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The Investigation of University Buildings Environments with Regard to Turkish Standards on Accessibility: Gazi University Faculty of Education Buildings

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Abstract

The accessibility problem encountered in many public buildings due to the built environment is also seen in educational buildings. This study is important in terms of evaluating the accessibility of university buildings and their environments that have great importance in public buildings, so that the education right, which is one of the fundamental rights and freedoms, can be fully and completely enjoyed by disabled people like healthy people. Universities are institutions that contribute to the social and cultural development of young people beyond their educational, research and vocational functions. For this reason, university buildings and their environments; should be equally accessible to all people, as it is an important socialization area, as well as the right of disabled people to access information and acquire a profession. In this article, Gazi University Education Faculty Buildings (Bosna&Hersek) in Ankara were chosen as the study area and as the limitations of this study, the physically disabled, hearing impaired and visually impaired people will be determined. The accessibility of the buildings environment and entrances will be examined through the relevant inquiry forms which created by using TS9111(2011) and TS12576(2012), and the existing incompatibilities will be determined, the accessibility level of the building's environment will be determined. Thanks to the observation and examination to be made, it will be possible to contribute to the determination of the arrangements to be made in order to improve the accessibility level of the selected area, as well as to create a feedback for the designer.

1. INTRODUCTION

One of the important indicators of the modernity level of a society is the opportunities offered by the disabled individuals in the society to participate in social life. One of the main elements of the disabled individuals to continue their lives with the same opportunities and conditions as non-disabled individuals is that the built environment should be arranged in an appropriate way, that is, accessible for everyone. Unless adequate and correct arrangements are made in the design and construction phase of the built environment, disabled people will not be able to receive health and rehabilitation services, continue their education, have a profession, access cultural, artistic and sports activities and in short, cannot participate fully and equally in social life. [1]

In the United Nations Convention on the Rights of Persons with Disabilities, which was created by Turkey in 2008, it consists of 50 articles for the full and comprehensive use of users, including "general principles, general obligations, equality and non-discrimination, awareness raising, accessibility, education, health, work and employment, participation in cultural life, recreation, leisure and sport" takes place. Article 9 of this contract is about Accessibility, and this article is planned "*to enable persons with*

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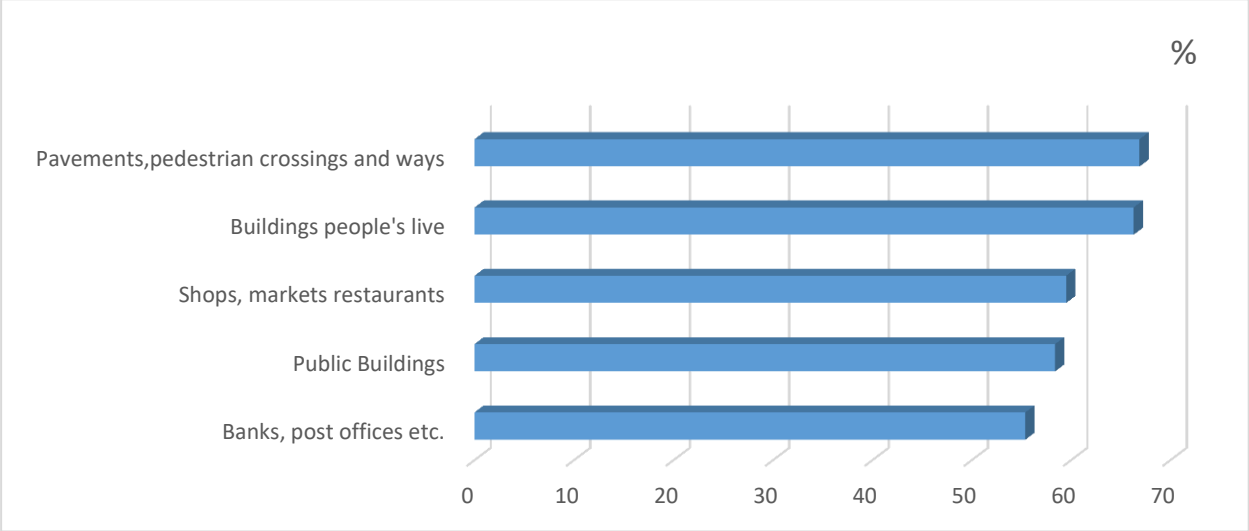
disabilities to live independently and participate fully in all aspects of life, States Parties shall take appropriate measures to ensure to persons with disabilities access, on an equal basis with others, to the physical environment, to transportation, to information and communications technologies and systems, and to other facilities and services open or provided to the public, both in urban and in rural areas." [2]

