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Orientation and Mobility Problems of Adults with Visual Impairment and Suggestions for Solutions

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Abstract: This research aims to identify the main problems experienced by adults with visual impairments regarding the use and accessibility of orientation and mobility skills and offer solutions for these problems. For this purpose, the knowledge of individuals with visual impairment on orientation and mobility skills and the problems they experience while using these skills and using public transport were discussed. Additionally, the skills they most need and want to learn, and the environment, people, and teaching style they want when being taught these skills were examined in detail according to the participants' opinions. In the study, phenomenology design, one of the qualitative research methods, was used. 17 adults participated in the research, which would provide the most diversity for demographic information such as age, gender, and educational status. The research data were collected with the interview form tool consisting of semi-structured questions. The interviews were deciphered and transferred to the MAXQDA program, which is a computer-aided qualitative data analysis program for analysis. The descriptive analysis method was used in the analysis of the obtained data. As a result of the study, it was found that the level of education in orientation and mobility is quite low and they need to be trained. They suffer accidents due to lack of education, architectural/environmental precautions, inadequacy of measures taken for transportation, lack of assistive technology, attitude of people and lack of training of sighted guides. O&M programs can be developed for adults that include various indoor and outdoor routes and using transport.

Keywords: Visual impairment, Orientation, Mobility, Problems in mobility.

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Introduction

The sense of sight provides an opportunity to explore and observe the environment before babies start to move. Babies can see people's movements and examine the objects around them. Babies with visual impairment do not have the opportunity to examine their surroundings using their visual senses. Therefore, visual impairment also brings some limitations. Conditions such as the fear of not being able to ensure safety while moving, the foster family structure, and the inability to participate in physical activities due to dangerous regulations affect the movement of the visually impaired person. These factors significantly affect the visually impaired child's development and result in problems with cognitive, social, and psychomotor development (Tuncer, 2004). Problems experienced in these areas of development cause the freedom of movement of the visually impaired person to be limited. One of the biggest problems in people's daily lives is the inability to function independently (Malik, Manaf, Ahmad, & Ismail, 2018). In the early childhood/pre-school periods, family need to provide freedom to their child for movement, performing activities that encourage the child to explore their environment (for ex: placing child on the board and holding hands that they can try to reach multisensory toys) (Pogrund et al., 1998), implementing setting accommodations such as removing dangeorus items for comfortable movement, letting the child to seek his/her enviroment via tactile sense, and provide a rich environment in which child having more interactions to move. Traveling from home to school, from school to home and to different environments in early childhood, pre-school, and later periods build the basis of being an independent individual.

Posture and gait problems may arise due to not providing a rich environment since infancy. Limitations in their concepts (Altunay Arslantekin, 2017) may cause people to experience problems while reaching their goals. People with visual impairments face serious problems moving in familiar and especially unfamiliar environments, overcoming these problems.

Limitations of movement that occur due to visual impairment can limit a person's ability to travel, particularly independently. As a result, their life energy can be significantly affected. Travelling skills are essential for participating in social and physical activities. In the study conducted by Shimuzi (2009), it was determined that although the visually impaired participants were active individuals, the frequency of their travels was much lower than those without impairment. Visually impaired people need freedom of movement to fulfil their social roles such as socializing, shopping, and working (Altunay Arslantekin, 2015; Cmar, 2015). Freedom of movement enables people with visual impairments to become independent individuals with high self-confidence. The ten skill areas students need to participate in and be successful in Orientation and Mobility (O&M) classes are: Attention, Sensory Integration, Behaviour, Memory, Concept Development, Generalisation, Problem Solving, Social Skills, Orientation, and Mobility Skills (Ambrose-Zaken, Galhoon, & Keim, 2010).Visually impaired people need to use their O&M skills to travel safely and independently in their environment (Ballemans,

Kempen, & Zijlstra, 2011). While orientation is the ability to recognize the environment and create a position relative to the environment, mobility is defined as the ability to act in the environment in an orderly, effective, and safe manner (Zijlstra et al., 2009). Wayfinding for the visually impaired; depends on their ability to determine their orientation and position (Treuillet & Royer, 2010). Orientation skills are extremely important for people with visual impairments to be able to move independently. Orientation skills consist of clues, signs/landmarks, indoor/outdoor numbering systems, measuring, and compass directions (Hill & Ponder, 1976). These skills enable people with visual impairment to find answers to where I am, where my goal is, and how I can reach it (Altunay Arslantekin, 2015). Individuals with visual impairment need to use all their senses to perceive their environment (Gardiner & Perkins, 2005).

For this reason, people collect information about their environment and determine their position in the environment by using tactile, kinesthetic, visual, auditory, olfactory, or tactile cues in the environment they come to for the first time. In the study conducted by Koutsoklenis and Papadopoulos (2011), it is emphasised that people often focus on and use odour cues according to their environments. When people come to the environment later, they transform the fixed ones into signs (Arslantekin, 2020). Measuring skills determines the dimensions of the area, the distances of the objects, and approximately how long it will take to reach the objects/target after walking. Determining the height of objects will enable them to decide which mobility skill to use. People who use indoor/outdoor numbering systems reach their goals more quickly. The use of compass directions and tactile compass will facilitate mobility within the wider environment and produce alternative routes. Additionally, search methods such as peripheral search, the grid method, and parallel search have been developed for visually impaired people to find objects in the environment and to have information about the area (Hill & Ponder, 1976).

The second dimension of freedom of movement, mobility skills, enables individuals with visual impairments to move safely to their targets. Mobility skills were developed based on the criteria of safety, effectiveness, and appearance (Altunay Arslantekin, 2017). It is a safety principle for people to move without hitting the obstacles they will encounter while walking. For example, the most basic mobility tool for people with visual impairment is the cane, and various techniques have been developed to use the cane. Keeping the cane in front of their body allows protecting their body without hitting things. The cane also protects against hazards by providing various information about the differences in the surface (Glanzman & Ducret, 2003; Rodgers & Emerson, 2005). In mobility skills, every movement has a purpose, which is the principle of effectiveness. For example, holding the sighted guide's elbow four fingers above and walking half a step behind makes it clear that they are climbing stairs. By paying attention to the principle of appearance, the aim was not to look different from other people in society regarding posture and gait.

Mobility skills are covered in a wide range. Trailing a wall, self-protection techniques, sighted guide skills, and cane skills are basic mobility skills. These skills are also divided

into various techniques. O&M teaching is vitally important (Regal, Mattheis, Sellitsch & Tscheligi, 2018), and independent travel requires effective problem-solving skills (Perla & O'Donnell, 2004). A study conducted by Safak, Altunay, and Once (1997) determined that it is very difficult to move by applying mobility skills, especially outside the building, in countries with unplanned urbanization, such as Turkey. In view of increasing needs in advanced age, studies should be conducted to overcome difficult problems like using public transport in the city, moving in traffic, shopping, moving in familiar/first environment, finding addresses and travelling between cities/countries to give independence to people with visual impairment. People should be taught the skills to use appropriate assistive devices and move to their destination according to the purpose of the journey to master the routes. Learning a route requires paying attention to the topographical features that make up the route, obtaining information on reaching the destination (Tellevik, Martinsen, Storlilokken, & Elmerskog, 2000), and using O&M skills.

Various studies on O&M skills have been carried out in the literature (Higgerty & Williams, 2005; Loomis, Golledge, Klatzky, & Marston, 2007; Scott, Barlow, Guth, Bentzen, Cunningham, & Long, 2011; Treuillet & Royer, 2010). In examining studies in Turkey, the O&M skills of primary and secondary school students are assessed (Altunay Arslantekin, 2015; Arslantekin, Buyukozturk, Aki, & Doganay Bilgi, 2016), determining the effectiveness of different teaching methods for teaching O&M skills (Atas, 2019; Cotuk & Altunay Arslantekin, 2017), and teaching primary and secondary students the ways in limited environments (Altunay, 2000; Cakmak, 2011). Although the Ozel Egitim Hizmetleri Yonetmeligi/Special Education Services Regulation (2018) emphasizes the need to provide special education and related services to children with disabilities in early childhood, there is no study that examines the O&M skills of people with VI in early childhood, preschool, and adulthood in Turkey and the effectiveness of instructional strategies.There are no systematic teaching activities for O&M skills in Turkey (Altunay Arslantekin, 2015). Not including systematic teaching activities causes people to encounter dangers at a young age and in the future and have security problems reaching the places they want to go (workplace, cultural activities, home, etc.). It is inevitable for people who do not have O&M skills to encounter accidents (for example, getting hit by vehicles while crossing the street in traffic, open windows, etc.). Being able to live as independent individuals from infancy to adulthood and even old age, without being dependent on others, largely depends on the effective use of O&M skills. It is necessary to prepare curricula to teach O&M skills (Budd & La Crow, 2000). One of the important elements of the Expanded Core Curriculum, designed to minimise the limitations of visual impairment abroad, is teaching O&M skills (Islek, 2020; Yalcin & Altunay Arslantekin, 2019). The program is aimed at teaching students to act safely and effectively in social life. As O&M instruction progresses, the teacher reduces assistance as the student becomes more and more skilled at travelling (Tellevik et al., 2000).

