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An Experiential Study on Empathic Design in Interior Architecture Education

* Ph.D candidate. **MELİS KOCAOĞLU** and Prof. Dr. **HALİME DEMİRKAN**
Department of Interior Architecture and Environmental Design, Bilkent University, Ankara, Turkey
[1] Email: kocaoglu.melis@gmail.com , [2] Email: demirkan@bilkent.edu.tr

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ABSTRACT

Design students should be able to design living environments and products according to diverse users' needs, problems and expectations. The aim of this research is to explore the role of empathy as a design learning tool in interior architecture education. Moreover, the intention is to determine and analyze the reflections after the role-playing technique is experienced. This study is conducted with the graduate design students and three tasks were assigned to them. In the first task, the students took visually impaired people's role and acted in real life activities in a café. Then, they expressed their role-playing reflections and design reflections through semi-structured interviews. Lastly, Verbal Protocol Analysis is used in determining and categorizing the relevant affective and cognitive empathic expressions that were recorded. Color and light, orientation, safety and accessibility were mostly expressed as design issues in reflections. Furthermore, findings indicated that cognitive empathic expressions were widely used than affective expressions.

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1. Introduction

Designers have a responsibility to respond diverse user's needs, problems and expectations. In order to achieve this goal, designers need to empathize with users, since empathic understanding serves designers in immersing in the lives, experiences and ways of living of the users. So, designers need to develop their empathic ability and should reflect it on their products or projects. Dictionary definition of empathy is "the ability to share someone else's feelings or experiences by imagining what it would be like to be in that person's situation." ("Empathy", n.d.). The two components of empathy are cognitive empathy and affective (emotional) empathy. Strayer (1987) stated, "[f]rom a cognitive perspective, empathy consists of either understanding the psychology of others (i.e. their thoughts, intentions, feelings, etc.) or, more specifically, their feelings" (p. 218). Affective empathy is a process of appreciation of others emotions and responding to and sharing emotions (Dökmen, 1988). Also,

***Corresponding Author:**
Department of Interior Architecture and Environmental Design, Bilkent University, Ankara, Turkey
E-mail address: kocaoglu.melis@gmail.com

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empathy is a natural and intuitive ability, it can be also learned from empathic persons and can be established through education by therapist, family members and teachers. In addition, this modelling can be used as an additional and/or alternative method in design education.

2. Empathy in Design Education

In order to create inclusively designed environments, empathic design could be used as an alternative approach since it provides in-depth understanding of users' feelings, thoughts, needs and expectations of products and/or living environments. Previous studies on architectural education mentioned that using empathic modelling in design process provides positive outcomes on students' design projects. They all agreed that it provides in-depth understanding of users' (e.g. people with diverse abilities, elderly, pregnant women, children etc.,) needs, problems and expectations of product and/or living environments (Altay, 2017; Altay, Ballice, Bengisu, Alkan & Paykoç, 2016; Altay and Demirkan, 2014; Gomez-Lanier, 2018; Torrens, 2000). In Altay and Demirkan's (2014) and Altay's (2017) studies, empathic modeling was used as an educational method in Human Factors course in the Department of Interior Architecture and Environmental Design at Bilkent University, Ankara. Similar studies were also conducted in industrial design and engineering education programs. For instance, the practice-based method was emphasized in empathic research in industrial design education at University of Illinois at Urbana-Champaign in the Industrial Design Program (McDonagh and Thomas, 2010). Besides, McDonagh, Thomas and Strickfaden (2011) indicated that empathic ways of learning that include direct contact with users increases design students' empathic horizon (McDonagh and Thomas, 2010) and could be used as an alternative approach in design education. It was mentioned that students need to simulate user's diverse abilities in such activity-based approaches with role-playing technique.