In the United Nations Convention on the Rights of Persons with Disabilities, Article 24 on Education includes, obligations to provide lifelong learning opportunities by including all disabled people in the education system without discrimination. [2]

Throughout the world, disabled people have lower health status, educational achievements, and participation in the economy than other healthy people because they encounter obstacles in accessing services such as health, education, transportation, employment and access to information that healthy individuals do not have problems in reaching. [3]



Graph 1. *Those who think that the physical environmental regulations are not suitable for the use of the disabled person (2010)* [4].

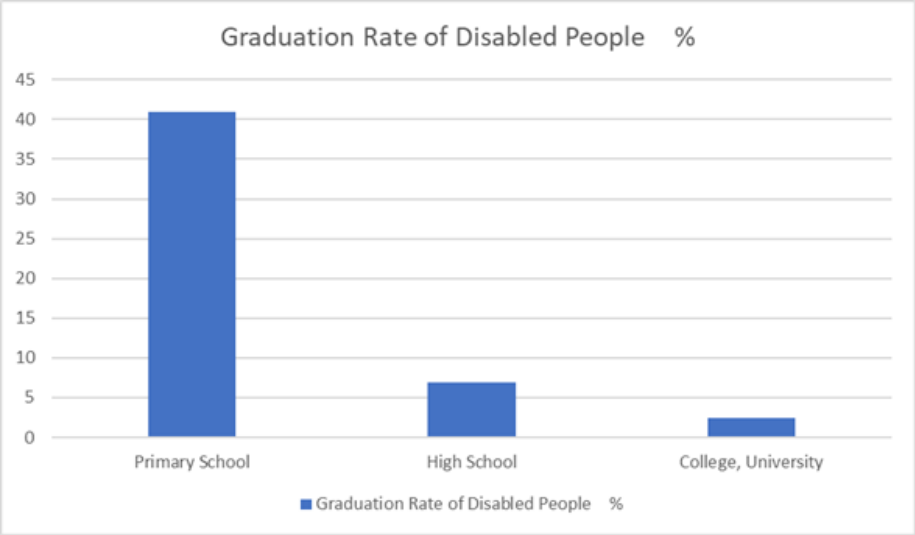
In 2010 the Disability Administration conducted a survey as "The Research on Problems and Expectations of the Disabled". According to the survey 66,9% of the registered disabled people think that the pavements, pedestrian ways and pedestrian crossings are not accessible for them. And 58,4% of the registered disabled people think that the public buildings are not accessible for disabled people. [4] This research shows us to the existing buildings and built environment which people use every day are not mainly considered as accessible for disabled people.

This places a responsibility on architects and others involved in the design and maintenance of the built environment to think sensitive and creatively in order to bring about an accessible public realm for everyone. [5]

Due to the many accessibility problems in public buildings and the importance and sensitivity of the subject, it is seen that there has been an increase in the studies on the subject in recent years. Studies [6] [7] [8] [9] [10] [11] [12] on the accessibility evaluations of various public buildings are available in the literature.

According to the Article 42 of the Turkish Constitution; "No one can be deprived of the right to education and training." [13] In accordance with this, the right to education for all citizens is guaranteed by the State. Since the right to education is one of the universal fundamental rights and freedoms, it is unacceptable for disabled people to have access problem to educational facilities due to design or manufacturing defects, arising from the built environment. For this reason, accessibility, which is the

main subject of the study, should be considered as a compulsory and one of the main criteria in any design.



Graph 2. *Results of the Turkey Disability Survey conducted by TURKSTAT Graduation Rate of Disabled People (2002)* [14].

