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ICONARP

ICONARP is a biannual peer-refereed journal of the Selçuk University, Faculty of Architecture online published every June and December. This special issue consists of the articles which produced by the reevaluation of the final products of the 3rd National ''Engellileştirilenler'' panel and workshop, which were held on 3-4 May 2018 in Selçuk University at Faculty of Architecture, through the arbitration process. Authors have been revised their articles for this special issue of ICONARP.

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ICONARP INTERNATIONAL JOURNAL OF ARCHITECTURE & PLANNING

ICONARP as an e-journal considers original articles, research briefs, book reviews and viewpoints in peer-reviewed. ICONARP is an exciting new venture occurred with experiences, theoretical approaches, critical and empirical studies in the field of architecture and urban planning.

SCOPE and AIM

The journal aims to be a platform for the studies of design, education and application and has a goal to be a bridge in between traditional/modern, east/west, local/global in the disciplines of Architecture / Planning.
Architecture and Planning, as two interconnected fields, are strongly affected by other disciplines such as fine art, urban design, philosophy, engineering, geography, economics, politics, sociology, history, psychology, geology, information technology, ecology, law, security and management. However, there are no academic journals which specifically focus on the connections of architecture and planning with other social fields. ICONARP aims to fill that gap. Our scope is to provide a suitable space for theoretical, methodological and empirical papers, which use global and local perspectives together, in architectural and urban studies.

ABSTRACTING AND INDEXING

ICONARP is an Open Access Journal which presents its content freely for online researches with the aim of contributing to the global exchange of knowledge. ICONARP believes that providing free online access ensures a wider spectrum of research base and reading rate to develop the related literature.

The abstracting, database and indexing services that ICONARP is included are: DOAJ, Index Copernicus, Tubitak Ulakbim TR Dizin, Iconda Bibliographic (The International Construction Database), ROAD (Directory of Open Access), DRJI (Directory of Research Journals Indexing), ROOTIndexing, Scientific World Index, Science Library Index, SIS (Scientific Indexing Services), J-Gate, Crossref, OpenAIRE, OCLC WorldCat, BASE (Bielefeld Academic Search Engine), Scilit, Google Scholar and D-Space (database).

EDITORIAL

ICONARP began its broadcast life as peer-reviewed faculty journal in the field of international architecture and planning and now it is the twelfth issue.

ICONARP is continuing its growing process with this special issue.

The thirteenth issue will be published in December 2018 and we wait for your contributions with your scientific studies until September 2018.

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Public Space and Accessibility

Meltem Yılmaz*

Abstract

Virtually everyone experiences a physical disability at some time in their lives; that is to say that their mobility has been restricted. An infant, en adult with an injury, a parent with a pushchair, an elderly person are all disabled in one way or another. Those who remain healthy and able-bodied throughout their lives are few. The physical environment and public services and public spaces in general should be as barrier-free as possible to fulfil the needs of all people equally. People with a disability have the same rights as other people. People with a disability are not a homogeneous group. They may include the mentally retarded. The most important item for the disabled people is the possibility of circulation; namely accessibility. Inclusive and universal design approaches have to be considered especially for the public spaces and public buildings. In this paper, some main items of circulation in relation with accessibility have been detailed as well as a workshop study outputs which has been hold in Selçuk University, Department of Architecture.

Keywords: *Iinclusive design, design for the disabled, universal design, accessibility*

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INTRODUCTION

All of us want to join the society life as an independent and equal individual. In order to join the society life we have to access and use the urban spaces primarily. Everybody has the right to access and use the urban spaces independently and equally. The provision of this depends on the accessibility of our urbanized environments.

Usually the cities are designed according to the young, healthy, athletic and dynamic people who can climb the 40 centimeters pedestrian curbs, go up from the stairs and can manage to come over every kind of obstacles. This is the easiest way of designing the built environment. The important thing is to realize the space organizations for the use of everybody. In all societies, besides young people there are old people, children, pregnant, wheel chair users, visually despaired, hearing impairment and the other different positioned people. So, especially the public spaces have to be planned according to the access and the usage of everybody. This requirement has become a compulsory in 5378 numbered Disability Act in Turkey.

PUBLIC SPACE

The acknowledgement of the word "public" is given as "collective, whole, society, general"; in other words, it means as open to everybody, open to the whole. The most distinctive quality of public sphere is its "visible and audible" character or "open" can be said. The other important quality of public sphere is "commonness". Briefly, the sphere that everybody can be "visible and audible" is "common" (or the areas that have been permitted for common use) public sphere.

The meaning of the **"public"** in the concept of public sphere is explained as "1. All, whole, 2. Population in a country, society, general". **Public Sphere** is explained as "Belong to public, the place that the public works have been done". The most important quality of the public sphere is its openness to the whole population. In public sphere, diversities join together and at the same time, it is witnessed to the communal and political events (Kosova, 2007:46, 51).

Philosophic and sociologic based public sphere is explained as an open interactive and informative area that individuals can participate. The democratic public system that depends on the principles like pluralism, tolerance, clearance that forms the essence of democracy; provides the participatory, conciliatory and transparent public spheres (Koca and Yılmaz, 2017, 11).

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We can see the public sphere as a widened area when associated with the 'space' which includes not only the political activities but, the routines that belongs to daily life. When the space is the point of issue, both of the two aspects (political activities and daily life) can be coincide. The urban square that is the stage of political activities is the space of publicity at the same time which belongs to everyone, common area that daily routines take place.

In Architectural Terminology generally the usage of public expression is sometimes used for the buildings as well as open/urbanized areas. Publicity means openness to everybody. Either closed space nor open urban area, public space carries the meaning of permission for general usage (Gürallar, Neşe, 2010).

Public space is conceived as open or closed spaces which constructed for the usage of every individual without any discrimination in the society (park, garden, stop etc.) ministration. Everybody has the responsibility to create solutions for the public life; we can not ignore the problems that the disabled people come across in their daily lives in built environment (Özdemir, 2017, 27).

General Directorate of Disabled and Elderly Services that connected to the Ministry of Family and Social Policy (2011, Decision 663), as its old name was Prime ministry Head of the Disability Administration defined **accessibility** as: "to access every right and services in all of the live areas and to benefit from those". In this direction, all of the people live in the cities have the right to benefit equally from the public spaces especially. In other words, everybody has the right to benefit from the public spaces equally and independently. Not for the society but with the society, the design for the access and usage together with the qualified interaction on physical space for whole citizens can be provided. Public space has great contributions on the formation and progress of public sphere. Public spaces are the milieus that citizens meet, come across, socialize, do activities and can be exemplified as areas like streets, avenues, parks and squares.

ACCESSIBILITY

The most important item for the disabled people is the possibility of circulation; namely accessibility. American Disabilities Act (ADA) is federal legislation passed in 1990 that prohibits discrimination against people with disabilities (Investopedia.com) defines the **accessibility** as: "Accessible road, is the road that from a node in the interior of a building to the public space does not include any obstacle and provides continuity". Accessibility must be the most essential feature of the human centred design in built environment. Everybody must use

the built environment independently and equally. Every country must have the goal of providing the usage of built environment in safe and beneficially including the disabled people.

The objective of each country should be the provision of the environments which are convenient, safe and enjoyable to use by everyone, including people with disabilities. City environments are particularly hostile to people with disabilities, mainly since access to most places is very difficult or almost impossible. The UN Standard Rules on Accessibility make the following recommendations regarding access to the physical environment (Arvanitis, 2004: 20-21):

- States should initiate measures to remove the obstacles to participation in the physical environment. Such measures should develop standards and guidelines and consider enacting legislation to ensure accessibility to various areas in society, including housing, buildings, public transport services and other means of transportation, streets and other outdoor environments.
- States should ensure that architects, construction engineers and others who are professionally involved in the design and construction of the physical environment have access to adequate information on disability policy and measures to achieve accessibility.
- Accessibility requirements should be included in the design and construction of the physical environment from the beginning of the design process.
- Organizations of persons with disabilities should be consulted when standards and norms for accessibility are being developed. They should also be involved locally from the initial planning stage when public construction projects are being designed, thus ensuring maximum accessibility.

Like everybody, the disabled people want to be safe when they go out from their homes. To move independently without coming across any obstacles on the streets and roads; to reach the building entrances easily and to use the entrance – exit door that everyone uses; to access the city squares and service areas at the same way are the main demands of disabled people (Koca, Yılmaz, 2017: 12).

According to this approach which named as 'universal design', discrimination has to be prevented, rightly and egalitarian approach has to be reflected into the space and products. The concept of universal design contributes us to understand more better the people that do not resemble to us whom we see as the "others"; contributes us to put ourselves instead of them who are less lucky from us or seems as less powered (elderly people,

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physically or mentally retarded people, children and the like) from us and behave attentional. This kind of approach will serve us to produce “inclusive” design and to take the required precautions by accepting that they have the right to use the built environment at least like us (İmamoğlu, 2013:67).

CIRCULATION

Pedestrian Roads: Accessible road does not include any elevation difference, stair, footstep or escalator (Figure 1). In open public areas like avenues, streets, crossings, etc. pedestrian roads have to be designed taking into consideration all of the users. Vehicle, pedestrian and bicycle roads can be separated from each other without using any elevation difference, only by using different materials and colors.

On the pedestrian roads there must not be any obstacles like vehicle barriers or rising bollards. The trees, shrubs or the lighting units like elements which can hit or scratch faces should be placed 30 centimeters away from the pedestrian roads.

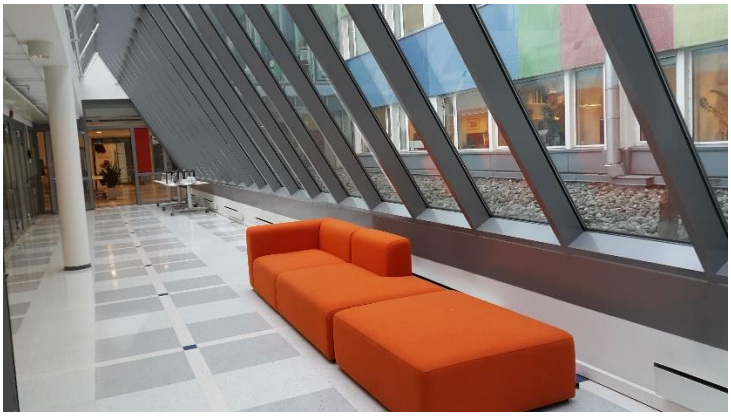

Figure 1. An interior pedestrian road; Oslo University (Yılmaz, 2017).