2.1 Role-Playing Technique as Empathic Modelling

One of the techniques of empathic modelling is role-playing (simulation) that provides students looking at environments from a different point of view through experiencing real-life situations. This technique is an effective way in enhancing empathy, as Dökmen (1988) stated, a person makes an effort to take the role of another person, and looks the events/actions from other's point of view and while sharing the feelings of another. It is widely used in empathic design education in integrating related course works or workshops with visual, mobility and hearing tasks (Altay, et al., 2016; Altay and Demirkan, 2014; Bernardi and Kowaltowski, 2010; McDonagh and Thomas, 2010; Nicolle & Maguire, 2003; Torrens, 2000). In addition, daily living activities are simulated using scenarios. However, simulating just one day, (e.g. using a wheelchair for simulating wheelchair users), is not sufficient for designers to understand user's everyday life experiences, but this technique encourages them to think deeply about the problems that potential users encounter (e.g. Nicolle & Maguire, 2003; McDonagh & Thomas, 2010; McDonagh, 2015). Altay and Demirkan (2014) used the role-playing technique in the campus environment to increase undergraduate interior architecture students' awareness of human diversity in the design process. In that study, students worked in a group and tried to take a role of users, by using either wheelchair, crutch or blindfolds. Besides, Altay et al. (2016) focused on enhancing students' empathic understanding and abilities by using the role-playing technique in a two day event-educational symposium and workshop. Students both from interior architecture and architecture departments simulated people with no visions' and pregnant women's abilities in the campus environment. In Bernardi and Kowaltowski's (2010) study, students diminished their vision wearing reduced vision glasses and restricted their movement and muscle strength by wearing hockey goal equipment. Also, they used wheelchairs in order to understand the activity limitations of physical disabled and elderly people. Similar studies were conducted in industrial design and engineering education programs. In McDonagh and Thomas' (2010) study, industrial design students simulated students with physical and sensorial disabilities' conditions through using a wheelchair and mechanical devices in the course called Disability + Relevant Design. Moreover, various simulation workshops (blindfolded, visual, hearing, mobility and dexterity tasks) were carried out in engineering education programs with university students in UK (Nicolle & Maguire, 2003).

2.2 Empathic Reflections

After experiencing in empathic modelling, getting reflection/feedback from design students is correspondingly substantial for assessing empathic understanding (McDonagh & Thomas, 2010). Also, it is important to understand how this model has an impact on students' design solutions thus, how students reconsider their design ideas in order to generate innovative solutions.

Students need to reflect their empathic understanding by verbal (e.g. interviewing) and/or literal (e.g. report, poster design, project design) communication skills. Van Rijn, Sleeswijk Visser, Jan Stappers and Özakar's, (2011) study involving children with autism found that direct contact is the most successful form of nonverbal communication in empathic design. Altay and Demirkan's (2014) empirical study showed that students developed immediate emotional responses and positive attitudes towards diversity and inclusion. These were reflected in the descriptive texts and designed posters. Later, Altay and her colleagues (2016) and Hess and Fila's (2016) studies reported that students had given positive feedbacks on empathic design awareness through their product designs and assessments. Positive outcomes were also noted by students in expanding their affective and cognitive empathic understanding and increasing the idea of inclusivity in their design decisions.

3. Methodology

The aim of this research is to explore the impact of empathic modelling as a design learning tool in interior architecture education. Besides, it aims to improve students' perspective on interior environments in order to gain more empathy for visually impaired people. Firstly, the empathic signs/expressions and design reflections (problems, suggestions and solutions) from students' role-playing experiences are determined and analyzed. Consequently, the cognitive or affective empathy expressions are assessed and categorized by qualitative research methods.

3.1 Participants and Setting

The participants were nine graduate students in the Department of Interior Architecture and Environmental Design, at Bilkent University, Ankara, Turkey. Participation was on voluntary basis. The age range is from 25 to 28. The setting is a café that is located on the campus.

3.2 Procedure

The study consists of three tasks; which are named as act, reflect and analyze. The first task is role-playing act using the activity-based approach. The second task includes reflective conversations and categorizing the empathic expressions as either affective or cognitive and the third is the verbal protocol analysis (see Figure 1).

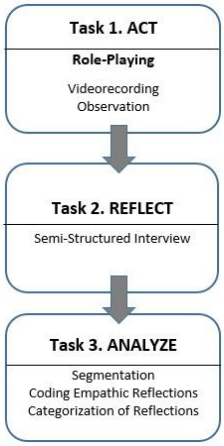

Figure 1. The Structure of the Study (Developed by authors).

3.2.1 Role-Playing Act (Task 1)

In this task, students took visually impaired people's role and acted in real life activities in a café. In order to decrease the vision of students, eyeglasses were covered with Vaseline for creating impaired vision. Besides, in order not to create an unsafe situation for students, a guide followed them without interfering their act. The role-playing acts were videotaped and the observer noted the students' experiences. The students conducted the following activities:

1. Climb up stairs and find the café door.
2. Open the café door without any assistance.
3. Enter the space and walk to the counter.
4. Give an order as; a cup of tea.
5. Pay it by taking money out of your wallet.
6. Wait in line for a cup of tea.
7. Find a place and sit down.
8. Reach the café door and go outside.