However, with the results of the Turkey Disability Survey conducted by TURKSTAT in 2002; it is seen that there is a serious decrease in the number of disabled people who graduate as the education period increases.[14] It is thought that both the inaccessibility of the education and training buildings and the difficulties they experience during transportation to the buildings cause negative consequences for the disabled people and their families in terms of continuing their education life. And this causes the education level of the disabled people and their participation in higher education to be lower.

University education also has a great importance for individuals to produce new ideas, shape their future, broaden their horizons, have a profession and take a more active role in social life. In higher education institutions; like healthy people, disabled people have rights to participate in production by receiving education in the field they want and to participate in social life by taking advantage of the social, cultural and all other opportunities offered by universities without any help.

2. METHOD

This article was prepared from my ongoing M.S. Thesis “The Investigation of University Buildings and Their Environments in The Context Of Turkish Standards On Accessibility: Gazi University Faculty Of Education Buildings” (Gazi University Graduate School of Natural and Applied Sciences, Program of Architecture, M.S. Thesis) [15] and also same methods were used in the study.

In this study, university buildings providing higher education were selected from the education buildings, and Gazi University Education Faculty Buildings called as “Bosna and Hersek Buildings” in Ankara were chosen as the study area.

In Turkey the Turkish Standards related with accessibility such as; TS 9111 (2011), TS 12576 (2012), TS ISO 23599 and TS 13536 are accepted as the evaluation criteria for accessibility. The method of this study will be collecting data with observation, measurement and evaluation of the selected university buildings entrances and environments which are important public buildings, through the query forms to be created by using TS 9111 (2011) [16] and TS 12576 (2012). [17]

As the limitations of this study, the physically disabled, hearing impaired and visually impaired people, who are more affected by the physical barriers in the built environment and constitute 23.1% of all disabled people, were determined.

This study is important to create an evaluation method in order to determine the existing condition of buildings and their surrounding physical environments. It can be used to make similar determinations related to accessibility in existing buildings in the same building group with the prepared query forms, enable the practical application of solutions in compliance with the standards in the areas where incompatibility and non-compliance are observed, create input for new designs to be made in the same building group, and provide input for other public works. It is important for buildings to create tools that can offer a method for evaluating their accessibility.

Inquiry forms which was produced by Gamze MIZRAK, using the relevant parts of TS 9111 (2011) and TS 12576 (2012) standards. In the query forms to be applied, 4 answers have been defined as "COMPATIBLE", "INCOMPATIBLE", "INAPPLICABLE (+)" and "INAPPLICABLE (-)". Within the scope of this thesis, the answer “COMPATIBLE” indicates that the query does not create an obstacle for accessibility, and the accessibility value is (0) zero; “INCOMPATIBLE” response indicates the situation where the inquiry creates an obstacle to accessibility, and so the accessibility value is (5) five; “INAPPLICABLE (+)” answer indicates the situation where the query cannot be made in this field, but the inability to query does not constitute an obstacle to accessibility and its accessibility value is (1) one. “INAPPLICABLE (-)” answer indicates the situation where the query cannot be made in this field and the inability to query creates an obstacle for accessibility and it should take (3) three as the accessibility value.

For each selected area, the number of questions with compatible answers will be multiplied by 0, the number of questions with incompatible answers will be multiplied by 5, the number of questions with an inapplicable(+) answer will be multiplied by 1, and the number of questions with an inapplicable(-) answer will be multiplied by 3 and sum of the accessibility values will be the Accessibility Value of the selected area or form. The maximum value that will occur if the questions in all the query forms are answered "incompatible" will be found by multiplying the total number of questions by the "incompatibility" value of 5, and how close this value in the forms is reached will give information about accessibility. In addition, the "incompatibility" percentage will be determined according to the query on the form related to the (Accessibility Value of the Form*100/Value of the Completely Incompatible) process. To find the percentage distributions of incompatibilities in all forms; (Accessibility Value of the Form/Number of Questions in the Form)*100/(Total Accessibility Value/Total Number of Questions). The maximum value that will occur if the questions in all the query forms are answered "incompatible" will be found by multiplying the total number of questions by the "incongruity" value of 5, and how close this value in the forms is reached will give information about accessibility. When the answer is "INCOMPATIBLE" or "INAPPLICABLE (-)" in the queries, it can be used in the renovation and improvement works to be made in the relevant areas by offering solutions for material change, functional change or a complete design change.