For the visually impaired people guided roads have to be applied on the pedestrian roads. If there does not any guiding road on the pedestrian ways the visually impaired people can follow the existing borders. In order to follow the borders smoothly all of the equipment on the roads have to be elevated 10 centimeters higher from the ground level.

The elevation difference in between the pedestrian way and the vehicle way must be maximum 15 centimeters. For the visually impaired people on the pedestrian ways, the guiding roads at least 50 centimeters away from the vehicle road have to be placed. The guiding roads have to be placed on a pure and acceptable route and have to be away from the manhole and drainage canals. For the usage of all disabled people, the material of guiding roads have to be on the same level with the ground pavement (Koca, Yılmaz, 2017:36-38).

Ramps: The slope of all of the ramps have to be 5 % if we think the independent usage of wheel chair user. The ramps that have a slope up to 8 % can be used by the wheel chair user with the help of others (Figure 2).

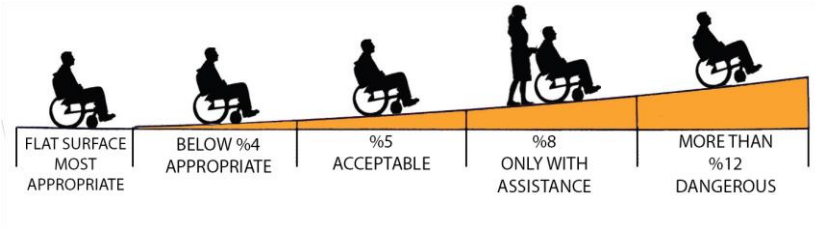

Figure 2. The ramp slopes (Koca, Yılmaz, 2017:43).

The clean width of the ramps has to be minimum 91.5 centimeters. At the starting and finishing parts of the ramps there must be an empty space left minimum 152.5cm x 152.5 cm. for the movement of the wheel chair user. The distance that the wheel chair user can go straight is 9 meters. In the ramps that longer than 9 meters, platforms have to be placed minimum in 152 .5 centimeters long. In the below figures, in Figure 3a you see only the stairs to reach the upper level which is not accessible for a wheel chair user. On the upper level there is the students' cafeteria of Hacettepe University Beytepe Campus and the wheel chair user student cannot access there. Afterwards a ramp with 5 % sloped with platforms constructed and it became accessible for everyone (Figure 3b).

Figure 3a. Stairs which are not accesible
Figure 3b. A ramp with platforms (%5 slope) constructed for accessibility of everyone

Stairs: The width of the stair has to be minimum 91.5 centimeters which is the minimum dimension for the passage of wheel chair user. The common stair and platform widths in housing units have to be minimum 120 centimeters, in public buildings the dimensions have to be minimum 150 centimeters. For the comfortable usage of everyone after 8 – 10 footstep a platform has to be placed in staircases.

At the starting, finishing and platforms sensible stimulating surfaces minimum 60 centimeters in width have to be applied. In order to ease the visibility and the prevention of slippery, the

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color of the step tips has to be different from the main color of the stair and has to be marked with a perceptible color.

The stair step width has to be minimum 28 centimeters, the height of the step has to be maximum 16 centimeters for the disabled people; for the other situations it can be maximum 18 centimeters. The formula for counting the relationship of the dimensions of the risers and steps:

2 x Riser Height + Step Width = 60 – 64 cm

For the usage of disabled people open or transparent risers for the stairs do not permitted. The finishing of the risers can be rounded, flat or angel.

Balustrades: Balustrades, parapets and holders have to be placed to the places where people in need of them like passage ways, stairs and ramps. Balustrades have to be placed 30 centimeters away from the starting and ending points of the stairs and ramps and have to continue all along the stairs. In ramps instead of balustrades protective borders at least 5 centimeters high can be used. The ramps or stairs which is wider than 180 centimeters need balustrades to be replaced in the middle. The height of the balustrades, parapets and holders from the ground level have to be 90 centimeters for adults and 70 centimeters for children (Figure 4). Visually impaired people can do edge following in the places where there are balustrades. So, in balustrades and holders a bordure that at least 10 centimeters higher from the ground have to be placed (Koca, Yılmaz, 2017: 45-47).

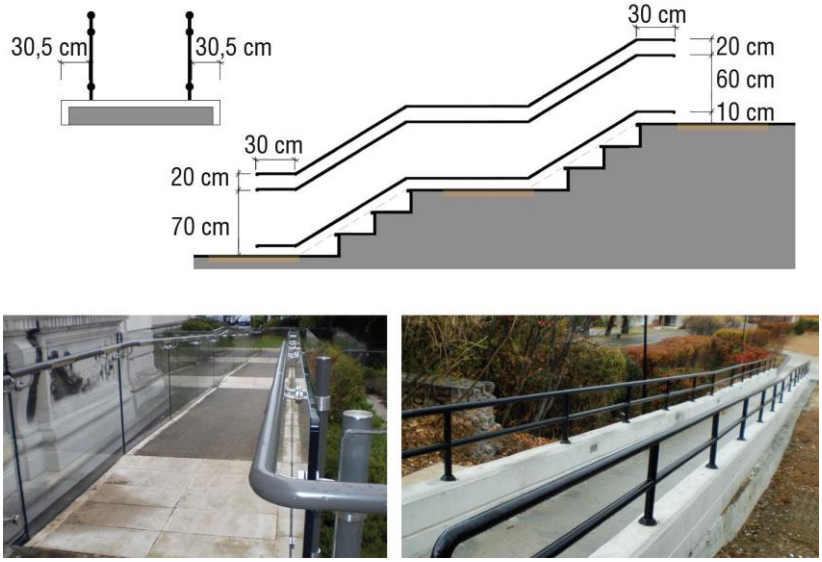

Figure 4. Balustrades and Parapets (Koca, Yılmaz, 2017: 47).

The stair or ramp balustrades can stand by themselves or can be fixed to the wall. If they fixed to the wall then the distance between the parapet and the wall have to be at least 4 centimeters. The

diameters of the parapets have to be at least 4 centimeters and have to provide the possibility to be hold in balance.

Entrances and Exits: In the buildings main entrances equal right, fair usage principles have to be considered for all the users. The entrances for the disabled people have to be designed accordingly. For the passage ways, ramps, stairs, entrance doors, information and warning boards required dimensions have to be used. In front of the entrances space for the movement of wheel chair user has to be provided. If there is carpet on the ground floor, the material has to be fixed on the ground securely. The carpet tips have to be fixed on to the ground and the edges have to be striped. The hair or the texture of the materials thickness must not be more than 13 mm. (Figure 5) (Koca and Yılmaz, 2017: 52-53).

Figure 5. Entrances and Exits – Hacettepe University Beytepe Campus (Koca, Yılmaz, 2017: 53).

TRANSPORTATION

Vehicle Approach: In the mass transportation or private car use, all of the users' approach to the vehicle, get on and out of the car actions of them needs an adequate space which is very important. For the disabled people the reserved space for them to see the vehicle, approach, to get on and out of the car has to be cleared from all of the obstacles. In built environments, different kind of applications have to be considered for the physical, visual and audial impaired individuals. For example, for a wheel chair user efficient area has to be provided; for a visually impaired individual stimulating surfaces on the ground and audial stimuli systems are needed; for people who see less, bright colors or phosphoric strings can be applied; for the audial impaired people visual stimulating systems can be applied.

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In between the pedestrian way and road, ramps should be constructed for the crossing. At the transition areas and at the other used ramps on the roads have to have maximum 5 % slope.

Vehicle Parking Areas: Vehicle parking areas have to be placed closer to the entrance and open to an accessible route. The dimensions of the disabled vehicle parking side by side with an angle are minimum 250cm x 250cm. Thinking the movement of the wheel chair the distance left in between the two parking areas for the transition corridors has to be minimum 150 cm in width. In front of the vehicle, minimum 91.5 cm in width transition road has to be left (Figure 6) (Koca and Yılmaz, 2017: 29-30).

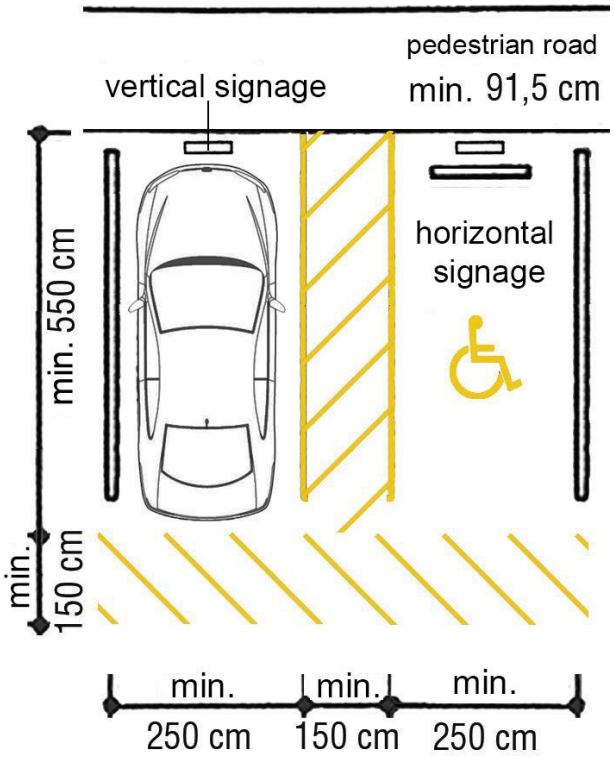

Figure 6. Vehicle Parking Area (Koca, Yılmaz, 2017: 30).

In the transition points from parking areas to pedestrian roads, there must not be any level difference preventing the crossing. If the level difference is inevitable then minimum 91.5 cm widened ramps have to be constructed. If the rams are sloped in one direction than the slope must be 5%, if sloped in three directions than the slope of the sides have to be 10 %. Ramps can be located on transition area or on pedestrian road.

The materials of the roads in between the buildings and the vehicle park have to be non-slippery and matte taking into consideration the weather conditions.

Stops: Stops have to be protective from the weather conditions depending on the existing region. Inside the stops there must be seating places, holding bars have to be fixed in needed sections and an empty space must be left for the parking of a wheel chair.

At the stops, audible and written (the writings may be embossed) information and warnings related to the mass transportation service has to be found. These writings and warnings have to be in contrast color with the background of the panels which the corners are rounded (Figure 7). Embossed information panels have to be placed in between 110cm – 130cm higher from the ground level (Koca and Yılmaz, 2017: 32-33).

Figure 7. Liverpool Bus Stops (Yılmaz, 2010).