The students watched each video, and then they discussed their experiences.

3.2.2 Empathic Reflections and Design Reflections (Task 2)

In the second task, students expressed their role-playing activities' reflections and design reflections in the semi-structured interviews (see Table 1). The aim of this task was finding the empathy-related responses and categorizing them into affective or cognitive empathic expressions. Another aim of the second task is to make the students rethink the problems that visually impaired people can encounter in a space and find solutions and suggestions. The empathic reflections were assessed according to the content of each sentence. In van Rijn et al. (2011) study, empathic expressions were discovered when "A designer express empathy if he or she literally says: I think/feel/guess, the children think/feel/want…" (van Rijn et al., 2011, p.69) In addition, they labeled the empathy-related reflections when the designer correlates students' experiences with target users' needs and experiences or compares them with others. In this study, this technique is considered in finding the empathic signs in stated comments. The literature review showed that various design characteristics as, color and light (Bernardi and Kowaltowski, 2010; Evyapan and Demirkan, 2000), navigation and orientation systems (Strickfaden and Devlieger, 2011), safety and accessibility (Jalalzadeh and Jalalzadeh, 2013) play a significant role in designing appropriate places while considering visually impaired people.

3.2.3 The Verbal Protocol Analysis Method (Task 3)

In this study, the retrospective protocol analysis is used (Suwa & Tversky, 1997). The following steps are: (1) to find the empathic expressions and design reflections in the content of semi-structured interviews (2) to encode students' empathic expressions into segments in subclasses of descriptions (3) to analyze segments.

3.2.3.1 Segmentation

The items of semi-structured interview are related with the empathic thinking and design reflections (see Table 1). Each comment of the student is determined in order to encode the empathic expressions. The segments were selected by its content; either included cognitive or affective empathic expressions.

Table 1. Semi-Structured Interview Items.

Items related with empathic reflections
To what extent taking perspective of visually impaired people enhanced your empathic thinking?
What did you learn from role-playing act?
How did you find the tasks?
What did you think when you watched your role-playing act?
What did you feel when you wore the eyeglasses with Vaseline?
What are your feelings toward undertaking role-playing as an activity?
What did you feel when carrying a cup of tea?
What did you think about what visually impaired people could possibly feel when other people are watching them?
Could you please explain your feelings when you need help from others in order to orient yourself?
Items related with design reflections
To what extent has the knowledge you gained positively affected your design decision making?
What could be the problems (accessibility, safety etc.) that visually impaired people can encounter in café environment?
Did you think of any suggestions for way finding, safety issue and accessibility issues to redesign this café according to visually impaired people's needs/problems?

3.2.3.2 Coding Scheme

In this study, the content oriented-coding scheme is generated and divided into categories. Based on the previous researches (Batson, Fultz & Schoenrade, 1987; Davis, 1980; Davis, 1983; Davis, 1996; Dökmen, 1988; Grynberg & Pollatos, 2015; Mehrabian & Epstein, 1972; Strayer, 1987) cognitive empathic expressions that are related with 'perspective taking' are categorized into four sub-scales as; cognitive empathy understanding (CEu), cognitive empathy analyzing (CEa), cognitive empathy evaluating (CEe) and cognitive empathy remembering (CEr). Affective empathic expressions that are related with 'empathic concern' are categorized into four sub-scales as; affective empathy arousal (AEa), affective empathy compassion (AEc), affective empathy distress (AEd) and affective empathy valuing (AEv).

4. Results

4.1 Related to the Role-Playing Technique

All students agreed that role-playing technique have enhanced their empathic thinking about visually impaired people's feelings and thoughts. They suggested that every designer needs to experience role-playing act, especially before designing public spaces. They all agreed that they understood visually

impaired people's difficulties and problems better after this experiment. They also self-criticized themselves and added that they had predicted the difficulties that visually impaired people face, but they did not sense their feelings without experiencing.

Students also made inferences based on their experiences to predict visually impaired people's problems and their needs. They compared visually impaired people's handicaps with theirs. For instance, they wondered how visually impaired people can walk without a guide and hitting someone/somewhere if they were afraid of walking with a guide.