Each question in the query forms will be evaluated within 5 criteria. These criteria are determined as "CONDITION", "MEASUREMENT", "MATERIAL", "QUANTITY" and "SIGNAGE". “CONDITION” is to determine the existence, absence of a regulation, its effect on use; In order to question the information that the “MEASUREMENT” application is in the right dimensions, slope, measure; In order to verify the suitability of the coating or material for which the "MATERIAL" application is selected; In order to determine the numerical adequacy of the “QUANTITY” regulation; “SIGNAGE” was chosen in order to question the existence of necessary markings and warnings.

By detecting the deficiencies, errors, and the existence of obstacles arising from the built environment in the design and construction phase of the design; The aim of this study is to provide solutions for the removal of applications that prevent accessibility, to create evaluation and measurement tools by arranging them according to Turkish Standards regarding accessibility, to investigate the availability of selected buildings and their immediate surroundings by all users.

3. FIELD STUDY

In this article the query forms to be applied and the parts of the relevant standards are arranged as follows;

- Form 1: Arrangements Regarding Accessible Routes; *TS 12576 - Section 5.1. Pavements, Section 5.2. Ramps, Section 5.3. Exterior Stairs; TS 9111- Section 4.3. Accessible Route, Section 4.4.2. Pedestrian Paths, Section 4.4.3. Ramps, Section 4.7.1.1.3. Railings, Section 4.11.1. Rules regarding the arrangement of the existing buildings close environment*
- Form 2: Regulations Regarding Bus Stops; *TS 12576 – Section 5.5.1. Section 5.8. stops*
- Form 3: Regulations Regarding Pedestrian Crossings; *TS - 12576 Section 5.4. Pedestrian Crossings; TS 9111 Section 4.4.3. Ramps*
- Form 4: Regulations Regarding Car Parks; *TS 9111 Section 4.4.1. Parking lots, 4.4.3. Ramps; TS 12576 Chapter 5.7. Vehicle Parking Areas for the Disabled*
- Form 5: Regulations Regarding Urban Furnitures; *TS 12576 Chapter 5.5. Urban furniture and equipment*

Figure 1. *Gazi University Faculty of Education Buildings Surrounding Environment*