In front of the stops and at the back of the stops minimum 100 cm has to be left for the transfer. If there are transparent surfaces in the stops, bright, colored and reflective strings higher 150 cm from the ground level, 14 -16 cm widened have to be applied on those transparent surfaces (Figure 8) (Koca, Yılmaz, 2017: 33).

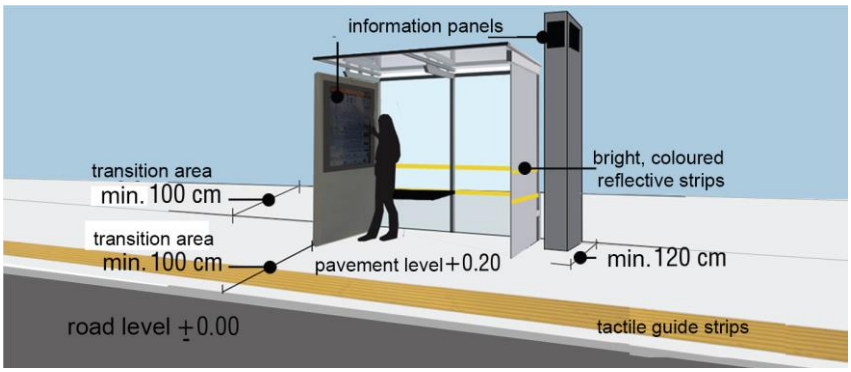

Figure 8. The bus – stops (Koca, Yılmaz 2017:33).

When mass transportation vehicles approached to the stop, a direct transfer has to be provided without any level difference (Figure 9).

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Figure 9. Bus ramp detail from USA (Yılmaz 2017).

WORKSHOP ON UNIVERSAL DESIGN

In Selçuk University, Faculty of Architecture, Department of Architecture, III International Universal Design Panel and Workshop hold on 3rd - 4th of May in Konya; The title was "to Think with Universal design". Related with the concept of 'universal design' 9 workshops organized with different subjects. One of them was the universal design of Selçuk university, faculty of architecture; 13 students attended to the workshop coming from different universities in Turkey. During the workshop, together with the participant students only the exterior spaces examined for the disabled people. After determining the problems and obstacles of the exterior spaces for the disabled, solutions discussed for an accessible design and proposals had drawn on a plan (Figure 10a) and a visual documentation (Figure 10b) also provided with the suggested designs.

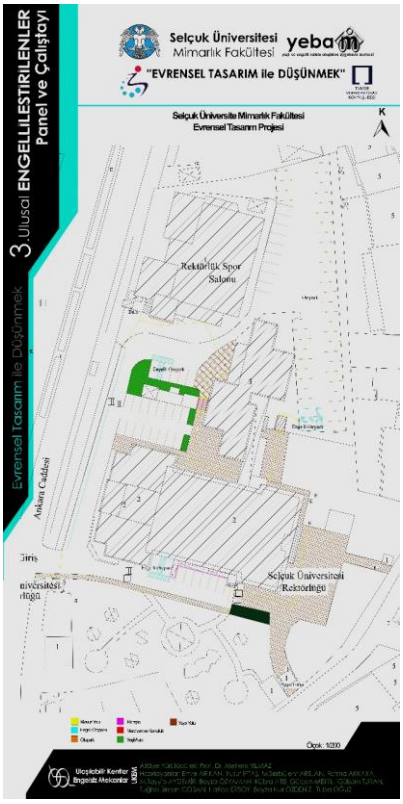

Figure 10a. The plan of Universal design for Selçuk university faculty of architecture (Yılmaz, 2018). **Figure 10b.** A visual documentation of the suggested design proposal (Yılmaz, 2018).

The aim of the workshop is to show the students to examine the existing built environment with a thinking eye and encourage them to consider an inclusive design approach for all. Initially they started to share the disabled family or relative members, and with their own experiences they tried to determine the obstacles and deficiencies in the existing built environment. After the determination, they tried to apply universal design principles for all in their drawings including not only physically disabled people but mental disorders also.

CONCLUSION

The environment belongs to all. It is a fundamental human right. Although major stakeholders in society, people with a disability are often excluded from this right. We cannot envisage a future of hope without access to meaningful citizenship for all. A new vision for humanity, one based on accessibility and social justice, is a prerequisite for a better quality of life.

In every society there are individuals who owns different properties and different ages. All the individuals have the

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right to access the public space and use it. The people with different disabilities in the society have to be able to use the built environment and public space in an independent and equal way. At that point, the urban planners, architects, local governments have to do their responsibilities. Cities and the buildings have to be designed and applied according to the principles of universal design. Local governments have to be precise for the application of universal design principles to the building designs and public space designs and has to do the required inspections.

Generally, in public spaces and buildings, the required precautions are taken according to the physically disabled people like wheel chair users, visually or audible impaired individuals and the like; but, there are space solutions also for mentally and cognitively disordered people. In Turkey, some built environment precautions are taken only for the physically impaired people. However, some space solutions have to be searched and provided for the people who have autism, dementia or the other similar disabilities. In order to realize this, the society have to accept the behaviours that include disabled people and contribute to the formation of a fair built environment for all.

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Resume

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Research Article

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Universal Design in Urban Public Spaces: The Case of Zafer Pedestrian Zone / Konya-Turkey

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Bilgehan Yılmaz Çakmak**

Abstract

Individuals in society who have different requirements and needs (disabled people, elders, children, prengnant women, parents with strollers etc.) go through many difficulties while accessing urban indoor and outdoor services due to the constraints originating from built environment. Universal design is the design of the environment and the product that can be used by all the people. With it's inclusive and unifying characteristics, universal design has become a design approach that have been adopted by the academia during the recent years. Planning and organizing the urban spaces with regard to the universal design principles will contribute to an increase in the life quality of all the people who use the city. This article aims to evaluate the usage of urban spaces in Zafer Pedestrian Zone, located in Konya city centre, within the scope of universal design principles. The concept of universal design in the historical process, universal design's emergence process and it's principles and significances has been discussed in the theoretical infrastructure section of the article.

In the fieldwork section of the article, the suitability analysis of a chosen sample place's space usage have been carried out scrutinisingly under four chosen headlines, with regards to the universal design principles and standards.

Keywords: *Universal design, disability, urban spaces, Zafer Pedestrian Zone, Konya*

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INTRODUCTION

Designs that have been done wrong or lacking in housing, the most basic unit of life, all public spaces and transportation zones, affects the involvement of disabled individuals to urban and social life in a negative way.

The fact that disabled people with limited ability to move due to the apology they already have are not able to use urban spaces independently and easily is the basic element that causes social and urban as well as economic life to be excluded. Disabled individuals, who already have a limited ability to move due to their disability, and their situation of not being able to use urban spaces freely and easily is the main factor of their exclusion from social, urban and economic life. However, this problem can be prevented by doing correct design and taking precautions. In this context, universal design, which is accepted worldwide, is a very important intellectual approach to provide everyone with involvement to daily life and it is a guide to city planners, designers, decision makers and executors. Different from designs that only enable accessibility of old and disabled individuals, universal design is a common design approach that enables convenient accessibility to all individuals in a community. This article aims to examine chosen sample space's urban-physical arrangements according to the principles and approaches of universal design, which is seen as a guide to creating urban spaces that are more livable and have more quality. With this goal in mind, approachs and models towards disability status that laid the groundwork for universal design approach and national-international scale legal legislations have been evaluated within the frame of historical process, in the theoretical infrastructure section. Then, the concept and importance of universal design have been discussed in terms of city planning and architecture disciplines, with giving information about its importance and principles. The fieldwork findings of the work are based upon the fieldwork findings of Selcuk University Faculty of Architecture's UKEM (3. Ulusal Engellileştirilenler Panel ve Çalıştayı) workshop, which took place on 04-05 May 2018. Workshop team consists of 3 City and Regional Planning, 3 Architecture, 2 Industrial Design, 1 Landscape Architecture students and 2 academicians from Selcuk University Faculty of Architecture.

CONCEPTUAL AND THEORETICAL BACKGROUND

Universal Design Approach

In 21st century's agenda, under the general topic of urban habitability, environmental aspects, ecological balance, democratic, egalitarian and sustainable social utility and design is

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being discussed. The backbone of this discussions we have nowadays arise from "universal design" topic.

Universal design is the design of the environment and the product that can be used by all the people. "*Focusing on social structure just as much as physical structure"* and *"being a design that unifies a product with a building or a city and being a design that aims to be accessible for everyone"* separates universal design from other design terminologies. Universal design concept is not about only disabled people, it is about all people, simply"everyone". According to Universal Declaration of Human Rights, published by United Nations (UN-Habitat) in 1949, numbered 7217; Everyone is entitled to all the rights and freedoms without distinction of any kind, such as race, colour, sex, language, religion, political or other opinion, national or social origin, property, birth or other status.

This is the planning and management of "*Friendly and Safe Cities for Everyone"* which is co-created by United Nations and other international organisations (UNICEF, WHO, etc.) (URL1).

Definition of Universal Design

Terms with different names like inclusive design, lifespan design, design for all, user needs design, real life design and transgenerational design are being used with the same meaning with universal design (Evcil, 2014; Duncan 2007). The important points that makes universal design approach different from other design terminologies like accessibility design or design without disabilities are it's characteristics of not being spesifically designed for a certain group of disability, being normal, feeling normal and being unifying. To achieve success in a universal design execution, serving as much as possible different users should be aimed.

Universal design is designing and creating a space, a product or an environment that can be accessed, understood, and used by everyone with the greatest scale as possible, regardless of age, situation, ability or disability conditions. Urban spaces and physical surroundings (or any other building, product and service in the space) should be designed in way that satisfied the need of anyone who wants to use it. This situation is not a special requirement for the good of a certain group like elders or disabled individuals. It is an essential condition of the good design. If a space is accessible, easily usable and easily understandable, every individiual will make use of it. Universal design creates products, services and spaces that satisfies the needs of people, by taking different needs and skills of everyone into account in the design process (URL 2).

Hanson (2004), who have compared universal design with designs specifically made for disabled individiuals, points out to the social benefits of designs that are done without excluding or seperating anyone. He emphasizes that, as time passes by, special designs that are made in order to include disabled people into social life, causes them to become target group (Duman, 2017). According to Knect (2004), while accessible spaces are separative, unlikeable and expensive, universal design has high levels of aesthetic standard. Special accessibility applications which can cause discrimination are said to be more expensive and not being aesthetic to a large extent (Kavak, 2010). Correct, good and successful planning and design will be made real when all the planning and design in any scale are done with showing regard to necessities of all the users in the society.

