skills and support learning (Piaget, 1962; Ginsburg and Opper, 1987). By contrast with this, symbolic play allows children to symbolize objects and things as different than the intended function. The third group expressed as formal play, defines the games where the roles and tasks specified basing on a certain group of rules are performed. Some plays classified by Smilansky share similarities with Piaget's classification. In addition to these, constructive plays by which children can reveal their creative and active aspects and dramatic plays in which the children play an active role in games are also determined as two different types of play (Goldman, 1987). Parten has examined the plays in terms of their ways of social communication (Parten, 1932). While unoccupied plays are games that children experience on their own, onlooker plays are games that the children play separately but observe eachother. In parallel plays, children play the
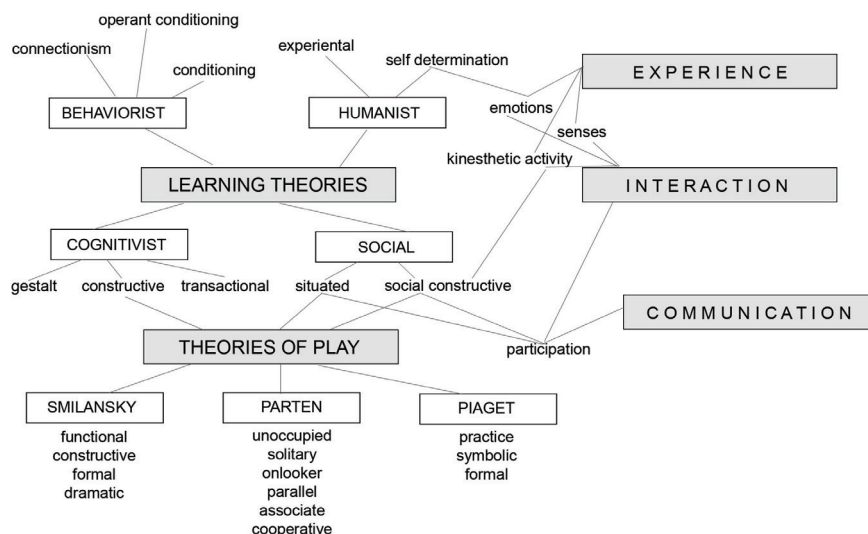

Figure 1. *Relations of experience, interaction and communication with learning theories and theories of play.*

same game differently while in associate plays children start to communicate but are not influenced by each other. Finally, cooperative plays are games in which children play by mutual interaction and communication.

Comprehension and application of the classifications of play are crucial for reinforcing the experiences of children with different methods in exhibition spaces. In this context, relationships of all titles and notions investigated and discussed are shown in Figure 1 with the aim of establishing a general framework and understanding the relationships.

3. Case study: "My Sweet Orange Tree" exhibition design for children

Within the scope of the research, an exhibition is designed and a case study is conducted in order to investigate the contribution of interaction design and methods to spatial experience and learning process of children. The research is supported by Istanbul Technical University, Master Degree Scientific Research Projects Support Programme. Aiming at presenting Jose Mauro de Vasconcelos' children's novel named "My Sweet Orange Tree" interactively,

an experimental exhibition including different interaction techniques for semantic comprehension of the novel is applied and primary school students have participated in this experimental exhibition. The exhibition was held at the Science Center located on the ITU Faculty of Architecture Campus within the scope of the Science Festival which lasted for four days. A total of 121 school-age children in the age group between 7-13 have experienced the study. As a result of the study, some clues related with interaction design for children were highlighted for future applications.

3.1. Design process and application of the exhibition

During the working process, the content of the novel 'My Sweet Orange Tree' was analyzed at first stage and an exhibition was created which the events within the book were represented. The novel tells the grow up story of a 5 year old child named Zeze. The story was divided into 7 main parts and each part was exhibited by using a different interactive exhibition technique. At the end of the exhibition, responses, activities and experiences of the children during the exhibition were observed and the impacts of interactivity methods that were used on senses, emotions and memory of the children were examined by survey method after the experimental exhibition.