> I did not know it was so hard and terrible. I was affected negatively. This is what they live every day. I had a guide, I knew I was safe, but they do not know this. (S6)

> It was so hard. I wondered how they can walk without hitting someone. If this place was crowded, I probably hit someone. (S9)

All students complained about wearing eye-glasses with Vaseline and they said that they were badly influenced when they wore it. One student expressed her feelings as "I was badly influenced, because I thought that how it would be if I really had such a life." They all agreed that everything is suddenly blurred, and they only perceived light and colorful things.
Seven students reported that they were afraid of hitting into something and burning themselves and/or the guide or other people who were around. One student said that "…if the guide was not there, I would not carry my cup of tea." Another one said "…I had an anxiety if seller filled the cup fully." Another student expressed that challenge as; if guide was not with me, I would be more afraid.

> I was scared of burning myself and others. I thought that if I could not take the glass of tea, I will pour it over the counter. Also, when I turned around to find a place, I thought that there were other people around me, if there was a crowd around me I could have spilled tea on them. (S2)

Six students stated that the tasks were hard and they were scared of doing them. One of them said that she felt as paralyzed and another one said that she has felt bad for visually impaired people. Two students found climbing up the stairs as the hardest activity. One student criticized the activities as:

> Firstly, I thought if seller filled the cup fully, how could I take it without burning my hand and I was afraid of hitting people while I was carrying the tea. I had trouble getting up the stairs since I saw all the steps as the same color, I could not differentiate the steps. Lastly, opening the door was difficult for me, because I thought that I would drop all the goods in my hand. (S3)

Others said the tasks were not difficult because of having little vision and hearing, so they could orient themselves by light and sound. Only two students expressed that they were comfortable in carrying a hot cup of tea. One of them explained it as the café was not crowded and she was relieved because of having the guide. The other one felt comfortable, because the distance from the counter to the seating area was short. Also, he recognized the red chairs directly in front of him.

Four students emphasized the importance of having a guide in such experiments. They said that they did not have much trouble, because the guide gave them confidence in the moments they had a sense of falling or hitting into somewhere. They added if the guide was not there, they would not find their way by themselves and would feel helpless and probably would ask for help. One student confessed if she was alone, she would be embarrassed when she wanted help. Moreover, one student was not pleased to get help, because she thought she could not do something that other people could do alone. Another one said she did not have much trouble, because she was familiar with this environment, but if she was in a place that she has never been, she could be stressed. Interestingly, one student did not ask for help and he explained it as he was getting used to the situation instead of asking for help. He has developed his own method in choosing the shapes and understanding the distances. When students were watching their videos, they remembered their activities and they criticized themselves.

> At that moment (after watching her video) I thought that I was not good at the activities. However, when I watched, I realized that I was

good. I noticed my mistakes, for instance, I thought I was approaching the counter, actually I was not even close to it. I had to walk more cautiously. (S2)

Only one student was pleased with her video, she thought she was moving well. Moreover, after watching their videos, two students agreed that even if they were familiar with this place, they had trouble and they acted as if they were entering there for the first time. One of them said as "…I actually knew where the counter and seating area are, but I was still hesitant and oriented to other sides".

Two students took lessons from this experiment, one of them said "we should empathize with them, help and have respect for them, we need to be more careful if there are visually impaired people around us". Other one explained her lesson as "now, if I see someone who is visually impaired or blind, I could definitely go for help. Before this experiment, I thought that they probably got used to it and could figure it out themselves." Three students mentioned how they felt when they were in the space:

> You cannot understand everything around and cannot see what you did. These are really hard. (S5)
>
> I had a little vision about where I would go, but I could not see any obstacles and some things went by. I was not aware of what it was. Was it a human or something else? (S7)
>
> I could not estimate any distance, I felt like in space. Yet, I was getting used to it after a while. (S9)

Two students explained that follow-up of the guide gave them confidence. If the guide was not with them, they would feel insecure and could not complete the activities. Yet, one student said that she felt too desperate even if she knew guide was following her. She added that, "…thinking constantly what to do, about the next step was really hard for me." Two students mentioned that they were not sure of what they were doing, not perceiving location of the door, counter or seating area even if they were familiar with that café. They were afraid of hitting somewhere and falling down. One student expressed her feelings as "even one centimeter height made me feel as if I was falling down from the edge of the cliff." One student said that he was not afraid but he was in panic, he expressed as:

I was not afraid, but I was in panic. For instance, when I was climbing up the stairs I got panic if I was going to fall, because risers were a little bit high. Moreover, I got panic when I was approaching to the counter, because I did not want to hit it. This place was not crowded but if it was, I would not walk properly. Also, I got panic to hit the guide. (S9)

4.2 Related to the Observations

The mean time for completing the activities was 2.21 minutes. In general, students were cautious and anxious during the role-playing act. They moved very carefully and slowly. Moreover, they were pleased with the follow-up of the guide, because they all agreed that they felt safe and secure by having the guide.