Process of Universal Design Approach

In this current century, social, economic, demographic and changes tied with age, create the starting point of the universal design. According to Steinfeld (1994), interest in universal design has increased due to the reasons like, increase of the number of the people who have to live with their disability, increase of the life expectacny, increase of the purchasing power of the disabled population, realizing the inadequacy of assistive technology, the design of the products and environments in an unresponsive way to the wants of the disabled individuals (Kavak, 2010).

The term, universal design has been used by the American architect Ronald L. Mace for the first time, in 1985. Mace and his designer friends at North Carolina State University created the universal design approach, it's principles and sub-principles. According to architect and educator Mace, who had polio at a little age and had to use a wheelchair, people are different according to their ability to move, skills, antropometric measurements, physiologic structure and durability. Designs that have been made according to average human or people who are described as normal, are not suitable for real conditions, since it doesn't involve every single user. This situation created the questioning of the term average human.

There isn't any direct legal legislation to use universal design, but, accessibility, availability and transportation has to be provided in order to produce designs that are suitable for everyone's use.

To ensure this, all developed countries have some construction laws and regulations, standards, guides and measures. In many country's laws and declarations, all individuals in the society have equal rights. This equality has to be implemented into public spaces. Universal design aims to design spaces that are suitable

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for the use of everyone in the society, that gives the same service to everyone, according to their functions. Regulations, standards, laws and codes that has been prepared by countries should be taken into account while creating designs that serve this goals. Without aiming to follow a checklist or set up rules, while applying universal design, accepted disabled people standards and laws prepared by countries should be taken into account. Designs that are suitable for everyone's use should be made, with the most important factor, disabled people, in mind (Duman, 2017).

Principles of Universal Design

Seven principles of the universal design approach determined by The Center for Universal Design are as below. These principles are at the cross-section of all design groups, City Planning, Architecture, Interior Design, Industrial Design and Landscape Architecture to name a few.

- Principle of Equitable Use
- Principle of Flexibility in Use
- Principle of Simple and Intuitive Use
- Principle of Perceptible Information
- Principle of Tolerance for Error
- Principle of Low Physical Effort
- Principle of Size and Space for Approach and Use (URL 3).

According to the Principle of Equitable Use, the design should be used and be purchased by individuals who have different sets of skills. This situation should be applicable to to both public space and environment regulations and product designs. Accessibility and usability aspects should also be taken into account in designs of places and physical environments. Same usage should be effective with every user, if this isn't possible, an equal or alternative regulation should be made.

Regulations and designs that alienates or embarrasses a certain people should be avoided. Safety, security and privacy should be offered to all users equally. Any design or regulation that is being carried out should be done in a way that appeals to everyone.

According to the principle of equitable use, everyone should have equal access rights in public spaces (public and private places, city centers, hospitals, streets, avenues, boulevards, pedestrian roads, transport facilities, open-air green spaces and all recreational activities). In a city planning scale, in order to offer this access right, the approach of creating social and cultural facilities for every user group should be adopted (Figure 1).

Figure 1. Examples of *equitable use* principle of universal design *(URL 4; URL 5).*

According to the Principle of Flexibility in Use, design should have a wide variety in accordance of personal skill and preference of the user and it'll be beneficial if it can offer alternatives. Options should be offered for different ways of usage. Similar usage and accessibility options should also be offered to left-handed or right-handed people. Precautions for sensitive and correct usage should be taken and designs should be made in accordance with the user's pace.

With the Principle of Flexibility of Use, a suitable design that offers different options at every scale can be carried out. With the supporting of the decisions of mixed areas, usages (work-home-school-social activities etc.) at walking distances can be created.

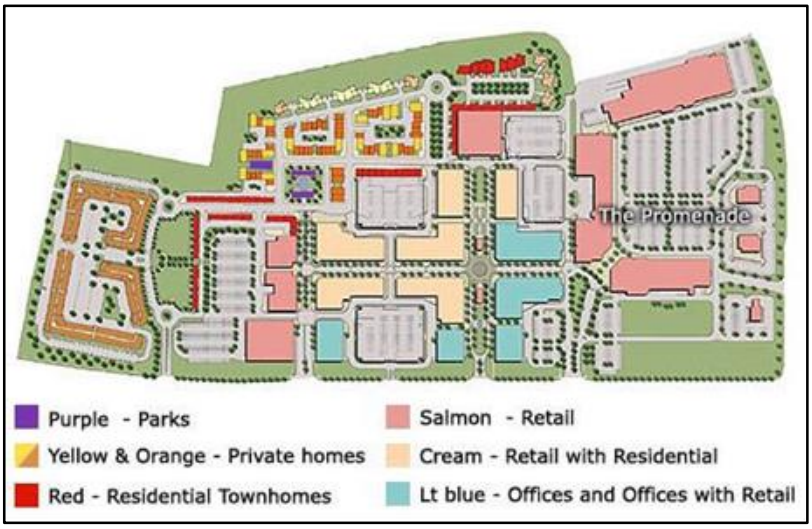

Figure 2. Mixed-use planning; example of flexibility in use principle of universal design *(URL 6).*

According to the Principle of Simple and Intuitive Use, the usage of the designs should be easily understood, regardless of the concentration level, which exists with in accordance with the user's experience, information, language and skills. Design and place setup should be simple in order to be easily perceivable. Unnecessary complexities should be avoided, the focus should be on user's expectations and intuitions. Regulations should be made with different education and language grades taken into account. Intensive usage of information level should be in accordance with

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significance level. The activation of effective stimulants while the process is continuing or when the process is done should be considered.

According to the Principle of Simple and Intuitive Use, design should provide simple usage regardless of people's experience, knowledge and skill levels. In this context, urban environments can be made more understandable and more attractive by using spatial qualities (Figure 3). For example, the understandability of a place can be increased wih Kevin Lynch's image analysis, in city planning scale. Urban identity items (landmarks) can support navigation.

Figure 3. Examples of simple and intuitive use principle of universal design *(URL 7; URL 8).*

According to the Principle of Perceptible Information, the designed product environment and place should present the information regarding usage in a way that doesn't get influenced by the user's environmental conditions and user's perception skills. Required informing should be done by using different methods of narration, like visual, verbal and tactual, understandability should be emphasized. Definitions of usage components should be provided by giving instructions and creating a guide. Solutions that can compete or can be better than the tools and techniques that individuals with limited understandability use should be developed.

With human-focused smart city applications, solutions that can increse the life quality of all the citizens can be produced (Figure 4). Technological advances bring facilitative, important opportunities and conveniences, especially for disabled individuals. Devices that scan written texts and convert them into audible format have been developed in USA, for people who are visually impaired. In Japan, walking staffs that have the ability of duplex communication can vocalise the name of the cross for the visually impaired person and sends a signal to traffic lights. After the signal are transmitted traffic lights switches to voice mode. Walking staff senses the crosswalk and prevents it's user from going out of the crosswalk. This way, visually impaired person can be supported to move safely and independently (Güngör, etc., 2011).

Figure 4. Examples of perceptible information principle of universal design *(URL 9; URL 10).*

According to the Principle of Tolerance for Error, the design should keep the bad outcomes and dangers arising from an accident or unwanted actions at a minimum level. Since the idea of universal design shows an approach that is oriented towards different individiuals and users, all users should be protected from accidental and dangerous situations. Regulations should be made in order to keep the margin of error and danger of usage elements to a minimum. Frequently used elements should be reached most easily, situations that can cause danger should be removed or should be kept under control. Warnings should be made regarding possible dangers and probable errors. Error-proof features should be provided and besides that, situations that require extreme cautions should have approaches that limit movement (Figure 5).

Figure 5. Examples of tolerance for error principle of universal design *(URL 11; URL 12).*

According to the Principle of Low Physical Effort, designed products and spaces should allow for efficient and comfortable usage by using minimum effort. Comfortable access to spaces and environments by making the least amount of effort should be provided. Users need to stay in their natural body forms in order to use the products or spaces. Qualities that will require acceptable amount of usage effort should be taken into account. Movements and actions that will require repetitions should be kept at minimum. Alternative approaches to decrease situations that will require a long duration of pyhsical effort should be developed (Figure 6).

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Figure 6. Examples of low physical effort principle of universal design *(URL 13; URL 14).*

According to the Principle of Size and Space for Approach and Use, appropriate space should be provided within approach, accessibility and usage sizes. This should be done in accordance with every user's body sizes, postures, and characteristics of movement in mind. An accessible perspective should be created in order to enable anyone, standing or sitting, to see the important usage elements. Every user's easy access to usage elements should also be provided. Different hand sizes and gripping features should be implemented. Places and spaces that allow for the usage of personal assistive tools and equipment's should be designed (Figure 7).

Figure 7. Examples of size and space for approach and use principle of universal design *(URL 15; URL 16).*

These principles should be taken into account in city planning and design practices, in revisions of existing plans and designs, in directions of the plan and design creation phase and in enhancement of life quality of users.

MATERIAL AND METHOD

Zafer Pedestrian Zone located in Konya city centre has been selected as the study area since it has a very intensive use by the pedestrians. Prior to study, national and international publications and guides and regulations related to universal design has been examined. With these researchs in mind, existing opportunities and problematic constraints and obstacles has been detected by doing social and physical analyses in study areas. Detected obstacles have been evaluated according to universal design approach and principles.

After the zone definition and analysis, accessibility detection study has started. For this study, various assistive tools has been used to determine the needs of not only visually impaired, hearing

impaired and physically handicapped people, but also kids, elders and individuals who might be carrying tools or other load.

As the starting point, analyses had been done on 1/1000, 1/500 and 1/200 scaled maps in order to determine the feasibility of building accessible places for everyone in public spaces, in selected locations, as part of the field study. In the field study, all the movement limiting factors that affect all the user groups (non-standard sidewalks, staircases, surface coating materials, ramps, street furnitures, building entrances, public transportation stops, pedestrian underpasses and overpasses, etc.) have been showed in the 1/200 scaled sheet with their sizes and qualities, in the location texture analysis phase. Accessible building entrances and locations have also been added to the texture analysis phase. Then, an assessment table has been created in order to question the place with suitability of universal design principles and sub-principles. In site measurements have been done in order to detect the current situation. Design elements (building entrances, sidewalks, ramps, crosswalks, parking lots, staircases, city furnitures, coating materials, etc.) that is located in the sample area and that can provide different users their needs have been determined with measuring their qualities, and their suitability. The physical qualities of these elements have been determined by taking photographs and observation. A suitability analysis has been done by cross-referencing the datas and findings of the study with standards. Analyses and findings have been examined under four main titles:

1. Usage of transportation and circulation systems (sidewalks, ramps, pedestrian roads, crosswalks, staircases and building entrances)

2. Usage of transportation zones (public transportation stops and parking lots)

3. Usage of city furnitures

4. Signs, signing and navigation resources

Evaluation criteria and table have been created by benefiting from resources about universal design that has a place in literature (Kavak, 2010; Sirel vd., 2012; Nimpuno, 2014) and national, international standards (TS 12506; ADA; The Center for Universal Design). Suitability to universal design principles percents of sample places have been calculated for each item. Each successful regulation that suits the standards in the table will get 1 point, if it is successful 0 points will be given (The dataset table used in the workshop is not included in this paper because of its long and detailed structure). If the standard doesn't exist within the area,

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the criteria will not be added to the calculation. Suggestions have been developed for elements that don't suit the universal design principles in order to develop space design proposals suitable for every user group in the sample area.