Evaluations made to determine the O&M skills level of primary and secondary school students in Turkey showed that programs related to O&M should be prepared. For this purpose, and Mobility Program was developed in 2018, and activity books were

prepared for primary, secondary, and high school students in 2020. However, there are no teaching practices for adults with visual impairments. Every individual should enjoy an equal right to freedom of movement. Another factor affecting freedom of movement is the obstacles that can be encountered and pose a danger due to architecture and environmental regulations. While moving in the city, difficulties are also encountered due to the improper construction of institutions and buildings. Ensuring that people can act independently in the built environment requires that the spaces are accessible, unhindered and that existing obstacles are noticed by the individual (Kaplan, 2013). Having a livable quality of cities is of great importance for the quality of life of all people, not only those with visual impairments. For this, arrangements should be made to prioritise accessibility. In the study conducted by Erdoğan (2019), it was determined that the most important desire of the visually impaired is to be able to live in the city without needing anyone.

Research has focused on providing solutions that will enable people with visual impairments to improve their independence and perform their daily activities and tasks independently, such as moving around cities safely (Ramadhan, 2018). There is a study dealing with O&M problems experienced by visually impaired people in Turkey. In the study conducted by Altunay Arslantekin and Ekinci (2014), a limited number of university students were interviewed. However, there is a need for studies to determine the problems experienced in such situations in detail and create solution proposals for the training of visually impaired (tactile) adults in Turkey, their mobility skills, and accessibility, etc. It will be sighted guide other studies such as revealing O&M problems, preparing training programs, and taking accessibility measures. This study identified the main problems experienced by visually impaired adults regarding O&M skills and accessibility and offered solutions.

Method

This research aims to identify the main problems experienced by adults with visual impairments regarding the use and accessibility of orientation and mobility skills and offer solutions for these problems. For this purpose, the knowledge of individuals with visual impairment on O&M skills and the problems they experience while using these skills and using public transport were discussed. Additionally, the skills they most need and want to learn, and the environment, people, and teaching style they want when being taught these skills were examined in detail according to the participants' opinions. In this context, phenomenology design, one of the qualitative research methods, was used in the study. This method focuses on evaluating lived experiences (Miller & Brewer, 2003). Phenomenology aims to bring personal experiences about a phenomenon to a more general level (Creswell, 2007). In other words, studies prepared according to the phenomenology pattern generally aim to reveal and interpret individual perceptions about a phenomenon and focus on phenomena that we are aware of but do not have a deep and detailed understanding of (Yildirim & Simsek, 2011).

Participants

In phenomenological studies, data sources are individuals or groups who experience the phenomenon that the research focuses on and reflect this phenomenon (Yildirim & Simsek, 2011). In the research, a study group was formed to provide the most diversity according to demographic information such as age, gender, and educational status among adults with visual impairment. In determining the research participant group, firstly, the associations operating in the visually impaired field in Turkey and the disabled student units serving at universities were contacted. In line with their information, a list of people who will constitute the possible participants of the study has been prepared. Thirty-eight people were called individually by the researchers, and information about the purpose of the study was given. 12 of these people were not included in the study because they moved using their visual remnant, 8 of them did not want to participate in the study, piloting was conducted with one person, and semi-structured interviews were conducted with the remaining 17 people. Detailed information about the individuals with visual impairment who participated in the study is summarized in Table 1 below.

Table 1.

Participants Demographics

Gender	**F**
Male	8
Female	9
Age	**F**
20-30	9
31-40	4
41-60	4
Educational Status	**F**
Primary	2
Secondary	3
Undergraduate	10
Graduate	2
Total	**17**

As seen in Table 1, there are participants in the study group according to age, education level, and gender. In the research, attention was paid to ensure diversity as much as possible.

In the research, the participants were asked, "Have you received professional mobility and orientation skills training at your schools or from anywhere else (Guidance Research Center (GRC), course)?". The responses of the participants are shown in Table 2 below.

When Table 2 is examined, it is seen that the participants mostly received training on senses, search methods, orientation skills, and mobility skills inside/outside the building. It is seen that the least trained skills are traffic and bad weather conditions.

Table 2.

Participants O&M Skills Training

Have you received professional mobility and orientation skills training at your schools or from anywhere else (GRC, course)?	Yes (F)	No (F)
Taught the use of senses	5	12
Taught search pattern-techniques	5	12
Taught orientation skills	5	12
Taught basic mobility skills inside/outside the building	5	12
Taught route-finding skills inside/outside the building	4	13
Traffic teaching	3	14
Bad weather teaching	3	14
Taught the use of architectural/environmental concepts (revolving doors, escalators, etc.)	4	13

Data Collection Tools

According to Yildirim and Simsek (2011), interviews are the primary data collection tool in phenomenology studies. In this study, following the purpose and method, a personal information form containing demographic information and an interview form consisting of semi-structured questions containing questions about the participants' use of orientation and mobility skills in daily life were used.

The Personal Information Form was used to obtain information about the demographic characteristics of individuals with visual impairment. The form prepared by the researchers included the variables of age, gender, and educational status. Additionally, the form included a question aiming to reveal the training of visually impaired individuals regarding O&M skills and eight sub-questions of this question.

Due to their standardisation and flexibility, semi-structured interviews eliminate the limitations of tests and questionnaires based on writing and filling and help gain in-depth information on a specific subject (Yildirim & Simsek, 2011). Therefore, semi-structured interviews are not as rigid as structured interviews and not as flexible as unstructured interviews. It is in the middle of both. Semi-structured interview forms offer interviewees the opportunity to express themselves better and provide in-depth information (Buyukozturk, Kılıc Cakmak, Akgun, Karadeniz, & Demirel, 2012). For this reason, semi-structured interviews were preferred in the research.

The researchers developed the interview form used. First of all, the literature was scanned, and the data collection tools used in the research were examined. Then, the outlines of the interview form were determined, and in this context, interview questions

were written to reveal the problems experienced by the visually impaired individuals regarding their O&M skills.

3 experts in education of the visually impaired and 1 expert in measurement and evaluation were consulted for the appropriateness of the questions. In the first part of the expert opinion form, information about the study was given, and experts' opinions on the suitability of the questions, their corrections and suggestions were sought. The experts examined the questions and made the relevant markings. The researchers examined the proposed regulations and changes, and the form was revised by making the necessary corrections. Using the revised revised questions, a pilot interview was conducted with a visually impaired female participant through the zoom program. The pilot interview lasted 50 minutes. After the interview, a question was removed from the interview form because the answers to other questions covered that question. The development process of the personal information section and the interview form consisting of 10 questions was completed by making the necessary adjustments and changes.

Data Collection Process

Before starting the data collection process, preliminary interviews were conducted with the participants via telephone. In these interviews, the purpose of the research was explained, and general information about the research was given. It was stated that the data obtained from the interviews would not be used anywhere other than for research, that the names would be kept private, that the interviews would be analysed for scientific purposes only, and that the results could be shared with them if they wished. Individuals with visual impairments were asked whether they would voluntarily participate in the research and were told that they were free to participate in the interview. Permission to record the interviews was also obtained from the individuals who wanted to participate in the study.