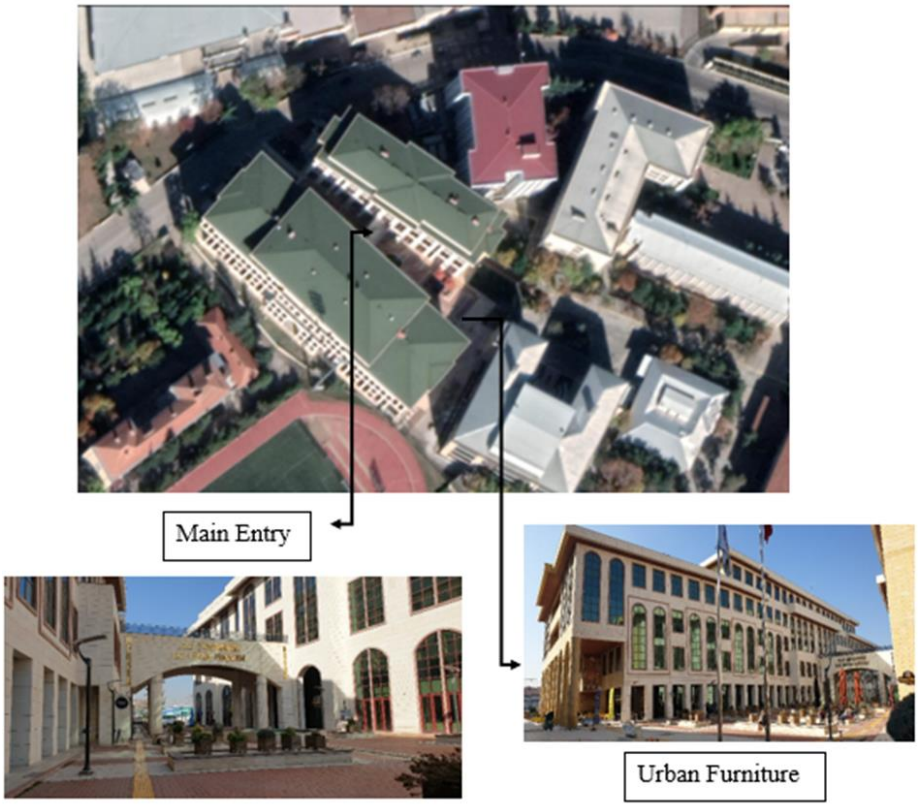


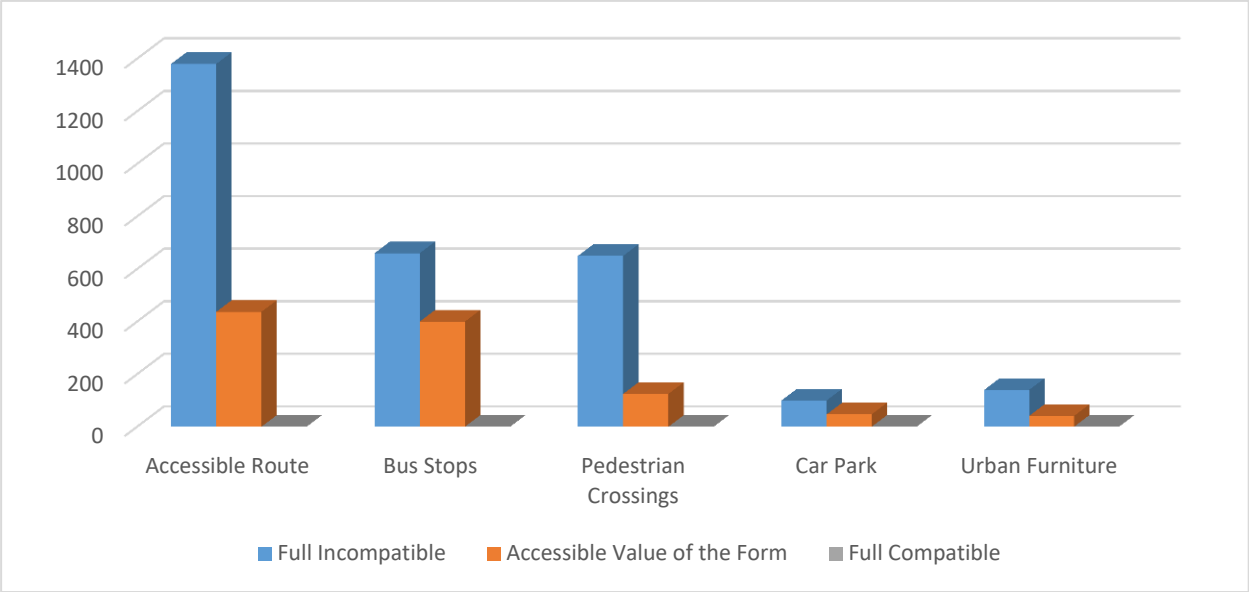
Figure 2. *Gazi University Faculty Of Education Buildings Main Entry & Urban Furniture*

Table 1. *Table of Accessibility Value and Percentage of Incompatibility of the Gazi University Faculty Of Education Buildings Environment*

Gazi University Faculty Of Education Buildings		PLACES	Total Number of Questions	1st Route	2nd Route	1st Bus Stop	2nd Bus Stop	3rd Bus Stop	4th Bus Stop	5th Bus Stop	6th Bus Stop	1st Pedestrian Crossing	2nd Pedestrian Crossing	3rd Pedestrian Crossing	4th Pedestrian Crossing	5th Pedestrian Crossing	Car Park	Pedestrian Route	Accessibility Value of the Form	Value of Completely Incompatible	% Incompatibility
FORMS																					
Form 1	Accessible Route		276	190	247														437	1380	31,67
Form 2	Bus Stops		132			49	74	74	74	63	66								400	660	60,61
Form 3	Pedestrian Crossings		130									25	21	34	30	15			125	650	19,23
Form 4	Car Park		20														47		47	100	47
Form 5	Urban Furniture		28															41	41	140	29,29
Total Number of Questions			586	138	138	22	22	22	22	22	22	26	26	26	26	26	20	28	1050	2930	35,84
Accessibility Value of the Selected Area				**190**	**247**	**49**	**74**	**74**	**74**	**63**	**66**	**25**	**21**	**34**	**30**	**15**	**47**	**41**			