In order for the parts to be experienced interactively, physical activity methods such as touching and joining in an activity were implemented in the light of the notions of sense, emotion and experience along with standard demonstration. The parts of the story, their contents and experience modes are shown in Table 1.

The exhibition space has been constructed in the manner to include the sections resulting from the analysis of the book. In each section, experiences related to a different part of the book are presented. These experiences are constructed with different methods in the light of different learning and play theories (Figure 2).

The following objectives are planned to be achieved as the basic design criteria:

Table 1. *Analysis of the book "My Sweet Orange Tree" and structure of the exhibition.*

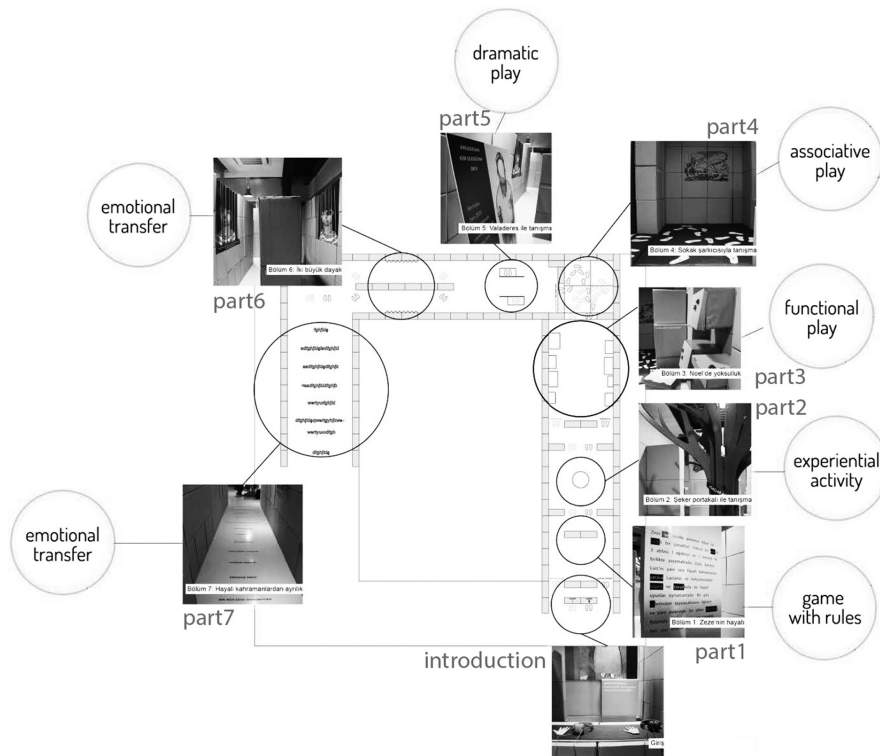| Introduction The Cover	**Experience: Entering to the exhibition space and facing with the novel's cover**
	Emotion: Enthusiasm
	Sense: Sight, hearing
	Activity: Looking at the cover, listening through earphones
Part1 Learning about Zeze's life	**Experience:** Reading the text and at the same time playing the game of combining the words with the images that represent those words
	Emotion: Enthusiasm, excitement
	Sense: Touch, sight
	Activity: Game with rules
Part2 Meeting with the sweet orange tree	**Experience:** Engaging in a similar dialogue with sweet orange sapling Zeze met.
	Emotion: Enthusiasm, being surprised, excitement and happiness
	Sense: Touch, sight, hearing, smell
	Activity: Walking, reading, sensational activity
Part3 Poverty at Christmas	**Experience:** Developing a great interest in the present boxes and getting disappointed after facing with the saddening story of Zeze
	Emotion: Enthusiasm, disappointment, sadness
	Sense: Touch, sight
	Activity: Functional Play
Part4 Meeting with the street singer	**Experience:** Hearing the story of this part accompanied by music when stepping on each footprint
	Emotion: Enthusiasm and happiness
	Sense: Hearing, sight
	Activity: Associative Play
Part5 Meeting with Valaderes	**Experience:** Placing their head in the holes which are located on two cardboard figures and reading the inscription in front of them to eachother
	Emotion: Enthusiasm, excitement and happiness
	Sense: Sight, hearing
	Activity: Dramatic Play
Part6 Zeze is beaten	**Experience:** Entering the space apart from their friends, seing a smiling child but the child transforms into a beaten and harmed child as they move on
	Emotion: Lonliness, sadness, disappointment
	Sense: Sight
	Activity: Emotional Transfer
Part7 Death of Valaderes and breaking with imaginary characters	**Experience:** Read the inscriptions on the floor aloud one by one as completing the exhibition and the story
	Emotion: Sadness
	Sense: Sight
	Activity: Emotional Transfer