In the analysis of the activities, it is observed that the students were mostly engaged in activities of walking and climbing stairs, and they spent most of the time in these. They moved slowly while climbing up the stairs because they were scared to fall down, since there were no handrails.

Moreover, even taking money out of the wallet was difficult for them. As they added, it was not possible to differentiate the money that they took out of their wallet. They were grateful for only purchasing a cup of tea. If they had purchased food, they would not have a chance to give the right money. Some of them tried to develop a method in their own way. For example, one student hit the trays' area and thus found his way. He hit the glass surface of counter and said he saw a white thing and followed the glass surface and found the cash point. He also found the red chairs and said if they were not red, he could not find his way. When he was going outside, he said that he preferred to go through the aisle which was in the middle of the chairs and tables, because he saw the silhouette of chairs. Also, when they were carrying a cup of tea they were cautious and moved slowly. One student said "I feel like I am getting closer". She said that trays were too bright (yellow) so that they were noticeable. When she was going out, she found her way by touching the chairs. Material differences on the floor surface (contrast by

dark gray ceramic and wood parquet) was a little bit noticeable for her. When she was passing to the seating area, some people were passing in front of her, so she hesitated and waited for them.



Figure 2. Simulating visually impaired people's daily-life activities in the café environment. (Source: Author1)

4.3 Related to the Empathic Reflections

According to the responses of semi-structured interviews (see Table 1), all students expressed their experiences empathically. Firstly, empathic reflections about role-playing experience (accordingly nine questions) were categorized and analyzed. Then, analysis of empathic reflections (accordingly three questions) in design outcomes were reported. Cognitive and affective empathic responses were scored and analyzed. The results showed that cognitive empathic expressions were widely used than affective expressions.

4.3.1 On Role-Playing Experience

The results showed that empathic reflections were seen in each students responses ranging from one to four in role-playing experiences. Totally twenty-one responses were labeled as empathic expressions and categorized. For determining the empathic signs, the content of each response was analyzed.

As one student (S2) expressed empathy in answering the question of 'What did you think about what visually impaired people could possibly feel when other people are watching them?' as: "In my opinion, if people have diverse disabilities, other people should not look at them differently because it was so disturbing. When my father was using wheelchair, people were looking at him differently. I think, everyone can come to any situation at any moment." This response includes both cognitive and affective empathy reflections, because she looked at the situation from the perspective of people who have diverse disabilities' then; she analyzed and evaluated the situation as a disturbing one and gave an example from her father's experience (CEa, CEe and CEr). She also argued that people with diverse abilities' situation should be respected (AEv). Moreover, another student (S3) answered the same question with a similar response as: "I think they can feel uncomfortable, because unfortunately some people are looking at them in a different way. For instance, some people look at my father differently because of his illness; his lack of hair and loss of weight. This can actually happen to everyone, your ability to see may disappear suddenly or you may be born with no vision or impairment. Even if you want to have a sense of well-being, some people see you as sick. Also, I thought if I made a mistake like if I was pouring tea or I was falling, people laugh at me." This response also includes both cognitive and affective empathy reflections (CEa, CEe, CEr and AEd). Moreover, student (S3) expressed empathy in answering the question of 'What did you learn from role-playing act?' as: "Even if I am familiar with this place, I had many troubles. So, I imagined a new student with visual impairment, I felt bad for him/her. It would be a difficult life here without any assistance." This response includes both cognitive and affective empathic reflections. Firstly, she mentions about her own experience and then she puts herself in a new visual impaired student's place and she feels bad for him/her (which included empathic concern) (AE) and imagined how that situation might be difficult for him/her (which included perspective taking) (CE). She has felt bad, so it can be categorized as affective empathic distress (AEd). Also, she analyzed (CEa) her own experience and deduced (CEe) that he/she might have trouble and difficulty.