The data collection process was carried out by doing individual interviews with two participants over the phone and fifteen through the zoom program. The researcher called the participant about an hour before the interview in telephone interviews and reminded them of the interview time. In the interviews he made through the Zoom program, he shared the link with the participant about an hour before the meeting. The interviews were completed between 28-50 minutes. During this period, the questions in the Personal Information Form were primarily asked the participants. Then, the questions in the Semi-Structured Interview Form were passed. If the answers given by the participants were not understood, the researcher asked the individuals to describe the situation by giving an example. The interviews ended after all questions were answered. At the end of the interview, participants were thanked for their participation, and the data collection process was completed.

Data Analysis

The process of preparing the interview questions for analysis consists of several stages. First of all, the interviews with the participants were deciphered and transferred to the MAXQDA program, a computer-aided qualitative data analysis program.

The descriptive analysis method was used in the data analysis. Accordingly, the researchers carefully examined the interview questions and the answers given to these questions, themes were formed, and the data were summarised and interpreted according to these themes (Yildirim & Simsek, 2011). After the themes were determined, the participants' answers were coded and sub-coded by the researchers during the zoom meeting. The coding process involves collecting text or visual data into small categories of information, looking for evidence for the code from different databases used in a study, and then giving the code a label. Since all the information in the qualitative data cannot be used, sorting is done (Creswell, 2013).

The themes and codes were analysed, and the findings were visualised in more than one way and presented in tables. According to the number of participants, the code distribution is included in the code frequencies and code-subcode models graphs. Additionally, as Yildirim and Simsek (2011) suggested in the descriptive analysis, to reflect the views of the participants in a striking way, the findings were tried to be supported by quoting the statements directly.

Credibility, Transferability, and Ethics

Some concepts and strategies are suggested as an alternative to validity and reliability and suitable for the nature of qualitative research (Yildirim & Simsek, 2011), to increase the quality of qualitative research. Among the strategies proposed to increase the credibility of study, participants data sources were briefly summarized after the interview and asked whether their perceptions reflected the transferred data. Additionally, a detailed description was made with direct quotations, the most frequently used method, to increase the transferability of the study results to similar environments. Permission of an ethics committee was obtained from a university in Turkey to pay attention to ethical principles in the study.

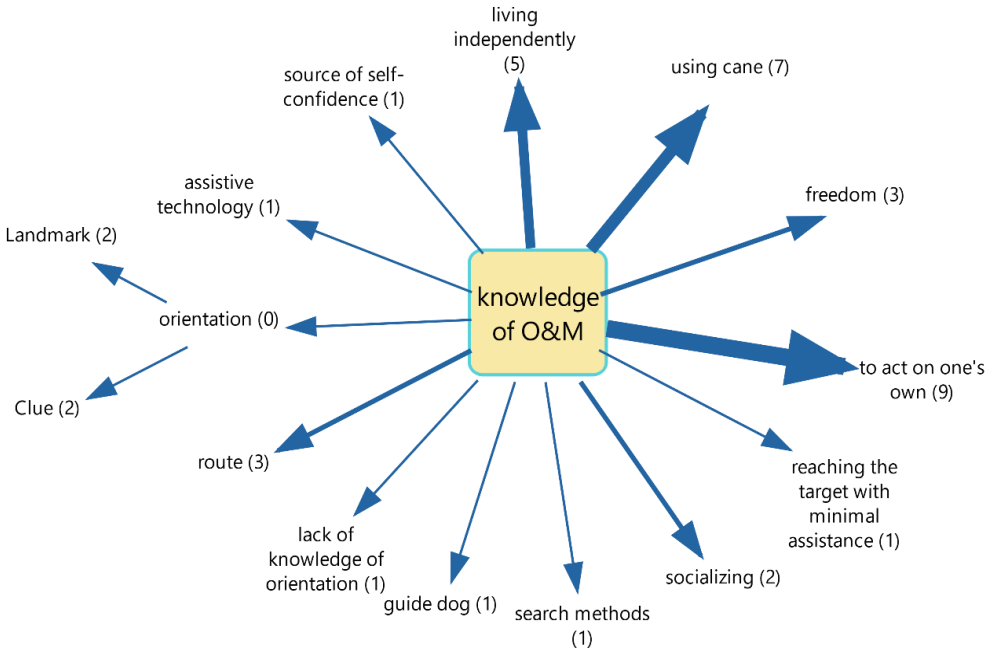
Findings

This research discussed the knowledge of individuals with visual impairment on O&M skills and the problems they experience while using these skills and using public transport. Additionally, the skills they most need and want to learn, and the environment, people, and teaching style they want when being taught these skills were examined in detail according to the participants' opinions. The findings obtained from the 17 participants views for each question are presented below, respectively.

Participants were first asked what they knew about O&M and were asked to explain. The answers given by the visually impaired participants were examined individually, and the code-subcode model prepared for the codes, subcodes, and their frequencies are given in Figure 1 below.

Figure 1.

Code-Sub-Code Model of What Visually Impaired Individuals Know About O&M Skills



When the model in Figure 1 is examined, it is seen that the participants mostly talk about *being able to move on their own*, then *using a cane* and *living independently* regarding their O&M skills. Additionally, some participants mentioned *cues* and *signs* with orientation skills, while one participant stated that orientation skills were *lacking*. *The other emerged codes are moving on a route, freedom, socialization, reaching the goal with minimal assistance, assistive technologies, and having these skills are sources of confidence*. The following statements are some of the participant views from which this information was obtained:

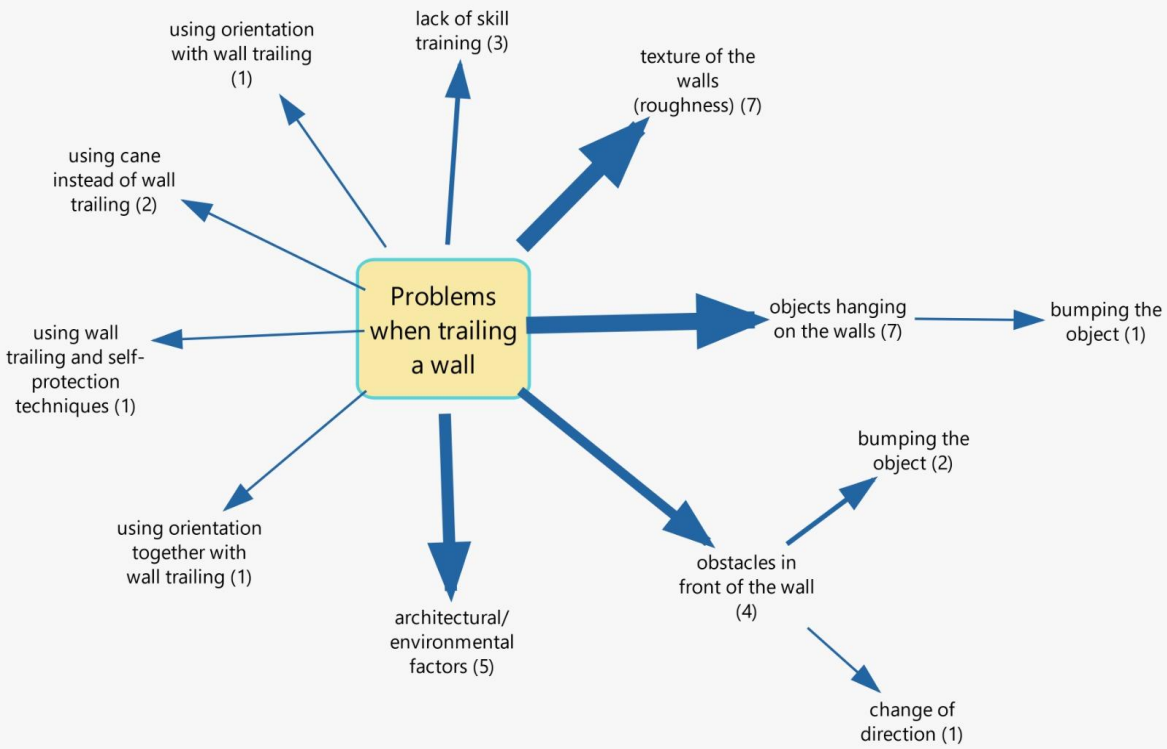
> P6: …. I would define it as the ability of the visually impaired individual to handle all their work alone because if the visually impaired individual, men, people can handle their affairs independently, they can act independently…
>
> P1: So, how the cane should be used, how it should be held...
>
> P9: I can say freedom. Not being dependent on others, being able to act on one's own, acting freely.