Figure 2. Parts of the book "My Sweet Orange Tree" on the plan of exhibition space.

• Providing an experience to children that resembles book reading

• Ensuring the children pass through emotional and experiential stages similar to those of the main character of the story, Zeze

• Appealing to different senses of the children

• Enabling the children to have an experience they can understand and remember

• Encouraging children to read the novel named 'My Sweet Orange Tree'

450 units of cardboard boxes in size of 30x50x50cm were used to create the exhibition space (Figure 3). The exhibition space as a whole resembles the activity of book reading, it is composed of hidden and consecutive steps to arouse

curiosity. Thus, the only part that children can see from the outside is the entrance, that is the cover, and they will see other stages as they proceed. These progressive stages are arranged in the order determined in accordance with the analysis of the book basing on the important milestones in the oncoming sections of the book. Table 2 contains images related to how all parts of the book are experienced by the children.

3.1.1. Parts of the exhibition: Introducing book through spatial experience

The students who visited the exhibition were taken in twos and they were observed one by one at each tour. The decision to enable two children expe-

Figure 3. Application process of the exhibition.

Table 2. Images related to how parts of the book are experienced by the children.

a. Introduction

b. Part1 Learning about Zeze's life

c. Part2 Meeting with the sweet orange tree

d. Part3 Poverty at Christmas

e. Part4 Meeting with the street singer

f. Part5 Meeting with Valaderes

g. Part6 Zeze is beaten

h. Part7 Death of Valaderes and breaking with imaginary characters

Figure 4. Steps that children will follow.

rience the exhibition at the same time was taken to ensure the social interaction to take place. When two children arrive at the exhibition space, they see a wall and two earphones (Table 1a). This represents the moment when the reader first sees a book. The wall that the visitor sees is the equivalent of the book cover. In order to arouse the curiosity of the visitor, it is arranged in the manner so that it is not possible for them to see other spaces, as well as reading a book. Two different guidance are provided with earphones which are in different colors. First the story is briefly summarized as an introduction and later on, the visitor is asked to follow either one of the blue or orange colored steps.

Both children will follow the steps in the color they are told to pass to the next part (Figure 4). When they step on the footprints, an illuminated inscription appears on the ground informing them about their first task in the next part.

In the first part of the exhibition, a grammatical game where it is intended to give main information about Zeze's life has been developed. Aim is to motivate children to read the text and at the same time enjoy themselves as they are playing the game of combining the words with the images that represent those words (Table1b). The system on the play wall in this part is operated with electromagnets. These electromagnets close the mechanism when a child moves on and then opens it for the next child. Thus the images fall on the ground and the game will be ready for the following experiences.

In Part 2, Zeze meets a sweet orange sapling and makes friends with it. Being a daydreamer, Zeze is friends with dogs and chickens and he also believes that many living creatures around him speak to him. He engages in a similar dialogue with this sweet orange sapling he met. In this part of the exhibition, a three-dimensional physical tree figure faces the visitor. This tree figure is made of MDF material which was produced with CNC cutting technique. There is an inscription on the sweet orange sapling which reads; 'Trees speak with their whole body. Put your ear on my trunk and listen to my heart beat!'