Another student (S1) expressed empathy in answering the question 'What did you learn from role-playing act?' as: "I need to check constantly on everything, even when I was putting the glass. I had to be careful about putting the glass at the right place or going to the right place. So, visually impaired people need to be more careful than people who have normal vision." This response includes cognitive empathy, because she is expressing her own experience as she was visually impaired (included perspective taking), then

associating it with visually impaired people's conditions and, also, comparing visually impaired with normal vision people as a result of her own analysis (CEa and CEe).



Figure 3. Simulating visually impaired people's daily-life activities in the café environment.
(Source: Author1)

4.3.2 On Design

Eight empathic expressions were found in the students' responses related with design problems, solutions and suggestions. Each student had one or two empathic expressions as design reflections. For example, one student (S9) responded to the question 'To what extent has the knowledge you gained positively affected your design decision making" as: "I understood that visually impaired people need something to orient them like a material change or putting guidance lines on the indoor floor surface. We as an interior architect should decide on colors, besides aesthetic concerns while considering people's disabilities. So, the color combination is good, but it does not mean anything for visually impaired people. They can see these colors nearly all the same". This response embraced empathy because he understood the needs of visually impaired people based on his experience, then he tried to propose solutions. In addition, he analyzed the existing color combination and decided that it was unsuitable for visually impaired people.

Furthermore, one student (S1) answered the question of 'What could be the problems that visually impaired people can encounter in café environment?' as; "Even at entrances there is a material change, level difference seems less important to us but for visually impaired people these are problematic. Also, irregular arrangement of furniture is important for them, because visually impaired people are trying to figure out the area by their hand. The more irregular it becomes, the more difficult it is to conceive it." This response included empathy because the student (S1) compared the visually impaired people's needs with her own and expressed the design problem by thinking their capabilities and tried to find a solution.

4.4 Related to Design Reflections

The role playing activities provided the necessary information to the students about visually impaired people's capabilities. They stated that experiencing the activities positively affected their design decision making process. They recognized the problems that they were not aware of before and emphasized that interior architects should determine first disabled people's problems, needs and expectations before starting to design. Besides, they all agreed that interior architects should pay attention for 'design for all' approach and environments should be designed universally. They also recognized that the activities conducted in a space are significant for design, so firstly the activities should be analyzed, then they should start to design. For example, in designing a café environment, one student emphasized that designer should think of two basic activities which are taking something from the counter and seating. So, designer should pay more attention for the counter and seating area's design. Students tried to generate solutions and suggestions by seeing the problems from a visually impaired people's point of view (according to their role-playing experiences). Accordingly, their comments on color and light, orientation, safety, accessibility are the mostly expressed problematic issues that visually impaired people might face in a café.

4.4.1 Color and Light

All students mentioned about the significance of color and light for visually impaired people. Because of having little vision, insufficient color contrast and lighting were mostly expressed as a problem. They suggested color contrasts instead of monochrome colors in furniture material, since they obtained an understanding that visually impaired people can differentiate dark and light colors. Beige and gray tones of chairs were found to be unrealizable. One student suggested that interior architects should choose appropriate colors for visually impaired people, besides their aesthetic decisions and added that the color combination (beige, dark, gray, white) of seating area was aesthetically pleasant, but it

does not mean anything for visually impaired people because they perceive these colors as the same.

> I noticed that material change, using light colors next to dark colors can orient people, and you can understand better where you are. While wearing this type of glasses, I noticed that there is a little vision, so visually impaired people have little vision and they can sense the light, so they need more day and/or artificial lighting. Also, increasing contrast among materials, not preferring monochrome colors can be good choices. (S2)

Lighting is mentioned as a crucial design characteristic by the students. They all agreed that adequate artificial lighting and day light in indoors should be provided for orientation and finding the cash point and seating area.