Secondly, the participants were asked to explain the problems they experienced while trailing the wall by giving examples. The participants' answers were examined, and the

code-subcode model related to the codes, subcodes, and their frequencies are given in Figure 2 below.

Figure 2.

Problems Experienced by Individuals with Visual Impairment While Trailing the Wall Code-Sub-Code Model



When the model in Figure 2 was examined, it was determined that one of the most common problems all participants experienced with manual wall trailing was the *rough texture of the walls* and *objects hanging on the walls*. Some participants stated that they had problems with *architectural/environmental factors, objects in front of the walls* and emphasised *bumping and changing direction*. It was determined that the problems experienced by some participants were caused by the *lack of skill/training* (for example, the reason for extending the arm at a 45-degree angle when using the manual wall tracing is to ensure that objects are noticed without hitting them). Furthermore, some participants emphasised the *use of walking cane instead of walk by wall trailing with hand*. It was determined that one participant used manual wall tracing with orientation (door tracking only to watch). The other participants encountered accidents because they could not use walk by wall trailing with hand and other skills (orientation and self-protection techniques together). The following statements are some of the participant views from which this information was obtained:

P10: I have problems indoors due to reasons such as the sharpness of the paint on the walls, pipes on the edges of the walls, glass protrusions, and sharp door handles. When I follow walls outdoors, rusted irons, nails, poles on the walls, and trees protruding make me feel anxious.

P2: … there may be injuries because we do not know what is on the wall and its structure. It may be possible inside the building, but there may be open windows or a hanging item in the middle of the wall. I use it, but these kinds of things can cause anxiety… In Adana, wires or something might hang on the walls, or how can I say, rusty irons might come off, so I usually follow with a cane rather than following the walls by hand.

P4: One thing happened when I was in primary school, there were fire doors on the wall, while I was following the wall, that fire door was left open, I hit it directly. We need to keep our hand at the level of our forehead. I hadn't done it. I was just wall tracking. In other words, I can state that the materials on the walls are a problem… I don't think we can follow the wall by hand functionally, as visually impaired people. So for this, you need to get a very good education. It is necessary to get training that can help follow the wall exactly….

P8: …it is not clear what they put there, a vehicle can be in the middle of the road, something else can happen, that vehicle makes you lose direction.

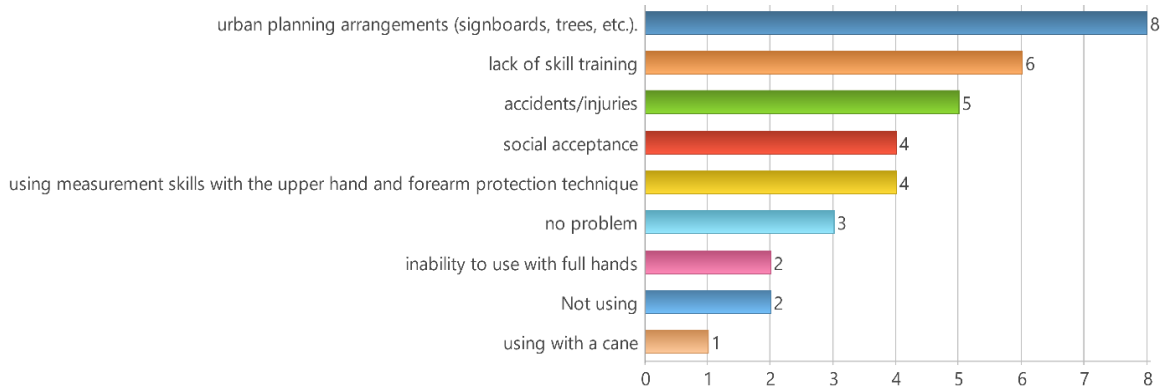
P12: … things at the height of my hand can be a fire extinguisher or a board. For example, something happens in some buildings, you go up the stairs, but the ceiling may not rise parallel to the stairs. I follow it with my hand so that I can notice the downward hump on the ceiling. But of course, at these points, sometimes there could be things like nails nailed to the wall.

P1: When we follow the walls manually, we do braille texts on the walls, especially in public institutions. These wall traces are more useful for us to count doors or determine the entrance angle of the door. Of course, some architectural defects can affect us a little.

As the third question, the participants were asked what problems they experienced while using self-protection techniques. The graphical representation of the codes related to this question is shown in Figure 3 below.

Figure 3.

Distribution of the Codes Regarding the Problems Experienced by the Participants While Using Self-Protection Techniques



When Figure 3 was examined, it was determined that the participants experienced various problems while using self-protection techniques. It is seen that they mostly state

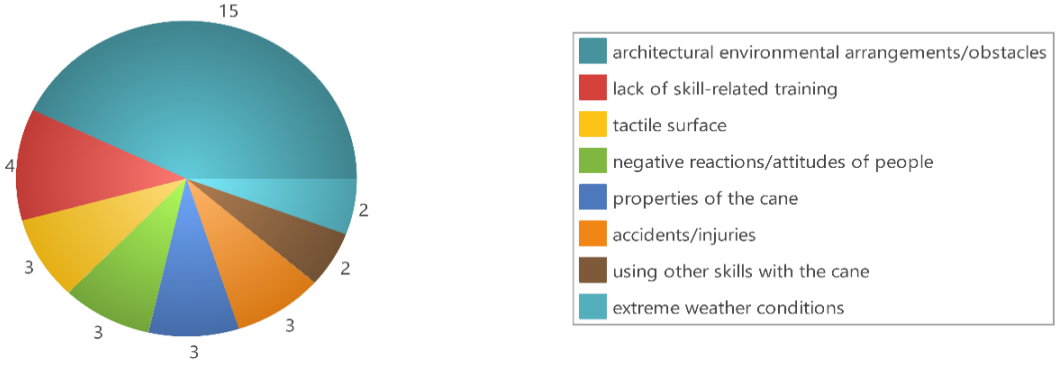
the problems related to *"city planning regulations"* when using self-protection techniques. In the interviews, it was seen that there were no statements about the upper hand and forearm protection technique that protects the upper part of the body and the lower hand and forearm protection technique that protects the lower part of the body. Some of the participants emphasised that they encountered accidents, especially because they did not receive training. A small number of the participants stated that they did not have problems with self-protection techniques, some of them did not use them, and some stated that these techniques might affect social acceptance. It was determined that some participants encountered accidents because they could not use self-protection techniques and measurement, and one participant could not use a cane and the high arm protection technique together. Problems such as not using self-protection techniques and having their hands full are the other sub-codes. The following statements are some of the participant views from which this information was obtained:

> P8: Let me tell you, it can be related to the size of the trees placed in some places, for example, you may settle something in your head, for example, there are even such electronic things in subways….
>
> P3: Self-protection techniques are important, but I did not receive training on this either. I have had accidents and crashes. I hit a wall once, and my face was bruised.
>
> P11: I don't really know these techniques... I do them sometimes, but it can look bad from the outside. Sometimes we have materials at hand, and even then, we can't make it. They are good techniques that keep us from crashing.
>
> P5: I do similar things myself. But I hit things too many times, and it doesn't work for me. But it has to be done, especially when walking on the street, our heads turned to stone.
>
> P6: Now, I can say that we have a lot of difficulty in upper hand and lower hand forearm protection techniques in terms of self-protection techniques.

Participants were asked *what problems they experienced while using their walking cane skills* and were asked to give examples for the fourth question. The graphical representation of the codes for this question is presented in Figure 4 below.

Figure 4.