There is an odorizer under the tree figure and a wireless speaker on the upper part. A heartbeat is heard from this speaker. The aim in this section is making the children put their ear on the tree like Zeze and listen to the heartbeat of it (Table 1c). In addition orange fragrance is emitted into the space to appeal their sense of smell along with senses of sight and hearing of the children.

Part 3 is the section of poverty at Christmas. In this part of the novel, Zeze and his brother Luis dream of a New Year's Eve gift. A truck full of gifts will come to the neighborhood for poor children but when the children arrive at the square where this truck is parked, all gifts were handed out and nothing was left. As a New Year's tradition, Zeze puts his shoes in front of his door for Santa Claus to fill them but there was no gift in them, either. Besides, there is nothing much for them to eat at New Year's Eve. In brief, Zeze has aspired for a gift in this part but his hands were empty. In this part of the exhibition it is aimed that children would share a similar feeling with Zeze. Accordingly the command on the steps tells them 'Look for your gift in the boxes!' Two children open the boxes lined up with two tracks on both sides one-by-one but there are no gifts in these boxes both only inscriptions which tell that Zeze didn't get any gifts. The inscriptions in four boxes are respectively as follows; "Zeze and his brother dream of getting gifts at New Year's Eve", "But they don't receive any gifts and they don't have money to buy any", "Zeze's father is unemployed and his family is very poor", and "This saddens especially Zeze and his father very much". The children have eagerly opened the boxes either in sequence or randomly and faced with the saddening story of Zeze (Table 1d).

Part 4 is named as 'meet with the street singer'. In this part of the novel, Zeze meets with a street singer and starts working with this street singer. In this part of the exhibition, the visitor receives this command: 'Move on with your friend step-by-step!' and each visitor should move on following the steps having the same color with him/her. There are numbers on these steps, thus the visitors will pass over the same numbers in turn (Table 1e). In implementation of this part, the children hear a part of the story of this part when they step on each footprint. Sensors are placed under the footprints. The text being read is accompanied by music. When they come to the last few footprints, they will only hear this music and leave this part.

Part 5 is where Zeze and Valaderes from Portugal meet. Zeze and Valaderes are two characters who meet and love each other too much. In this part, the aim is having the children communicate with each other more. The command issued to the children when they pass to this part is as follows; 'Place your head in the hole!' Two cardboard figures await the children in this part. There are holes on the heads of these figures that the children can place their heads. The children follow the footprints in their own colors, arrive at their places and place their heads into the holes. When they put their heads into the holes, they will see each other and the inscription in front of them. This inscription says; 'Read your frıend who you are!' There are self-presentation texts of Valaderes and Zeze next to each other's figures. Thus the children

Figure 5. *Primary school students visited the exhibition.*

will have a more intense dialogue with the other visitor they share the space (Table 1f).

Part 6 represents the part where Zeze was beaten. Zeze is unjustly beaten by his father and older sister and these beatings leave deep marks in his heart. Zeze becomes seriously sick in bed and decides not to love his father any more because of these beatings. In this part of the exhibition, children diverge and move on separately. An image which is seen differently from two angles is used here (Table 1g). When the children en-

ter the space, they see a smiling child but the child transforms into a beaten and harmed child as they move on.

At the end of the story, Part 7, Zeze's beloved Portuguese friend Valaderes is passed away and Zeze has become a grown child and left his imaginary heroes. The children read the inscriptions on the floor aloud one by one and complete the exhibition and the story. The inscription on the floor is as follows; 'One day when Zeze is at school, one of his friends hurriedly enters the classroom and tells the class that there was a train accident nearby and Valaderes, whom Zeze loves so much is dead. Thereupon Zeze becomes so sick in bed. When he is recovered, he leaves his dreams and heroes and becomes a grown child'. In this part where Zeze leaves his dreams, children leave the exhibition.
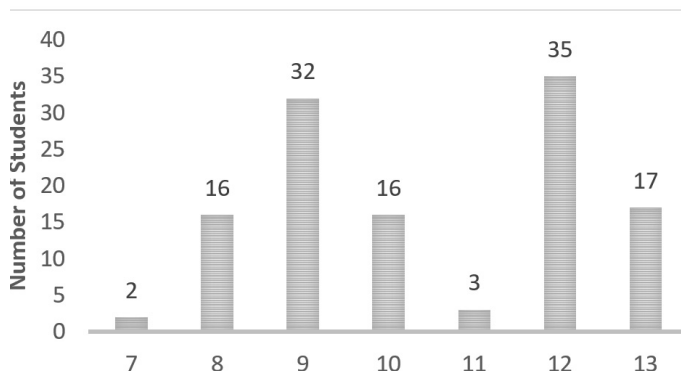
3.2. Survey method