CASE STUDY: ZAFER PEDESTRIAN ZONE-KONYA

Historical Background of Case Study Area

Konya is a deep-rooted and rich settlement that has been hosted many civilizations that have seen settlement evidence since the Neolithic period. Çatalhöyük is known as the oldest and most developed Neolithic settlement center, it has been discovered so far. Similarly, neolithic traces have seen in similar character of the Çatalhöyük's neolithic traces on the Alâeddin Hill. Alâeddin Hill, which is the center of the city, was founded at the beginning of the Chalcolithic period (5500-3000 BC) with the end of the Neolithic period (9000-5000 BC) and also one of the mounds which had been inhabited regularly since 2000 BC. Findings of Phrygian, Hellenistic, Roman, Byzantine, Seljuk and Ottoman settlements were obtained on the excavations in the district. The Hittites, who established a great empire in the lands of Anatolia and Syria, also dominated Konya. During the Phrygian period, Konya has been surrounded by walls that has been developed in the Inner Castle (Alâeddin Hill) and has become into a castle-city. Between the old city center and Alâeddin Hill known as strong center line for history, culture, tourism and trade (Figure 8).

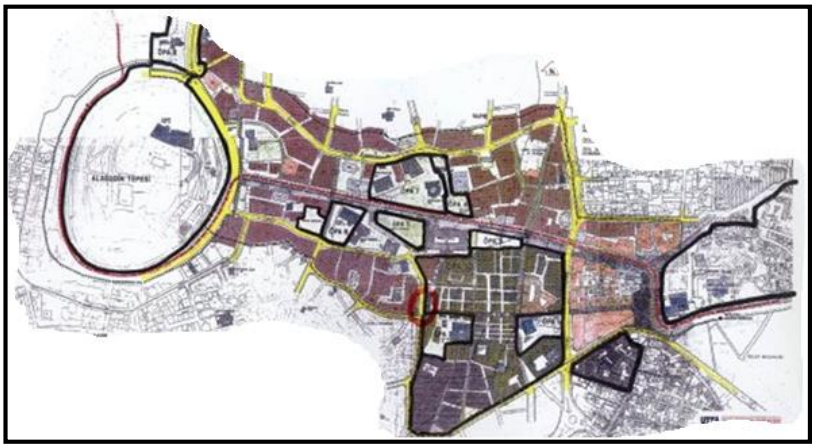

Figure 8. Konya Historical City Center Reconstruction Plan for Conservation *(URL 17).*

The position of Zafer Pedestrian Zone in Konya City can be seen in figure 9.

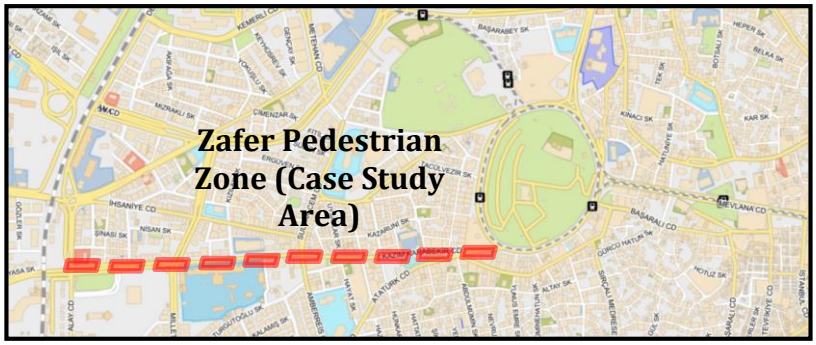

Figure 9. The Location of Zafer Pedestrian Area in Konya

Lynch analysis was performed by looking at the macro scale on the field of study to define the Zafer Pedestrian Zone center line and accessibility / barrier-free trace detection. Focus points, triangulation areas, boundaries, regions, vehicles and pedestrian paths and functions are determined. It is seen in Figure 10.

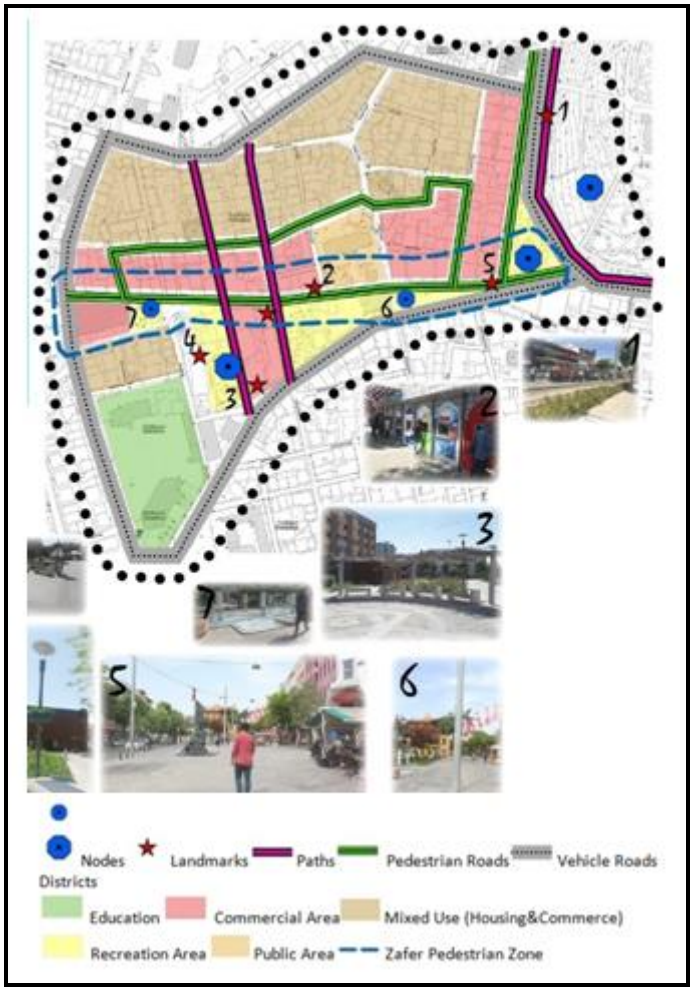

Figure 10. Zafer Pedestrian Zone and Near Surrounding Lynch Analysis

As a result of the determinations made, it has been determined that there are some focal points such as Hoca Hasan Mosque in the area, the pedestrian approach to the area is essential, reaching the area with public transportation stops, the tramway stops are the point of triangulation and Alâeddin Hill is a border, intersection of vehicle and pedestrian circulation at two points.

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Evaluation of Field Study Findings

Detailed analysis of the suitability of the principles of universal design of the circulation and circulation systems in the study area is shown in table 1.

Table 1. Evaluation results of circulation systems in the case area (detailed)

Pavements (P)	**Success (%)**	**Failure (%)**
P1	58.3	41.7
P2	25	75
P3	50	50
P4	16.6	83.4
Mean	**37.4**	**62.6**
Ramps (R)	**Success (%)**	**Failure (%)**
R1	0	100
R2	57.1	42.9
R3	14.2	85.8
R4	42.8	57.2
R5	57.1	42.9
R6	57.1	429
R7	14.2	85.8
R8	100	0
R9	85.7	14.3
R10	100	0
R11	33.3	66.7
R12	57.1	42.9
R13	71.4	28.6
R14	42.8	57.2
Mean	**52.3**	**47.7**
Pathways (PW)	**Success (%)**	**Failure (%)**
PW1	33.3	66.7
PW2	11.1	88.9
PW3	33.3	66.7
PW4	44.4	55.6
PW5	77.7	22.3
Mean	**39.96**	**60.04**
Stairs (S)	**Success (%)**	**Failure (%)**
S1	0	100
S2	25	75
S3	12.5	87.5
S4	62.5	37.5
S5	62.5	37.5
S6	25	75
Mean	**31.25**	**68.75**
Pedestrian Crossing (PC)	**Success (%)**	**Failure (%)**
PC1	27.2	72.8
PC2	81.8	18.2
PC3	27.2	72.8
PC4	45.4	54.6
Mean	**45.4**	**54.6**
Building Entrances (BE)	**Success (%)**	**Failure (%)**
BE1	12.5	87.5
BE2	0	100
BE3	0	100

BE4	0	100
BE5	0	100
BE6	37.5	62.5
BE7	62.5	37.5
BE8	12.5	87.5
BE9	12.5	87.5
Mean	**15.2**	**84.8**

Detailed analysis of the suitability of the principles of universal design of the public transport stops and parking areas in the study area is shown in table 2.

Table 2. Evaluation results of public transport stations and parking areas in the case area (detailed)

Public Transportaion Stations (PTS)	**Success (%)**	**Failure (%)**
Streetcar Station1	44.4	55.6
Streetcar Station2	55.5	44.5
Streetcar Station3	77.7	22.3
Bus Station	0	100
Mean	**44.4**	**55.6**
Parking Areas (PA)	**Success (%)**	**Failure (%)**
PA1	0	100
PA2	22.2	77.8
PA3	44.4	55.6
Mean	**22.2**	**77.8**

Detailed analysis of the suitability of the principles of universal design of the street furniture in the study area is shown in table 3.

Table 3. Evaluation results of street furnitures in the case area (detailed)

Resting Benches (RB)	**Success (%)**	**Failure (%)**
RB1	60	40
RB2	60	40
RB3	40	60
RB4	60	40
RB5	40	60
Mean	**52**	**48**
Phone Boxes (PB)	**Success (%)**	**Failure (%)**
PB1	0	100
PB2	33.3	66.7
PB3	33.3	66.7
PB4	42.8	57.2
Mean	**27.35**	**72.65**
Drinking Fountain (DF)	**Success (%)**	**Failure (%)**
DF1	0	100
DF2	50	500
Mean	**25**	**75**
Signboards (S)	**Success (%)**	**Failure (%)**
S1	100	0
S2	40	60
S3	100	0
S4	0	100
S5	25	75

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S6	50	50
Mean	**52.5**	**47.5**
ATM (Cash Machine)	**Success (%)**	**Failure (%)**
ATM1	0	100
ATM2	50	50
ATM3	100	0
Ticket Kiosk	100	0
Mean	**62.5**	**37.5**

Analysis of the suitability of the principles of universal design of the circulation and circulation systems in the study area is shown in table 4 and figure 11. According to findings, the most unsuccessful usings were building entrances (84.8%) while the most successful usings were ramps (52.3%).