The Distribution of the Codes Regarding the Problems Experienced by the Participants While Using Cane Skills



When the data in Figure 4 is examined, it is seen that almost all of the participants have problems with *architectural* and *environmental regulations/obstacles* while using their cane skills. It is seen that there are deficiencies in training related to the skill. Tactile ground surfaces, negative reactions, attitudes of people, and the suitability of the cane are other problems experienced. Problems in bad weather conditions and using the cane along with other skills are other subcodes. The following statements are some of the participant views from which this information was obtained:

> P4: …I noticed such a hole at the last moment, but because I was moving too fast, I fell into the hole. In my opinion, when walking with a cane, it is necessary to walk a little slower without changing the angle.
>
> P8: It is related to the wrong placement of the embossed lines on these places, and it is also related to the vehicles parked on the pavements because they inevitably cause people to lose their direction. When you least expect it, it can be about things like road construction etc..
>
> P10: … rubber floors are very slippery in rainy weather, and I have trouble using a walking cane on these floors. At the same time, underneath some sidewalks are empty, and I experience problems such as water splashing, breaking my cane, and bending my cane. When I move the cane on stones, I sometimes have problems such as the cane getting stuck and putting pressure on my abdomen due to the different heights of the stones.
>
> P6: … let's say we are walking on the road, on the sidewalk, we have to apply the touch technique. We do this with a diagonal technique. For an obstacle on the right to be noticed, that touch technique needs to be done carefully. Especially when we don't do this on the sidewalks, we don't notice the tiny poles, and when we don't notice them, we understand that we didn't use that technique when we hit the pole, but yes, little accidents can happen.
>
> P11: "…the sidewalks are narrow, and there can be trees and fungus; you can crash and fall on them. On the other hand, sometimes cars and big buses park on the pavement, then you lose your way. Another thing, sometimes it can be a problem to pass through doors, the cane gets stuck under the door, and then we try to get it out."
>
> P10: When you do not expect it, things can happen, and obstacles arise. For example, sometimes I have a bag in my hand and a cane in my other hand, a tree or something can be above, then I hit my head. By the way, when I have a bag in my other hand, I can't use other self-protection techniques; again, something happens when I don't expect it.…

As the fifth question, the participants were asked what problems they had with walking with a sighted guide and were asked to give examples. The graphical representation of the codes for this question is shown in Figure 5 below.

When Figure 5 is examined, it is seen that almost all participants have problems with the *"training of the sighted guide"*. It is seen that some of the participants have problems due to their lack of training in skills (going through narrow places with a sighted guide, etc.). One of the participants stated that he had problems crossing the street with the sighted guide. The following statements are some of the participant views from which this information was obtained:

> P11. The guide may not know; it's normal. The guides were worse when I was young, and now the young people are educated. They ask, but they take my arm. They do not give confidence when crossing the street. I use the guides most often when crossing the street. As I said, it doesn't feel

safe to cross with them. We walk side by side, and sometimes they say 'uncle run run'. It wouldn't be a problem anyway if I could run, but how can the blind run? It's just a short distance away.

P1: His tension reflects on me as well. For example, when we are going to get off the pavement, he says that I should get off first. However, he has to come down first to guide me. So I can say that people are not educated enough about guidance.

P6: The sighted guide is insufficient in this regard. Sometimes they think that we will walk ahead; we have to tell them ourselves. Accidents also happen, so we can hit the sign when walking side by side. They also try to send us ahead while passing through narrow areas, so training is a must.

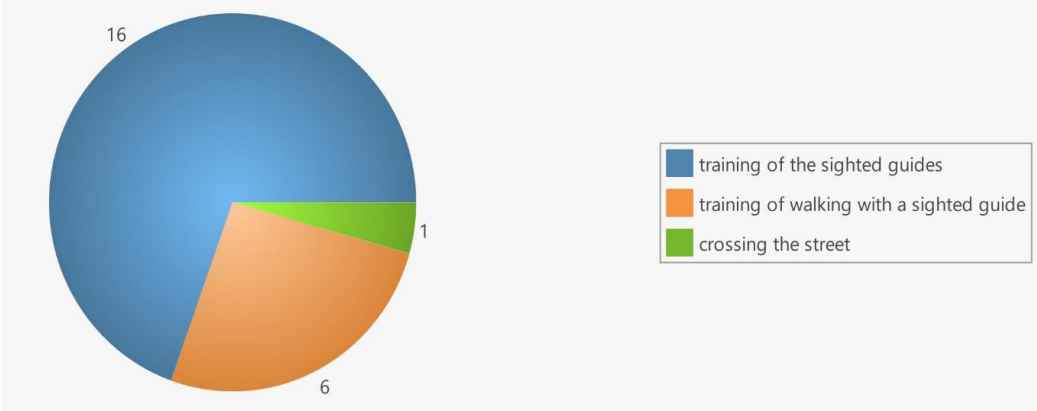
P9: I say that the guide should take my arm or that I should take his arm. Sometimes they get into my arm by tugging, then I warn them.

P10: If the other person is an outsider, if they are uneducated, them taking my arm and grasping my armpit prevents me from moving freely. In general, staggering and tripping are very common because the other person cannot control the approach angle. In the same way, when we offer to take their arm, they do not know how to direct it, so there may be collisions with the poles, there may be stumbling, and foot sprains when going up and down the pavement, there may be problems such as not being able to adapt to their pace when moving fast. Usually, these are the problems with the guide.

P12: … when there are narrow and hazards of spilling things, for example, there may be cosmetic stores, glassware stores, opticians, etc. In such cases, I hold them by the shoulder, or if they have a backpack, I hold the backpack.

Figure 5.

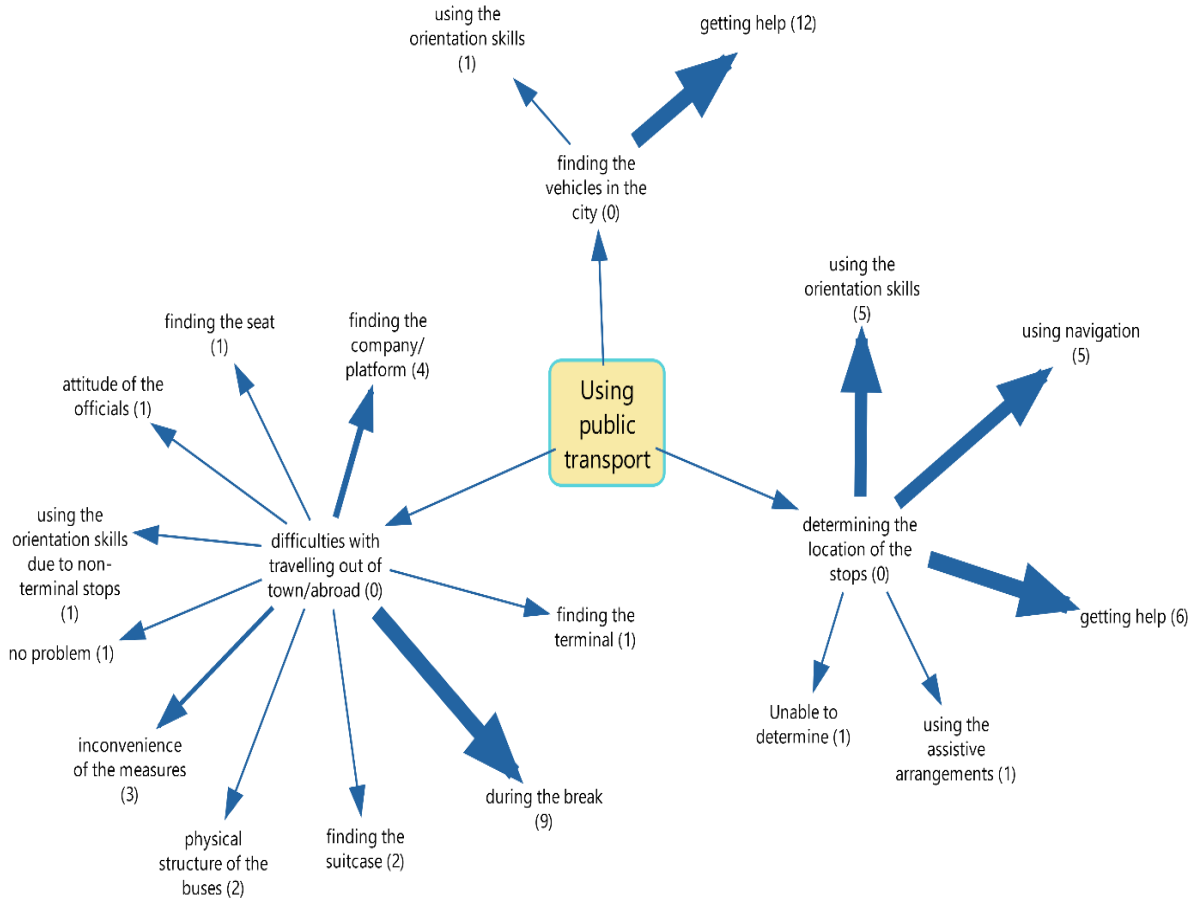
The Distribution of the Codes Regarding the Problems Experienced by the Participants While Walking with Sighted Guide



Participants were also asked about their use of public transport, and all but one participant stated that they used these vehicles. The code-subcode model of how the city stops determine their locations, how they find the vehicles to get on in the city, how they travel out of town or abroad, and how they use aeroplanes and buses, and their frequencies are as in Figure 6 below.