> Definitely, lighting is so important for visually impaired people. I oriented myself accordingly white light (sign of café) which is located above the counter. Color contrast is also crucial because it was easy for me to see contrast colors. (S5)

4.4.2 Way finding/Orientation

Students recognized the lack of orientation in the café environment and said that if they were not guided, they would not know where they were going. Also, they all agreed that adequate artificial lighting and day light in indoors should be provided for orientation. In addition, they suggested provision of tactile surfaces and material change on the floor surface. Besides, in order to provide 3-D perception they proposed cash point should be colorful and guidance lines or points could be covered with red LED lights. Some of them emphasized as:

> If he/she perceives light the path can be illuminated with LED light lines, because I was directed to light and sound. (S8)

> When I was looking for a place to sit, I hit one of the chairs and understood there was a seating area here. I did not see anything because everything seemed as black, I did not realized red but yellow and white were the most noticeable colors. (S7)

4.4.3 Safety

The staircase, surface material of floor, type of door and design of counter found to be problematic for safety concerns. Firstly, while climbing up the steps, the students were scared to fall, as there were no handrails. For safety concerns, students recommended handrails at both sides of stairs and changing color of steps to be eye-catching. Also, non-slippery materials both on the floor and on the steps were suggested.

> The area for carrying tray was felt me like I was going to crash at any moment. So, it can be redesigned to make it safer. Also, visually impaired people can crash into sharp edges of counter (S2).

They all agreed, if something is spilled, the existing floor material (stone) can be slippery, it can be annoying that visually impaired people cannot see. The existing vestibule door found to be unsafe and a sliding door with sensor was suggested. Lastly, they proposed that the counter needs to be redesigned because of its sharp edges.

4.4.4 Accessibility

Designed for accessibility concern, the students suggested changing the location of cash point in order to be seen directly while entering the café. In addition, the seating area found to be cluttered and need to be redesigned, there should be a clear area around the seating area. All students preferred to sit near the counter, and agreed the distance from counter to the seating area was adequate. Two of them said; if this place (where she was sitting) are full, it's too much trouble for visually impaired people to reach the back tables. Moreover, one student recommended a special seating area for visually impaired or blind people. She supported her ideas empathically; "…that area can be designed and visually impaired people can be directed there. Of course, other people can sit there, but they should know that we (visually impaired people) have the priority. I do not think that it can be stigmatizing because this kind of area prevents possible problems."

5. Discussion

In this study, the students were required to experience the built environment from visually impaired people's point of view. Previous

studies showed that students have positive outcomes on empathic design understanding through their design reflections and their perspectives on people with diverse abilities' conditions, needs, problems and expectations were enhanced (Altay and Demirkan, 2014; Cardoso and Clarkson, 2012; Gomez-Lanier, 2018; McDonagh and Thomas, 2010). This study also showed that role-playing activity improved the perception of students through people with diverse user needs and helped them to think more empathically towards the problems of visually impaired people. This approach is an appropriate one in trying to understand real-life states as Altay & Demirkan (2014) stated. Besides students realized the design characteristics of spaces that are significant for visually impaired people (Gomez-Lanier, 2018). In this research, students did not obtain their empathic behavior from visually impaired users. They only tried to explore visually impaired people's capabilities, needs and expectations by imagination gained from their role-playing activities. Therefore, it is proposed in other studies that designers should built face-to-face interactions with potential people with diverse user needs, because direct contact and communication play a significant role in developing empathy (Altay, 2017; Kouprie & Sleeswijk Visser, 2009; van Rijn et al., 2011). Generally, students analyzed and evaluated the situations empathically, compared the visually impaired people's capabilities with theirs and gave examples from their own experiences. Students underlined that they should empathize with, help and have respect for people with diverse needs.

6. Conclusion

The analysis showed that graduate students developed their empathic ability towards visually impaired people's needs, capabilities and problems that they face in the built environment. It was understood from their reflections that experiencing the empathic modelling provided them to understand and feel users' conditions in-depth way. Students all agreed that they would take into consideration visually impaired people's problems in their future designs. The role-playing technique also revealed an improvement in the designer's knowledge and design value system.

Findings showed that cognitive empathic expressions were widely used than affective expressions. In design reflections; color and light, orientation, safety and accessibility issues were mostly expressed as design problems for visually impaired people.

This study contributes a new finding to literature, since there are few studies concerned with visually impaired people's public space utilization. It was carried with a limited number of students, and future studies might profit from increasing the number of students and using the same or different empathic modelling techniques in various public spaces. Also, the amount of time for the experiment might be increased and different activities might be conducted and it is proposed in other studies that designers could built face-to-face interactions with real users, because direct contact and communication play a significant role in developing empathy. This work may be a guide for interior architects or people who are related with the public space design.

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Conflict of interests

The Author declares that there is no conflict of interests.

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