Table 4. Evaluation results of the use of circulation systems in the case area

Circulation Systems	Success (%)	Failure (%)
Pavements (P)	37.4	62.6
Ramps (R)	52.3	47.7
Pathways (PW)	39.9	60.1
Stairs (S)	31.2	68.8
Pedestrian Crossing (PC)	45.4	54.6
Building Entrances (BE)	15.2	84.8
Mean	**36.9**	**63.1**

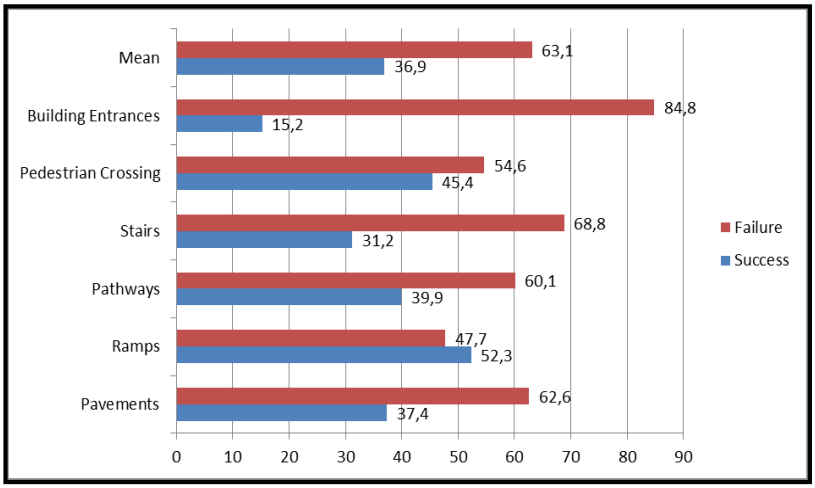

Figure 11. Evaluation results of the use of circulation systems in the case area

Analysis of the suitability of the principles of universal design of the transport stops and parking areas in the case area is shown in table 5 and figure 12. Both of public transport stops and parking areas has scored below 50% of the analysis of the suitability of the principles of universal design rating. General average achievement level is 33.3%.

Table 5. Evaluation results of the use of public transportation stations and parking areas in the case area

Stations and Parking	Success (%)	Failure (%)
Public Transportation Stations (PTS)	44.4	55.6
Parking Areas (PA)	22.2	77.8
Mean	**33.3**	**66.7**

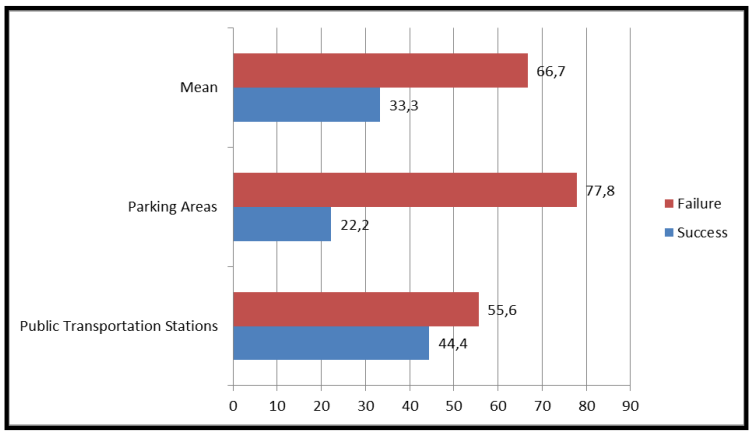

Figure 12. Evaluation results of the use of public transportation stations and parking areas in the case area

Analysis of the suitability of the principles of universal design of the street furniture in the case area is shown in table 6 and figure 13. ATMs and ticket kiosks are the most successful with 83.3%, while phone boxes, drinking establishments and street lamps are below 50%. The most successful usings were ATMs and ticket kiosks by rate of 83,3% while phone boxes, drinking establishments and street lamps using are below 50% on the scoring. The general success rate of street furniture is 46.2%. In this case, it shows up that street furniture is not appropriate to principles of universal design in case area.

Table 6. Evaluation results of the use of street furnitures in the case area

Street Furnitures (SF)	Success (%)	Failure (%)
Resting Benches (RB)	52	48
Phone Boxes (PB)	27.3	72.7
Drinking Fountain (DF)	25	75
Garbage Cans (GC)	50	50
Signboards (S)	52.5	47.5
Street Lamps (SL)	33.3	66.7
ATM (Cash Machine) and Ticket Kiosk	83.3	16.7
Mean	**46.2**	**53.8**

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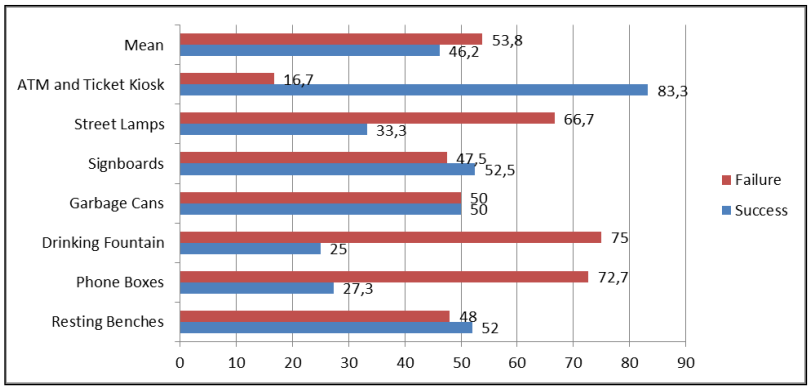

Figure 13. Evaluation results of the use of street furnitures in the case area

Evaluation of the Physical and Spatial Regulations of Zafer Pedestrian Zone According to of Principles of Universal Design

If people with special needs can not reach from the same point with everyone and they diverted to a different route, it can not said that the arrangement is suitable for the principles of universal design. There must be a ramp or elevator in the area and these items must be integrated with the stairs. There is a ramp to get on the tramway stop, there is no ramp on the pavements to reach the stop at the Kultur Park. It is preferred to use the elevator in a different entrance instead of arranging the use of stairs and ramps together in same entrance on the cafe in commen area on the Zafer Pedestrian Zone. This situation does not suitable for the principle of equal use of universal design. Also, this elevator is using for the purpose of cargo handling if required and this situation does not even suitable for the principles of human rights. The situation that many businesses do not have a ramp at the entrance or have one or two steps at the entrance does not suitable for the principles of equitable use (Figure 14).

Figure 14. Usages that do not suitable for the principles of equitable use

If flexibility in use examined at the urban scale, Zafer Pedestrian Zone is whole common and special usage area which can be used as a area defined by landscape elements with provide daily-social necessity and interaction for every individual from every age. However, fractional arrangements do not allow easy use for everyone in the area (Figure 15).

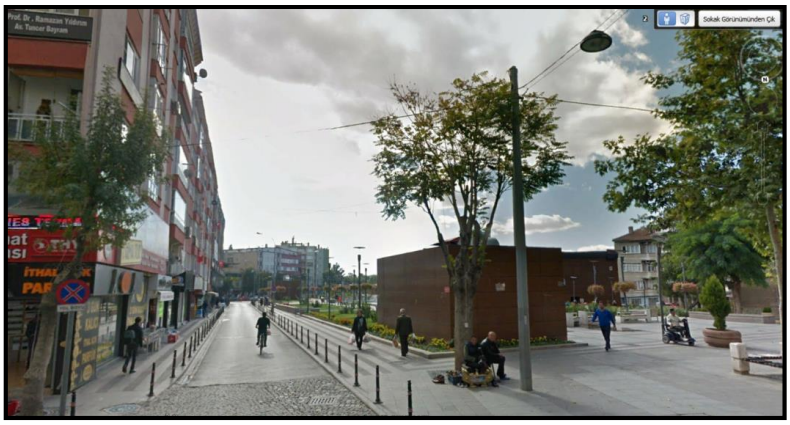

Figure 15. Examplary usage of flexibility in use

Infrastructure covers forming the level difference on the ground along the Zafer Pedestrian Zone, widely spaced grid in ramps downhill constitute an impediment for everyone. Also, it is a dangerous situation that there is no warning sign or strawman for feeling level the difference on the ground. In addition to this, the pool located in the cafe area in the common area on the Zafer Pedestrian Zone surrounded by a wall in the sitting level and is suitable for the principle of tolerance for error (Figure 16).

Figure 16. Usages to suit\not suit principle of tolerance for error

For the people with limited mobility, areas must be accessible in a short time and easy route. In case of need, area must be accessible

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on easiest and safest route with simple\intuitive methods and writing and voice signs for people who lost sight or hearing. Even healthy individuals can not find the place they want to reach, lose their time and energy because of warnings or information signs that are not in the proper eye direction, designing without warning colors. Simple designed areas and spaces will help to make social life easier for everyone. Absence of written and audial signs in WC and parking area on the cafe in commen area on the Zafer Pedestrian Zone does not suitable for the principle of simple and intuitive use in recognition of the area. A larger area is allocated for the disabled parking area in the garden of the Provincial Health Directorate with indicated by the symbol (Figure 17).

Figure 17. Usages that suitable for Principle of Simple and Intuitive Use

The cobblestone sidewalks that continue along Zafer Pedestrian Zone are obstacles for pedestrians, bicyclists, crutches or wheelchair users. Also, the wide gap between the grids does not suitable for the principles of universal design. People who do not want – can not use to stairs, cam reach the are with using ramp thanks to practicable slope of ramp on the cafe on the cafe in commen area on the Zafer Pedestrian Zone. In this case, many spatial arrangements in the sample area do not suitable for the principle of low physical effort of the universal design (Figure 18).

Figure 18. Usages to suit\not suit Principle of Low Physical Effort

Warning, information or direction signs must be designed with readable text and graphical designs reverse color of the floor color. All those signs must be understandable and noticeable without effort for everyone. City map does not bespeak for everyone on the tramway stops. Camlıköşk Square, which is one of the busiest spots in the city, the voice guidance of the traffic lights are difficult the hear in extraordinary traffic therefore it is not suitable for Principle of Perceptible Information. The elevator in the gardens of the Provincial Health Directorate can be reached with a yellow trace line therefore it's suitable for the principle of perceptible information (Figure 19).