Figure 6.

Problems Experienced by Individuals with Visual Impairment while Using Public Transport Code-Alt Code Model



When the model in Figure 6 was examined, it was determined that a significant part of the participants *"wanted help"* in finding public transport and determining the location of the stops. Except for one person who stated that he did not have any problems, it was determined that all participants had many problems during their trips outside the city. The most problematic situation is during the *"use of breaks"* in out-of-town transportation by buses. Additionally, it was determined that the participants had serious problems with *"finding the company/platform"*. It has been revealed that there are problems regarding accessibility that *"measures taken by companies are not suitable for the physical structure of the bus"*. It was determined that there were problems finding the terminal, seats, and suitcases, and orientation skills could not be used due to stops outside the terminal. While some participants use navigation to find stops, they use limited orientation skills such as counting stops while on the bus. One person says it is supportive editing, and there are problems with the structure of the material. The following statements are some of the participant views from which this information was obtained:

P1: There is no speech system in our buses. That's why we can't explain ourselves. I get help from the passengers on the bus or the bus driver saying, Can you tell me when my stop comes?

P8: I ask, you can't do it without asking, to do it without asking, either the phone has to say those stops, or it has to give a signal when the bus arrives….

P17: There is anxiety in everyone, everyone is fast, it is necessary to ask again. We get on somehow, but it becomes more of a problem when I get off during breaks. I'm afraid I'll miss it.

P16: I go to Ankara Intercity Bus Terminal; they show me the bus I'm going to. I don't get off during the breaks. If it's very urgent, the women help. But I cannot act alone in Ankara Intercity Bus Terminal without help… Someone else sits on the seat.

P15: I can count pauses if it's not loud, but….

P12: … the bus is like ….. 10-15 minutes. Then we reach the terminal. I sometimes discover things like this about the place I'm going to land. Other than that, I find my seat by asking someone. For example, I can guess more or less… where is it, but I mean, I have to ask about which of the 3-5 seats I guessed is.

P6: …in aeroplanes, due to the education they have received, we usually get on the plane first and get off last … I usually make my way when the plane stops and proceed by myself. As soon as they see me, they catch me….

P7: The biggest fight we have had on the plane is because they say 'we have to take you to the plane with a wheelchair'. On an aeroplane, it is thought that I must sit by the window. For example, if we went with two more blind friends, we can't sit next to each other. Even though our side is empty, we are both asked to sit by the window.

P5: The inside of the bus is narrow, so it is difficult to walk with someone or with a cane.

Participants were asked, *"What O&M skill do you need the most?"*. The themes and frequency values created from their answers are presented in Table 3 below.

Table 3.

Frequency Values for the Orientation and Mobility Skills They Need Most

Theme	*Participants*
Route	(P1, P15, P17)
Orientation skill (use of cues and hints)	(P1, P13, P16)
Traffic training (safe passage at intersections)	(P6, P12)
Walking cane techniques	(P2, P4, P5, P7, P9, P10, P11, P13, P16)
Self-protection techniques	(P3, P7)
Use of technology	(P3, P10)
Search pattern-techniques	(P8, P17)

Note: Participants could provide more than one opinion.

When Table 3 is examined, more than half of the participants stated that the skill they need the most is walking cane techniques. This skill was followed by route and orientation skills. According to participant views, self-protection techniques, technology use, and search pattern- techniques were the least needed skills.

Participants were asked, *"Which orientation and mobility skill would you most like to be taught?"*. The themes and frequency values created from their answers are presented in Table 4 below.

Table 4.

Frequency Values for the Orientation and Mobility Skills They Most Want to Learn

Themes	*Participants*
Walking cane techniques	(P1, P2, P5, P7, P9, P10, P11, P12, P13, P14, P17)
Self-protection techniques	(P3, P8, P17)
Route teaching	(P4, P15, P17)
Use of technology	(P1, P3, P7)
Traffic skills	(P6, P11)
Orientation skills	(P16)
Search pattern-techniques	(P8)

Note: Participants could provide more than one opinion.

When Table 4 is examined, most participants stated the cane techniques as the skill they most want to be taught. This skill was followed by protection techniques, route teaching, and technology use. The skills that the participants least wanted to be taught were orientation skills and search pattern-techniques.

Respondents were asked where, by whom, and how they would like O&M skills to be taught. The participants' answers were individually examined. The code-subcode model of the codes, subcodes and their frequencies is given in Figure 7 below.

Most of the participants emphasised that "special education teachers should provide training". Participants stated that training should be taught at home and school, in the environment in which the skills are realised, starting from infancy/childhood. The number of those who think that it should be taught at school is limited. Some of the participants emphasised hands-on and one-on-one training. Some participants stated that the teacher and family should work together. Two of the participants said that training could be obtained from experienced/trained people with visual impairment. The following statements are some of the participant views from which this information was obtained:

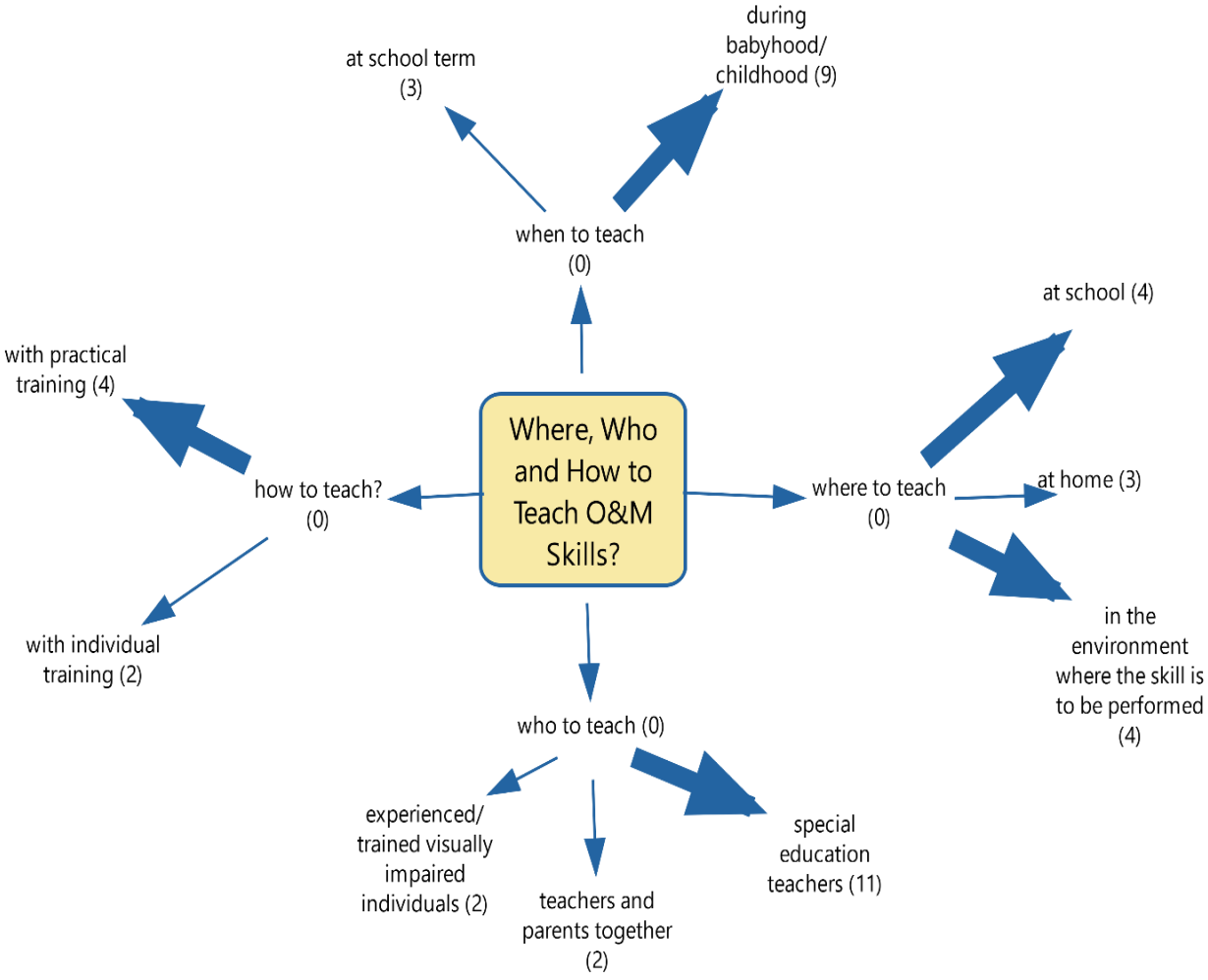
> P7: The state also opened rehabilitation centers after primary school… Experienced special educators were employed there. This issue should not be left to the mercy of the private sector. I think it should be taught by special education teachers trained by the state.
>
> P9: I think an application should be made, that is, instead of giving cane training in an environment that the students know, it can be given practically in a place they do not know.
>
> P4: I say it should have started when I was a baby. When people think of orientation and mobility, only a cane comes to mind; it's ridiculous. For example, listening to sound, labelling things with a smell. Children should be given this training as soon as they start communicating from childhood.
>
> P8: I think it should be acquired at a young age as much as possible.