121 students visited the exhibition in scope of the experiment (Figure 5). Their experiences were observed during their visit, and a questionnaire was applied to the students in order to understand their understandings of the story, the most liked parts, and their enthusiasm on reading the book. Figure 6 represents the age profile of the participant students.

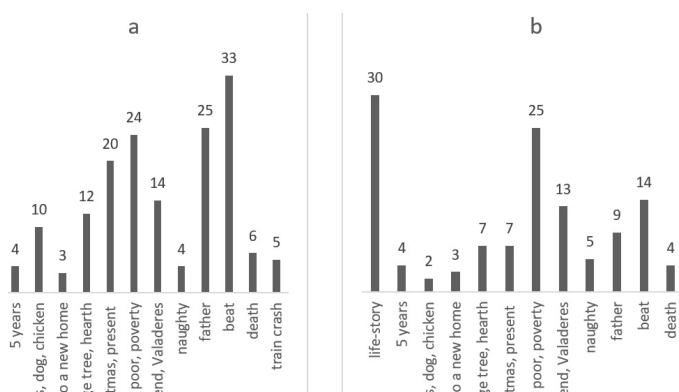**Figure 6.** *Age profile of the participant students.*

Figure 7. *Common words that the participants who were in different age groups have used frequently (a.7-10 age group b. 11-13 age group).*
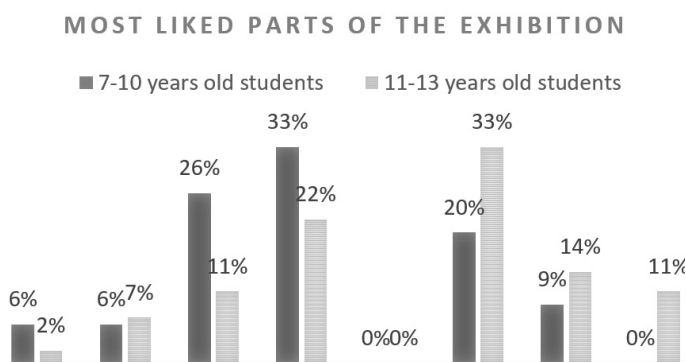

Figure 8. *Most liked parts of the exhibition by students.*

3.3. Results and evaluations

In the survey, students were asked to summarize the story of "My Sweet Orange Tree". Figure 7 shows the graph of common words that the participants of the exhibition who were in different age groups have used frequently. Results show that there are some differences and also similarities between different age groups. According to this, it is seen that the students in the 7-10 age group mostly remember the events while the students in the 11-13 age group remember the whole story and Zeze's poverty.

Figure 8 shows the graph which contains the numerical values related to the parts of the exhibition that the students liked most. While the students in the 7-10 age group loved Part 3 most (33%), the students in the 11-13 age group loved Part 5 (33%) most. Smaller children (between 7-10 age)

liked repetitive and practical activities and they were more effective on their memories; while social activities were more attractive for other children (between11-13 age). The written information was not attractive for the smaller children and they could not remember the information. On the other hand, for both age gropus, comprehensibility ensured pozitive effects.

The students who have visited the exhibition were examined in terms of their experiences, emotions, senses and the activities they've performed. As a result of the observations, some issues were determined that might be inputs for future designs. The evaluations regarding each part are given below:

• At the entry, the earphones handed out to children were found interesting especially by the students of younger ages. The students older than 10 years have listened to the voices from the earphones and immediately left the place but those who were younger than 10 years have listened to the voices for a longer time. It was found out that the 7-10 age group liked this part more than the students in other age groups.