As can be seen in Table 1, the percentage of incompatibility was obtained by multiplying the accessibility value by 100 and dividing it by the incompatibility value. In the evaluation made according to the questions in the inquiry forms; 31.67% incompatibility regarding the accessible route, 60.67% incompatibility at bus stops, 19.23% incompatibility in pedestrian crossings, 47% incompatibility in car parks, 29.29% incompatibility in urban furniture were detected. The percentage of total incompatibility observed in the questions in all the query forms is 35.84%.

In addition, it is determined that the incompatibilities about accessibility in all inquiry forms are related 16.84% to Accessible Routes, 32.30% to Bus Stops, 10.24% to Pedestrian Crossings, 25.05% to Car Park and 15.57% to Urban Furniture.



Graph 3. *Evaluation of Accessible Value of the Forms*

In Graph 3, the maximum incompatibility value to be obtained in case of incompatible answers to the questions in all the query forms (number of questions * 5) was determined, the maximum compatibility value was determined if it was completely compatible (number of questions * 0) and the current accessibility values in the query forms were shown comparatively. As can be seen in the graph, Bus Stops and Car Park are the most problematic areas regarding accessibility.

Evaluation of the Form 1: Accessible Routes

Figure 3. *Accessible Routes (Photograph: Gamze MIZRAK, July 2021)*

It is seen that accessibility is highly provided on the accessible route from Gate A to the main entrance of the building. However, it has been determined that the pavement materials of some garden paths are not one-piece, smooth and evenly inclined. When evaluated from the bus stops to the main entrance of the building, it is seen that there is no 150*150 cm area at the beginning and end of some of the ramps, sidewalk paving stones are not smooth and evenly inclined, and some obstacles on the route such as plants, trees and poles are not taken into the safety lane correctly.

Figure 4. *Accessible Routes (Photograph: Gamze MIZRAK, February 2021)*

The guide track route is interrupted by moving and fixed obstacles and manholes. Pedestrian sidewalks and curbstones are not easily distinguished because it is the same color and texture.

Figure 5. *Accessible Routes (Photograph: Gamze MIZRAK, July 2021)*

When the accessible route from bus stops in the direction of gate E to the building rear entrance doors was examined, it was determined that the building rear entrance staircase wasn't covered from atmospherically conditions and there were protrusions at the ends of the steps. There were no non-slip tape strips, and there was no surface for the visually impaired at the beginning and end of the stairs. It is seen that the diameter and height of the handrail are not suitable, and although the width of the stairs is more than 300 cm wide, no railing is made in the middle.

Evaluation of the Form 2: Bus Stops

Figure 6. *Bus Stops (Photograph: Gamze MIZRAK, July 2021)*

Most of the bus stops which close to the campus entrance gates are not adequately arranged. Except the bus stop in front of Gate A, there are not adequate markings and information signs at the other stops. There are no arrangements with covered and sitting benches to protect people from the weather conditions at bus stops except the bus stops in front of Gate A. Except for the bus stop in front of Gate A, the widths of the pavements are inadequacy according to the Standards. In addition, at the bus stops there aren't any warning signs about no parking.

Evaluation of the Form 3: Pedestrian Crossings

Pedestrian crossings provide highly accessibility with their widths, markings and materials. It has been determined that some pavements and tactile ground surface indicators are damaged on the sidewalks reaching some pedestrian crossings. And also, tactile ground surface indicators which indicate the transition to the pedestrian crossing are missing. There are also no special lightings to make it easier to spot pedestrian crossings.