P14: As I said, since it will start from pre-school, first of all, teachers and families should be trained on this subject. As you know, education is not only at school, but also at home, and parents should definitely be given education.

P1: Wherever route teaching will be done, for example, if they want to learn the hospital, they should learn the hospital. So it should be taught right on the spot. Let it be practical... We should definitely get mobility teachers who understand this business.

Figure 7.

Code-Subcode Model for O&M Education of Individuals with Visual Impairment



Participants were asked, *"What is the one thing you would most like to do alone as a visually impaired individual?"*. The themes and frequency values created from their answers are presented in Table 5 below.

Table 5.

Frequency Values Regarding What They Want to do Alone

Themes	*Participants*
Driving	(P2, P4, P7, P9)
Nature walks	(P3, P17)
Taking grandchildren to the park	(P5)
Going to the hospital alone	(P1)
Going into the sea and locating my belongings independently	(P6)
Cooking	(P8)
Using technology	(P8)
Riding a motorcycle	(P12)
Paragliding	(P10)
Travelling Turkey alone	(P13)
To barbeque	(P11)
To draw/make a picture	(P14)
Going shopping alone	(P15)
Travelling alone	(P16)

Note: Participants could provide more than one opinion.

When Table 5 is examined, it is seen that what the participants want to do it alone differ. It is seen that there are actions such as driving, nature walks, going to the hospital alone, going to the sea and finding belongings independently, cooking, using technology, shopping, and travelling alone.

Conclusion, Discussion, and Suggestions

This study was carried out to identify and offer solutions to the main problems faced by visually impaired adults regarding O&M skills and accessibility. Freedom of movement requires the effective use of O&M skills. Living independently in the community depends on using their O&M skills to reach their destination (bank, hospital, school, etc.) safely and effectively. People with visual impairment need to have these vitally important skills.

What We Know about O&M

As a result of the research, when adults with visual impairments were asked what they knew about O&M, many said it was "moving on their own" and "using a cane". Additionally, individuals emphasised that mobility is a source of self-confidence, assistive technology, orientation, route, guide dog, using a cane, searching methods, socialising, reaching goals with minimal help, living independently, and freedom. Vanderpuye, Attia, Amoako, Fofie and Asamoah (2020) show that acquiring O&M skills helps people with visual impairments to freely enter any situation, enables them to gain a variety of real-life experiences, improve their understanding of concepts and develop personally so that they feel confident, and contributes positively to their self-confidence.

Adequate O&M skills improve the self-esteem and sense of independence of the visually impaired by enabling them to perform many skills such as going to the toilet and classroom on their own without falling (Chen, 2012).

The Use of O&M Skills

In the study, adults stated that they experienced various problems related to using O&M skills. It can be thought that this situation may be caused by environmental regulations and the lack of skills. In Turkey's mobility evaluations, it has been determined that people with visual impairments do not have most orientation and mobility skills (Altunay Arslantekin, 2015; Arslantekin et al., 2016). Vanderpuye et al. (2020) also determined that students in the visually impaired school experience difficulties using self-protection and walking with a sighted guide effectively.

In the study, adults emphasised that the skills they most needed and wanted to be taught were "cane techniques". The cane is the most important mobility tool, and it needs systematic teaching of cane techniques to use it effectively. The most emphasised situation in the interviews is the "lack of education of sighted guides". In a study conducted by Altunay Arslantekin (2015), it is seen that child with low vision in the school for the visually impaired sighted guide their peers by pulling on their arms, holding them by the shoulders or walking side by side.

In the study, it was determined that one person used a guide dog and had some accidents. In the study conducted by Lloyd, La Grow, Stafford, and Budge (2008), it was emphasised that the mobility performance of people with visual impairments increased when a trained guide dog was used, but that walking cane skills should be used together with the guide dog. Therefore, having O&M skills for people who use guide dogs will make it easier for them to reach their destination safely.

Activities Preferred to be done Individually

The responses "going to the hospital alone, driving a car, walking in nature, taking grandchildren to the park, swimming, finding things on your own when going out, cooking, using technology, riding a motorcycle, paragliding, travelling alone in Turkey, shopping alone, and travelling alone" to the question "As a visually impaired person, what would you most like to do alone?" illustrate the need for O&M skills and the importance of systematic instructional activities. The literature on people with visual impairment has shown that "mobility is an important part of daily life and its impairment greatly affects the quality of life" (Lahav & Mioduser, 2002).

O&M Training

The research shows that the number of those who stated that they received professional O&M skills training at their schools or elsewhere (GRC, course) is relatively low, while

those who answered no is high. Altunay Arslantekin and Ekinci (2014) determined that most of their students do not know the names of O&M skills. Because there is not enough practice, students try to develop random techniques. Therefore, this finding supports the study.

Participants in the study stated that O&M skills should be taught at school and home. The number of those who say that it should be taught during infancy/childhood is relatively high. In the study conducted by Altunay Arslantekin, and Ekinci (2014), it is stated that carrying out studies from infancy will enable the fluent and permanent use of skills. People can live as independent individuals through the preparation of education programs. The most important element in teaching these skills is competent and qualified teachers.

Wolffe, Sacks, Corn, Erin, Huebner, and Lewis (2002) noted that problems remain as to whether competent teachers teach the skills necessary for "students with visual impairments to become confident, independent, and employable young adults". Teachers devote most of their teaching time to academic skills. Although the importance of the Extended Core Curriculum has been emphasised in many studies, it seems that families and teachers in Turkey still focus primarily on teaching academic skills such as mathematics and literacy (Altunay Arslantekin, 2015).

The fact that adults' O&M education is very low and the list of skills they want to learn is dense can indicate that systematic teaching activities for these skills are not included in Turkey. Rudiyati (2014) emphasised that teachers, as the lead actor, are critically important in learning O&M skills for children with visual impairment. To eliminate the deficiencies in daily life, people with visual impairment attend non-specialist courses (Altunay Arslantekin, 2017). McKenzie and Lewis (2008) reported that auxiliary staff provided training support in assistive technology, braille, O&M, and social skills. As a result of this, Wolffe et al. (2002), asking, "So is it surprising that so many people have difficulty living independently, participating in activities, finding and maintaining meaningful employment?" emphasises that there are serious problems related to teaching. Two of the participants stated that training could be obtained from experienced/trained visually impaired people. Having visual impairment and good use of skills does not indicate that they can be a qualified teacher. For effective teaching to be carried out, the person who will teach must also be applying proven teaching methods.

In the study, the participants emphasised that the family can also support teaching O&M skills besides the special education teachers. Although the overprotective attitudes of families seem to protect the child from danger, it negatively affects their mobility (Altunay Arslantekin, 2015) and makes them dependent on the home (Kanyilmaz Polat, Bacak, & Kiroglu, 2020). Working together with teachers and families is extremely important for the generalisation of O&M skills to daily life. In a study conducted by Cotuk and Altunay Arslantekin (2017), it was found that simultaneous walking skill development through hand tracing on the wall offered to visually impaired students with siblings is

effective and they can generalise the learned skills in different environments. Furthermore, Crudden and McBroom (1999) emphasise that families have a significant impact on the employment of people in the coming years, overcoming transportation obstacles and providing motivation.