• It was observed that all age groups loved Part 1 evenly but the percentage of being liked is not higher than the percentages of other parts. While most of the younger children have chosen to read the inscription from the beginning and aloud, it was observed that the children at the age of 11 and older were tend to see the words quickly and place them in their places. Thus written texts have been perceived by younger children more strongly and in the part of the survey where the story is summarized, especially the children who are in the 7-11 age group have rendered the story by using the exact words in the text.

• The second part where the children saw the tree was also interesting for the children. Listening to the heartbeats of the tree and sensing the orange fragrance was an exciting activity for the groups younger than 11 years and their reaction was mostly astonishment. However, some children have identified themselves with the main character of the book, Zeze, in this part and stated that they feel like they are Zeze in this exhibition.

• Part 3 which was about poverty at Christmas is selected as the part the children loved most (28%). They have all got excited and looked for their gifts and were disappointed like Zeze when they couldn't find them. They have read most of the inscriptions excitedly and eagerly and poverty of Zeze was the most frequently mentioned words within the survey.

• None of the students liked Part 4. The interactive experience provided in this part was not understood by the students and the need for extensive guidance was felt.

• Part 5 where Zeze met with Valaderes was the second most liked part of the exhibition (26%). This part was appealing for children in younger and older age groups and it has become an activity which strengthens the dialogue between two students in each group. The majority of children have read the text aloud to their friends. However, it was understood that there was a need for flexibility regarding dimension and space since the age range was very wide. Most of the children have mentioned meeting with the old man in the survey.

• Regarding Part 6, particularly the students in the 7-11 age group have remembered the beating Zeze got from his father and 47 students (39%) have mentioned this beating. Many children were stunned in this part during the exhibition. Especially the younger children have found the change in the images surprising. However, very few of the children have read the inscription on the wall. As they were got used to interact till this part, they have tried to change the accordion image by playing.

• Part 7 where they have left the exhibition was one of the parts where the children have read the inscriptions most but just a few have mentioned the data in this part in their summaries (14%). This was the part of the exhibition that the children have wandered easily and quickly. Reading the word groups beginning from the closest, while they walk it was fun for them and each age group has easily completed this group at a pace specific to that group without the need of any warning.

At the end of the exhibition, the novel itself was exhibited together with

the questionnaire. One of the questions in the questionnaire was whether the children would like to read the book or not. Only two (2%) children have responded negatively to this question. All children except these two have given answers indicating that they are eager to read the book.

As it is understood from the reactions of the children after the exhibition and their comments in the survey, it was a new and different experience for most of the children. They were very excited because they couldn't see inside at the entrance. All age groups have stated that they would like to have this experience again. They have left the exhibition joyfully and happily.

4. Conclusions

In exhibition design, various factors are effective such as plan layouts, speculation of space, properties of the exhibited content, concept, information that is planned to be represented to the visitors, time that the visitor will spend, and so on. Design of the exhibitions has to include all the requirements in an optimum balance and also in a flexible way to provide each visitor different experiences in their point of view. As a summary of this research, some important clues are revealed that might be crucial for the design of exhibition spaces for children in the light of experiences and evaluations that were exposed in scope of the study:

• It was seen that children of different age groups react differently to interactive constructs in exhibition spaces and these constructs had different effects on children.

• "Spatial repetition and sequency" are important during the visits, it helps children to learn the language of the space so they learn the space and interact with the exhibition easier progressively.

• Parts where "sensual transmission" is provided were more effective and memorable for children.

• Parts that included activities which provided "social interaction", were amusing and memorable for children.

• Transmission style of the information and its understandability was important with respect to be understood by the visitor and memorability. Accordingly, when the behaviors and experiences of the students are evaluated, it was seen that audio and visual narratives were more understandable by younger age groups than inscriptions and followed without boring them.

• However, it was understood that arrangements where the students are guided by guides or effective directory methods in interactive constructs is of prime importance.

Acknowledgement

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