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Figure 19. Usages to suit\not suit Principle of Perceptible Information

The ATMs on the Zafer Pedestrian Zone located to provide sidle distance and the devices are placed at eye level. But screens are not inclined so that the sitting individuals can not see the screen. There are no obstacles in the sidling area to the fountain and height of the tap is proper for sitting or standing individuals and is suitable for the Principle of Size and Space for Approach and Use (Figure 20).

Figure 20. Usage to suit\not suit Principle of Size and Space for Approach and Use

There are no different directors on the pedestrian zone for different groups of obstacles in terms of sound, color, lighting, materials and texture. Pedestrian traffic lights have warning lights, but the volume is too low. There are many obstacles (bicycles, boxes, water hoses, etc.) in the area that restrict the movement of the springs. There are defective lamp cables on the ground and large screws that protrude from the surface and there are no warning signs or colored bands for all these obstacles. There was insfrastructure work during the field survey and there weren't any warning elements around. Also, there is no feelable flooring around any street furniture.

Suggestions for Unsuitable Usage with Principles of Universal Design

On-site observation, detection and analysis studies, unimpeded practising for determine to uninterrupted and accessible center lines. After these studies, absence and deficiency (figure 21) identified and solution proposals introduced. Innovative solution proposal for urban furniture that are unsuitable for principles of universal design and which are scattered and disorderly placed in different lines is "Multi-Modular Street Furniture"

Figure 21. Dispered, disordered and non-universal street furniture

Multi-Modular Street Furniture

It is determined that there is absance of sitting unit suitable for principles of universal design at the Zafer Pedestrian Zone. The design produced as a solution with the use of certain points on the pedestrian zone for the all individuals with different physical properties; guidance, rest, lighting, charging and it may be a solution to the necessity to spend some time together.

As seen in figure 22 and figure 23, the sitting unit responds to individuals with different necessitys according to different heights levels. Especially short people, elderly people and children can rest together in the same comfort level with other individuals. For create an integrated design and remove irregularities, element of the main function of the electric lamps must be have different levels of lighting option, guiding digital surface, battery charger unit for battery-operated wheelchair, landscape elements such as flower beds. Also, the energy of the entire system provided by solar panels, which contributes to the energy efficiency of the city.

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Figure 22. Multi-Modular Street Furniture Design Alternative 1

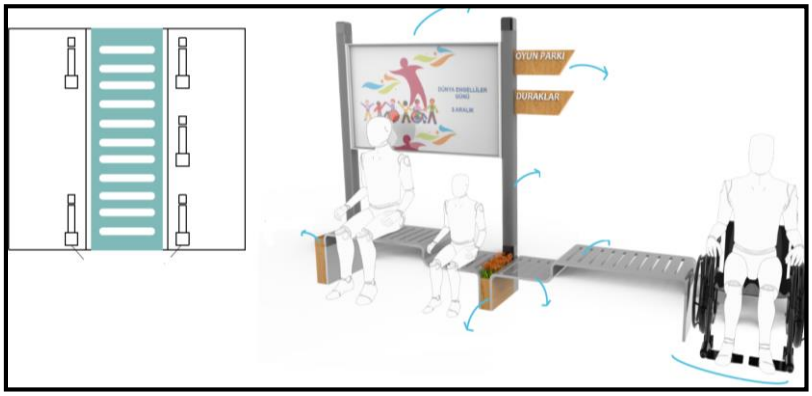

Figure 23. Multi-Modular Street Furniture Design Alternative 2

CONCLUSION

As a result of planning and designing according to healthy individuals of a certain standard, other individuals who are out of this definition taken away from the possibilities of independent and easy to use urban area. Main reason of the adoption and becoming the main topic of the universal design approach is that all people are the subject of the user group. Simple measures to be taken and good design can make it possible to use the cities comfortably and easy for people who are restricted in their movement for various reasons. Reaching the urban area and using the area is the most important requirement to ensuring full participation of social life. It is a condition of human rights and a city right to be able to benefit from the area independently and equally.

Universal design should not be viewed as an approach developed for disabled or elderly individuals. People with different needs and abilities should be able to use urban areas and buildings as

possible as comfortable and safely without special assistance. Opportunities to facilitate the mobility of individuals should be provided outdoor and indoor usages in the cities where they live their lives. In this context, design will be considered good if it designs with considering and covering all user groups.

According to the findings in the case area, the deficiencies in the field study should be eliminated and the necessary elements should be redesigned in integrated city furniture. Also the most important problem is that a barrier-free pedestrian crossing can not be seen and used in the floor material and footprints. The tangible surfaces should be placed for visually impaired. It is suggested that the entrance of commercial buildings should be arranged both with accessible design criteria and in accordance with the principle of equal usage of universal design. It is urgently suggested that the points of intersection of the vehicles-pedestrian roads and the pools must be secured by railing arrangements.

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User-Involved Universal Design Experience in The Space, Product and Service Development Process

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M. Kübra Müezzinoğlu**

Abstract

Designs aimed at the involvement of disabled people in social life are thought to bring the disabled users into a situation isolating them from the society. This study aims to emphasize that with the use of universal design principles, rather than making different designs for each user group, the space, products and services available to everyone can be revealed. This study was carried out with the view that space, products and services designed by universal design principles can be used by the disabled and that the disabled are an integral part of the society. The study was conducted with three study groups, which were formed by the active involvement of disabled individuals. Working groups focused on designs that can serve all users with reference to the experiences, expectations and needs of individuals with disabilities. At the end of the study, groups designed spaces, products and services that meet the needs of disabled people with universal design principles and provide routine participation in social life.

Keywords: *Universal design, disability concept, disability types, universal design principles, user-focused design*

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INTRODUCTION

Disabled individuals at the forefront of disadvantaged groups and designs for them are aimed to involve the disabled in social life. However, these designs, made specifically for the disabled, are dragging them into a process that separates and isolates the disabled people from the rest of society. It is considered to be possible that the expectations of all user groups can be met and individuals with disabilities can be included in social life without any problems with the designs created by considering the user needs with universal approach. The studies done by The World Health Organization (WHO) have indicated that about one quarter of the world's individuals are directly or indirectly confronted with some form of disability in their lives.

According to figures published by the UN, it is known that there are around 500 million people with disabilities in the world (URL-1). According to the researches done by Turkey Statistical Institute (TSI) in 2010, there are 280.014 people reported in the medical report to have at least 20% disability rate, recorded in the National Disability Database and living in the borders of the Republic of Turkey and (URL-2). This data shows how important the disabled population has a place in the general population and brings some facts to light. According to this data, the reason why we are not able to meet a large number of people with disabilities in streets in our daily lives is that they are exposed to some physical and psychological obstacles in daily life rather than a small number of individuals with disabilities. However, disabled people also have the right to benefit freely from all possibilities that society benefits as much as everyone else. Equal access to this right is possible only when the necessary legal and spatial arrangements are made and the needs of disabled individuals are taken into account.

It is quite significant to be able to perceive individuals who are defined as disabled as an integral part of society rather than as a separate part, and to provide this with space, product and service designs. In this respect, the concept of universal design and the accessibility of this concept become a current issue. Universal Design is defined as the design of spaces, products and services that are equally accessible and usable by different groups of people of different ages, sizes, genders, interests and skills. It is one of the main objectives of this study to make awareness of this design concept especially by the designers, draw attention to different user groups forming the society and to produce solutions for the individuals whose lives are restricted due to deficiencies and errors caused by the design.

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DEFINITIONS and BASIC CONCEPTS

Historical development process of the literature concepts, the principles that make up the concepts and the current approaches added to these principles have been studied through examples and universal design principles have been examined through examples in terms of space, product and service designs in this chapter, where definitions and concepts belonging to universal design are examined.

Disability Concept and Types

People with disabilities due to innate or later loss of their physical, psychological, sensual and social skills at various levels due to natural disasters, malnutrition, illness or accidents are obstructing their vital activities partially or completely and most importantly making it difficult for them to continue their social life (Aytaç, 2005, Beşer et al., 2006).

In the literature studies, it has been determined that various organizations have different definitions about disabled individuals. Uskun et al., (2005) notes that the expected benefits can not be obtained from the studies due to not using the appropriate classifications in the researches, the confusion about the concepts of disability, handicap or impairment, not being able to draw their boundaries precisely, and having no fixed standard between countries.

As a result of the researches made on this issue; the definitions of disability made by The United Nations (UN), the International Labour Organization (ILO) and the Turkey Statistics Institute (TUIK) are given below;

According to the Article 1 of the Declaration of the Rights of Disabilities, annex numbered 3447 of the Universal Declaration of Human Rights that was enacted on 9 December 1975 in the UN General Assembly, disabled individuals are defined as “people who are unable to do the things to be done in a normal person's personal or social life due to any innate or later deficiency in their physical or mental abilities” (United Nations, 1975).

The International Labour Organization (ILO) defines disability as "a person with a further decline in the achievement or maintenance of a suitable work, resulting in a reduction in physical and mental abilities" (International Labour Organization, 2008).

According to the definition of disability made by Turkey Statistical Institute (TSI), disabled people are those “who are unable to comply with the requirements of normal life owing to the loss of

physical, mental, spiritual, sensory and social skills at various levels by birth or later for any reason and is in need of special physical arrangements in structures and open spaces" (DIE, 2004).

As it is understood from these definitions, the disability may be caused by innate or later illness or accident; loss of function in physical or mental activities that the individual must perform in his or her daily life, resulting from limitation or inability to perform within the limitations normal or considered normal; it can also be defined as the difficulties that can be experienced in activities such as seeing, hearing, speaking, learning, grasping, accessing, washing, eating, going to the toilet, involving in work and social life.

In order for the needs and wishes of disabled people to be determined and met, it is first necessary to know the types of disabled people and then to make appropriate designs according to the types of disabilities. DIE (2004) classifies disability as orthopedically disabled, sight disabled, hearing disabled, language and speech disabled, mentally disabled and other disabled (DIE, 2004). Orthopedic disabled are those with inadequacy, deficiency and loss of function in the musculoskeletal system. Sight disabled are those with complete or partial visual loss or impairment in one or both eyes. Hearing disabled are those who have complete or partial hearing loss in one or both ears. Language and speech disabled are those who are unable to speak for any reason or have impairment at the speed of speech, fluency and voice impairment. Mentally disabled are people with various degrees of mental disability. People having illnesses that require continuous care and treatment, which cause work capacity and functions to be hindered, also fall into the other group of disabilities. This group also includes people with blood diseases, cardiovascular diseases, respiratory system diseases, digestive system diseases, urinary tract and reproductive tract diseases, cancers, endocrine and metabolic diseases, mental disorders, nervous system diseases and HIV (DIE, 2004).