In the study, the participants emphasised practical and individual training. It is essential to carry out applications by considering people's individual characteristics and needs with visual impairment. Participants emphasised that teaching should be taught in environments where the skills will be performed the most. In the research conducted by Altunay Arslantekin and Ekinci (2014), most of the students stated that the teaching should be done practically, and they wanted to learn how to move indoors (for example, hospital, bank, etc.) and outside of the building routes they do not know.

The Use of Architectural/Environmental Accommodations

In addition to effective teaching, another important factor affecting the use of O&M skills by visually impaired people is architectural/environmental arrangements. The study participants emphasised that they frequently had an accident/injury and experienced many problems. In the study conducted by Riazi, Riazi, Yoosfi, and Bahmeei (2016), it was emphasised that all participants experienced accidents in their environment. When the problems experienced by the participants in Turkey are examined, it can be said that some accidents are caused by the lack of O&M skills/inability to use them properly. Ballemans et al. (2011) emphasise improving the quality of life, reducing falls/accidents or increasing walking speed as indicators of successful outcomes after O&M training to use walking canes.

In the research, it can be said that some accidents are due to landscaping full of obstacles. Those who stated that they had problems while using cane skills were especially numerous. Participants stated that they frequently encountered architectural/environmental problems and obstacles, bumped into them, encountered dangerous situations. They also had problems with obstacles such as cars parked on the pavement, items placed in front of walls, and items hanging on walls that caused them to change their direction. They said that regulations for city planning, such as signage and trees, also pose an obstacle. Kanyilmaz Polat et al. (2017) stated that environmental conditions cause people with visual impairments to crash and fall. In the study evaluating cane skills by Attia and Asamoah (2020), it was emphasised that the most important difficulty preventing the free movement of people with visual impairments is the nature of the environment. Riazi et al. (2016) highlighted that participants said, "I would rather walk along the street than on the pavement". They stated that bicycles and motorcycles passing on sidewalks, parked cars on the sidewalks, potholes, and other obstacles on the sidewalks are also causes of accidents. In a study by Pavey, Dodgson, Douglas, and Clements (2009), it was stated that there were difficulties in finding directions due to obstacles on sidewalks, poorly maintained roads (for example, uneven pavement slabs, overhanging fences), and dog droppings left on

the sidewalks. Campisi, Ignaccolo, Inturri, Tesoriere, and Torrisi (2020) emphasised that factors affecting mobility are physical features such as the lack of infrastructure, parked cars, and uneven tactile ground surface.

The tactile ground surface aims to help people become more independent, confident, and secure in indoor and outdoor environments. The participants also stated that they had problems due to the material of the tactile ground surfaces, objects placed on them, and obstacles such as trees. Improper mounting of the tactile ground surface can cause confusion and accidents for visually impaired people (Pembuain, Priyanto, & Suparma, 2020). In the study conducted by Low, Cao, Vos, and Hickman (2020), one participant said that the tactile ground surface should be on every platform because they fell on the rails with the guide dog. In reviewing the literature, there are several studies on tactile flooring that compare applications in different countries and expose flawed regulations such as the lack of warning blocks (Mizuno, Tokuda, Nishidate, & Arai, 2008) and cite examples of applications in South Africa (Combrinck, 2014).The tactile ground surfaces should also have the feature of facilitating the accessibility of people to public transport. These findings in the literature support the findings of this study.

The Use of Public Transportation and Attitudes

The use of public transport is critically important for the visually impaired to be independent and able to access various activities (Low et al., 2020). Providing access to public transportation is an essential element in reducing the mobility restrictions of individuals with disabilities (Padzi & Ibrahim, 2012). In the study, the participants stated that they experienced various problems related to local vehicles. They said that they received help, especially in finding local vehicles and determining the location of the stops. Most studies show that individuals with visual impairment prefer transportation with people (family, friends, etc.) without visual impairments (Crudden & McBroom, 1999; Golledge, Marston, & Costanzo, 1997; Shimuzi, 2009). One person concerned with locating the stops stated that supporting arrangements are used, but them being easily worn out is a major problem. Participants also emphasised the absence of an audio warning system. Pavey et al. (2009) also emphasise that people have difficulties accessing information about public transportation and that they seek help from others.

Furthermore, lack of regulations or creating wrong regulations result in being dependent on others. The results of the studies (Dicle & Toprak, 2020; Odabas Uslu & Gunes, 2017; Ozteke Kozan, Bozgeyikli & Kesici, 2018; Yildiz & Gurler, 2018) describing problems of environmental regulation related to public transport (such as lack of stops, unevenness of the surface, lack of sound) support the findings of the study. There may be obstacles that make transportation inaccessible in the physical environment, and in the provision of services, it is essential to make arrangements for them. In the study, the participants also stated that they had problems in various situations such as finding suitcases, the physical structure of the buses, and finding a seat during out-of-town trips. The participants stated that they had great difficulties, especially at rest stops and that

they did not take a break because they were afraid of not finding the bus again. This situation also results from the lack of practical training on O&M skills, environmental regulations, and supportive technology to facilitate mobility.

Some participants stated that they used navigation to determine the location of the stops, but they also had problems with this. Riazi et al. (2016) determined that people have problems in navigation when they go to the target by themselves in the external environment. The adoption of smart cities equipped with technological supports will improve people's quality of life and make the environment more accessible. Technological developments can improve individuals' ability to participate in social activities fully, live independently, and provide accessibility (Sobnath, Rehman, & Nasralla, 2020). Studies emphasise the contribution of supportive technologies to independence (Riazi et al., 2016), autonomy, and life satisfaction (Cifcibaşı Iyigün & Tortop, 2018; Yilmaz, Ersan, & Agca, 2018).

Another factor affecting the freedom of movement of people with visual impairment is the attitudes and education of people without visual impairments. Negative attitudes of people and lack of information exacerbate the difficulties experienced by people with visual impairment (Pavey et al., 2009). Participants stated that they experienced problems arising from the attitudes of airport employees and their lack of knowledge. They stated that they were taken to the plane with a wheelchair, waited for everyone to get off, and had problems with the bus driver's attitude. Ozteke Kozan et al. (2018) studied problems with people/employee's attitudes and their forgetfulness to mention the stop. Seeing the person as a person waiting for help paves the way for the continuation of negative attitudes.

The research has some limitations. One of these limitations is interviewing seventeen visually impaired people. In future research, more people with visual impairment can be reached and interviewed. In the research, interviews were conducted with adults. In other studies, problems related to O&M skills can be identified by interviewing younger age groups, their families, friends, and teachers.

Some suggestions were made in line with the findings obtained from the study. O&M programs can be developed for adults that include various indoor and outdoor routes and using transport. For the use of O&M skills, there is a need for studies by municipalities with the support of field experts. Studies are carried out in architecture (environmental arrangements) and engineering (technology that provides orientation, perception of obstacles, etc.) for people with visual impairments mobility. Experts can work together with an interdisciplinary approach to offer realistic solutions for people with visual impairment and make appropriate arrangements.

In a study conducted by Griffin-Shirley, Pogrund, Smith, and Duemer (2009), it is emphasised that hiring O&M specialists has many advantages, such as detailed evaluation and practice. The National Occupational Standard for Orientation and Mobility Trainer in Turkey was developed and published in the official gazette (Gorme Engelliler Yonelim ve Bagimsiz Hareket Egitmeni (Level 5) Ulusal Meslek

Standardi/National Vocational Standard for the Visually Impaired Orientation and Mobility Trainer, 2013). If O&M specialists are appointed in the future, it is thought that the visually impaired will be able to participate in life as more independent individuals without being dependent on others.

Studies can test the effectiveness of applying various teaching methods with adults in acquiring O&M skills. The effectiveness of teaching walking skills with a sighted guide can be examined by applying various teaching methods to peers in different age groups (pre-school, primary school, secondary school, high school). A software program can be developed in Turkey to teach sighted guide skills. Studies can support the self-confidence of people with visual impairment and the development of positive attitudes of people with no visual impairments.

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