Figure 7. *Pedestrian Crossings (Photograph: Gamze MIZRAK, July 2021)*

Evaluation of the Form 4: Car Parks

Figure 8. *Car Parks (Photograph: Gamze MIZRAK, March 2021)*

In the outdoor car park area which close to the building entrance, 5 disabled parking spaces are arranged by marking on the ground. However, there aren't any maneuvering areas at 150*600 cm. dimensions between the parking spaces. In addition, the night lighting of the car park is not adequate and there are no curbs on the sidewalk. There isn't any accessible route for the disabled from car park to the selected buildings entrances covered from weather conditions. There is also no directing sign for disabled parking. It is seen that the garbage containers are placed on the disabled parking area and there is no marked disabled car park in the parking garage.

Evaluation of the Form5: Urban Furniture

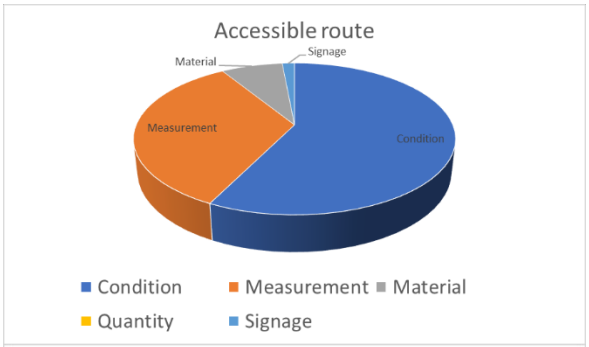
As a result of the inquiry, it is seen that the urban furniture on the environment of the building is quite compatible in terms of accessibility. However, the height of the sitting benches is lower than the range of 41-46 cm. and there are no backrests and armrests. There are no warning signs and precautions near obstacles such as lighting poles. According to the Standards the height of the trash bins are low and the movable umbrellas of the cafes are sometimes positioned on the pedestrian walkway and create an obstacle.

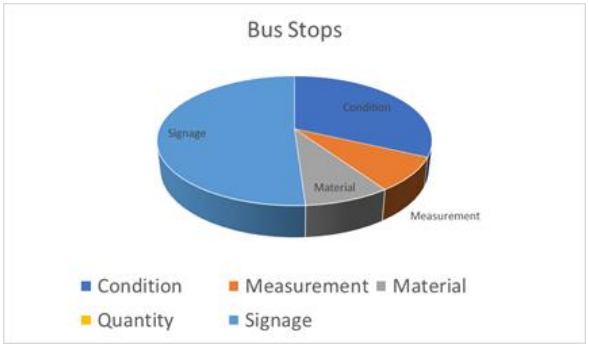
Figure 9. *Urban Furnitures (Photograph: Gamze MIZRAK, March 2021)*

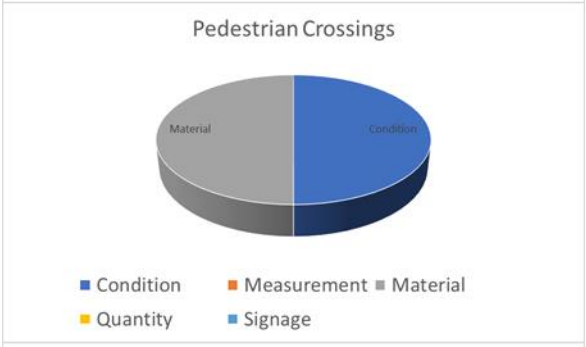
There is no urban furniture from the bus stops to the Gate A and Gate E. There is no urban furniture from the Gate E to the selected buildings. On the accessible route from Gate A to the selected buildings, some of the benches do not have armrests and backrests, and there is no warning surface which indicates the pedestrian route passes into the resting area.

4. CONCLUSION

Although most of the applications in the surrounding environment of the buildings are suitable in terms of accessibility, there are some deficiencies and incompatibilities due to newly built buildings and their environments. Some of these problems are application-related, while others are ignored during the design phase. Some incompatibilities are due to usage errors and people's insensitivity. For example, placing garbage containers in the disabled car park.







The main problem in most of the incompatibilities is about the conditions and if the applications have been made, there are deficiencies or errors in measurement, material or marking, as seen in Graph 4.

In the query forms, it is seen that most of the problems related to the condition and measurement in the areas that show incompatibility regarding the accessible route, while in the bus stops there are mostly incompatibilities due to the marking problems. While there are problems caused by the condition, size and material in the car park; incompatibilities are seen in the pedestrian crossings due to the material and condition. It is seen that there are incompatibilities related to the condition and size in the urban furniture. It is seen that there are problems related to the situation and size in the urban furniture.

As a result of the investigation, suggestions for solutions to the identified problems are as follows;

- About the problems observed about Accessible Routes; Floor and pavement surfaces along accessible routes must be hard, stable, durable and non-slip (wet & dry). (TS 9111 Article 4.3.5) External stairs must be covered from atmospherically conditions. If the width of the stairs is more than 300 cm, a railing should be made in the middle. (TS 9111 Article 4.7.1.3.3) There should be a warning surface at the beginning and end of the ladder. A protective non-slip strip with a width of 2.5 cm should be placed at the end of the step. There shouldn't be protrusions at the ends of the steps. The diameter of the handrail must be 32-40 mm. It should contain information in Braille alphabet. (TS 12576 Article 5.3) Two levels of 70 cm and 90 cm high handrails must be built on the railing on the ramps. (TS 9111 Article 4.4.3.2) At the beginning and end of the ramps, there should be an area of at least 150 x 150 cm. (TS 12576 Article 5.2.1) There should not be advertising and information signs that would restrict freedom in the corners of the pedestrian sidewalks. (TS 12576 Article 5.1.7.3) Pedestrian sidewalks and curbstones should be different color and texture. (TS 12576 Article 5.1.7.2)
- About the problems observed about Bus Stops; there should be an organized bus stop which protected against the atmospherically conditions. There must be a bench at 41-46 cm. height and there should be a back resting above 45 cm. behind the bench. The width of pavements near the bus stops must be at least 300 cm. There should be information signage and adequate markings at the bus stops. At 100 cm. and 140 cm. level there should be a 15 cm. thickness retro reflective warning tape. At all bus stops there must be no parking warning signs.

- About the problems observed about Pedestrian Crossings; there should be distinctly brighter from road lighting and lit from above. (TS 12576 Article 5.4.1.4) There must be three-sided curb ramps between the pavements and pedestrian crossings. (TS 9111 Article 4.11.1.3) At the start of the ramp, there must be a tactile ground surface indicator at least 60 cm. wide. (TS 9111 Article 4.4.3)

- About the problems observed about Car Park; night lighting of the Car Park should be sufficient. (TS 9111 Article 4.4.1) Between the car parks there must be at least 150*600 cm. maneuvering areas. (TS 12576 Article 5.7.4) There must be curb ramps between loading zone and pavement. (TS 9111 Article 4.4) There should be directing sign for disabled parking. (TS 9111 Article 4.4.1)

- About the problems observed about Urban Furniture; there must be detectable warnings between the resting area and pavement. Urban furniture must be placed in such a way without forming obstacles to the pedestrian traffic. Sitting benches height should be between 41-46 cm. and back resting above 45 cm. (TS 12576 Article 5.5.1) There should be at least 100 cm of space for the wheelchair to maneuver next to the table in the rest area. Trash bins height should be between 90-120 cm. Warnings should be arranged around the obstacles with tactile or colored signs with a height of 70 cm and above. (TS 12576 Article 5.5)

With these proposed solutions, a more accessible public space will be created for disabled students, staff and academics.

By determining which problems (material, measure and detail) arise from the problems that prevent accessibility in the context of Turkish Standards in selected area, it is determined that these problematic areas are partially or completely modified in accordance with Turkish Standards and solutions are proposed and accessibility can be made with the examination method to be developed. It will be possible to identify relevant deficiencies and priorities.

As a result of the study, it is possible to determine the deficiencies and priorities related to accessibility in the context of Turkish Standards, with a review method that will be developed thanks to the inquiry forms to be created. Accessibility will be provided equally for all people in all public spaces by making partial or detailed adjustments to the identified incompatibilities and deficiencies. Presenting solution suggestions by evaluating the results in terms of different variables and will be applied in selected University Buildings entrances and environments.

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