User groups do not have only disabled individuals. Individuals need different design arrangements and standards during their lifetimes (eg, infancy, childhood, old age, etc.) or situations (illness, disability, pregnancy etc.) (Tutal, 2013). The main idea in this conception is to design environment and products that can be used by the maximum number of potential people, without the need for special design and adaptation based on the fact that all people have disabilities for some reason, such as age, skill loss, etc. (Dostoğlu et al., 2009).

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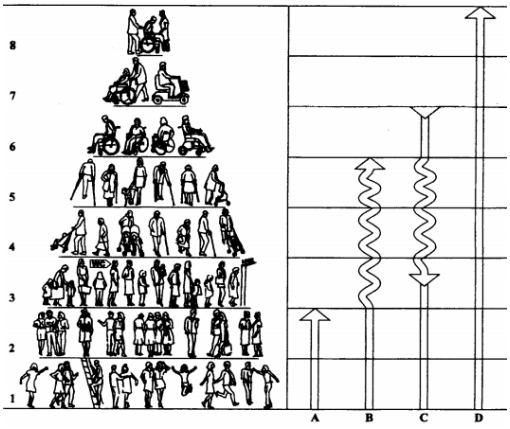

Figure 1. The Universal Design Pyramid *(Goldsmith, 2000)*

The best explanation of reaching the maximum number of potential users is seen in Goldsmith's "Universal Design Pyramid" (Figure 1). The users in the first two steps of the pyramid express the healthy and energetic people who can be burdened with heavy burdens and jobs, while the third line refers to the individuals with normal competence. The users in the fourth step of the pyramid are the disabled group according to the environment designed, arrangement or the suitability of the design, while the fifth and sixth step of the pyramid refers to the user group on which the universal design is based. The reason for this is that the designs made for the user group in this step are more inclusive as they include people in their subgroups. With a similar approach, Hazer (2005) emphasizes that design approaches based on the needs and desires of the individuals in the disadvantaged group will provide comfortable use for people in the other population group.

Universal Design Concept

When examining the historical evolution process of industrial product design, it is seen that many parameters are examined from technological developments, economic and political systems to the change of value judgments in society. From the production of handicrafts in which fewer products are manufactured, to the serial production with the industrial revolution, the problems that have emerged throughout the world and their solutions have been searched (Evcil, 2014).

The universal design approach, the main idea of which is to avoid separating or dismissing any user, is described by North Carolina State University's Universal Design Center as "products and environments to be used by people of all ages and abilities to the highest possible extent" (Story, 2001).

Olguntürk (2007) states that universal design is a holistic philosophy that opposes the treatment of individuals with disabilities as a special group, while Evcil (2014) notes that the

adoption of this philosophy by both users, designers and administrators is considered as a level of maturity reached by societies today. This concept is called "inclusive design" in America; however, it is called "design for all" in Europe (Ostroff, 2001). This term is replaced by various expressions such as life span design, trans generational design, user needs design, and real life design; while Dostoğlu et al. (2009), relating this diversity in terminology to the social and cultural differences of societies also points out that all differences affect the way in which the universal design approach is adopted and the way it is developed. All these concepts are based on common goals such as comfort, security, embracing everybody, sufficiency, independence, involvement, sustainability, integration, cultural compatibility, gender appropriateness, inclusion and material accessibility.

The universal design approach, expressed as the design paradigm of the 21st century (Preiser, 2008), has been the work of many researchers and each has defined this concept in different ways. According to Goldsmith (2000) and Ostroff (2001), universal design is a holistic, integrated, and transparent approach that includes accessibility requirements, detailing the elements of the system at the beginning, and then connecting subsystems until the top system is complete. While Hanson (2004) states that the universal design approach is the ideal system of thinking that is achieved by being separated from other design methods by being participatory, democratic, heterogeneous, low cost and user oriented; Evcil (2014) defines universal design as a search for the ideal rather than a finished state by producing innovative and pioneering alternative solutions according to changing and developing human needs. According to Knetch (2004, quoted in Evcil, 2014), drawing attention to the fact that the universal design approach is a movement around the world, this design concept aims to form a framework for generating solutions rather than specifying a specific goal.

The universal design concept first began to be used by American architect Ronald L. Mace, who lived in the mid-1980s, dependent on a wheelchair after suffering from polio in childhood (Kavak, 2010). In his speech at the "Designing for the 21st Century: An International Conference on Universal Design" conference held in New York in 1998, Mace expressed that the concept of unobstructed design is completely different from the universal design; that unobstructed design aims to provide solutions to individual needs alone while the universal design aims to facilitate the life of all users; and assistive technologies can offer only individual solutions, just like their own wheelchair (Jacobs, 1961).

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The concept of universal design, expressed by Hanson (2004) as a macro-environmental approach, aims to reach situations where a single user is not even excluded, by broadening design parameters and reject all positive or negative discrimination. This design approach, which offers intelligent design solutions to make life easier for all users, and which then needs to be easy to understand, modern and highly aesthetic in form language (Zec, 2009), also improves individual performance, health and social involvement (Steinfeld and Massel, 2012).

The Universal Design Principles

The concept of universal design is presented in its own history with good examples representing some aspects of it rather than describing the characteristics of a particular period concept, since there is no formalized criterion that could define the question of how to make a design most usable (Evcil, 2014). But then, in search of whether we can bring the concept of "maximum availability" for universal design into measurability in order to be able to design a period of available products and accessible environments, we have been searching for some accessibility codes such as ADA (the American with Disabilities Act Standard for Accessible Design Institute), and usability criteria such as ANSI (American National Standards Institute) and ISO (International Standards Organization) Standards. However, these standards have been limited to specific products and environments, necessitating the designation of principles that guide the universal design process (Story, 2001). Because it has been understood that the universal design should be regarded as part of the decision-making process rather than as a final product (Evcil, 2014).

On April 28-29, 1995, a team of ten people consisting of architects, product designers, engineers and environmental design researchers came together at the Center for Universal Design at the State University of North Carolina, and created the "Universal Design Principles" in order to guide the professionals for the presentation of environment and product designs on the basis of concepts of "equal status, equal behaviour, equal value" (Boduroğlu, 2005). The first draft was created on May 22, 1995 and the second on July 26, 1995; and the principles were finalized on April 1, 1997 as follows (Evcil, 2014):

Principle 1: Equality in use (fair use)

Principle 2: Flexibility in use

Principle 3: Simple and intuitive use

Principle 4: Comprehensible information

Principle 5: Fault tolerance

Principle 6: Low physical effort

Principle 7: Size and area required for approach and use

Researchers who continue Ron Mace's mission are still working today to develop these principles, though (Evcil, 2014). Mr. Satoshi Nakagawa, the manager of a Japanese design company named "Tripod Design" added three new principles to the "Product Performance Program" inspired by universal design principles in 2006, in order to objectively evaluate the universal design performance of a design (Evcil, 2014). Evcil stated that three new principles were added to the 7 principles mentioned in the book “Design for All” published in 2014. These principles are as follows:

** Adding to Human Delight (Manley, 2000, Evcil, 2014)*

** Product Durability and Production Economics (Nakagawa, 2006)*

** People's Health and Natural Environment (Nakagawa, 2006)*

**Functional and Aesthetic Integration (Değertekin, 2010, Nakagawa, 2006, Evcil, 2014)*

** Social Cohesion and Participation (Değertekin, 2010, Evcil, 2014)*

Universal design is not a trend, but a permanent design approach that assumes that the kinds of human abilities are ordinary, not special (Ostroff, 2001). The aim of universal design principles and related rules is to express the concept of universal design in a comprehensive way. The principles help educate all designers and consumers about the features of more useful design solutions. In addition, these principles, which constitute a specific standard, can also be used to guide the design process as it allows systematic evaluation of designs. They also allow for the development and implementation of the inclusion approach in the construction of the principles in many areas.

In addition, there is no obligation to implement all of these principles at once that increase and improve the demand for functional product design, which enables access to a large number of users. This approach, which basically includes the principle of equal use, can only be done gradually in the design process. Because universal design, aiming at providing the conditions that bring the least effort to human soul and body, is not a set of rules but an application philosophy and a common sense approach (Zimmerman, 2006, Akyol, 2009).

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Within the scope of this study, universal design principles are divided into subheadings in terms of space, product and service designs since they are aimed to recognize, listen, understand and even experience the physical environment, product and service together with individuals having different types of disabilities. In the next section, the existing examples of these classifications will be given.

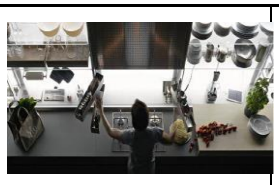
Universal Design Principles in terms of Space Design

Since the individuals in society have equal rights to socialize and to live their cultural life freely, it is necessary to design spaces that can be shared by all healthy and disabled individuals and prevent social loneliness. Even though the differences in movement of people moving within the same space is mainly are due to the differentiation of personal characteristics, this does not necessarily require to be a disabled or not disabled user. Therefore, universal design encourages users to make spatial designs without distinction.

In addition to building vertical circulation elements such as building entrances, common areas, toilets, ramps, elevators and ladders, according to the standards appropriate to the disabled to create accessible design; indoor and outdoor solutions should be made where healthy individuals as well as disabled can coexist without isolation from social life, and horizontal and vertical access schemes should be established.

The space designs of the universal design principles covered in the research were examined by supporting the following examples.

Table 1. Examples of universal design principles in terms of space design

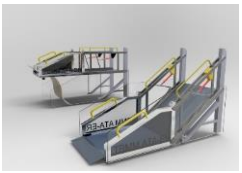
		
Robson Square (URL-3)	Hafele Kitchen Equipment (URL-4)	Korea Smart Card Open Door System (URL-5)

Designed by Arthur Erickson, "Robson Square" is one of the most important examples of how successful the universal design principles can lead to social integration and involvement principles. When the design of the square is examined, it is seen that there are various alternatives for the users in terms of circulation in the square, that the circulation on the sloping ground is provided not only by the ladder but also by the ramps and at the same time the ramps within the square are not separated from the square.

Developed by “Hafele” company on easy transportation and access concepts; kitchen equipments have applications and solutions that meet all the principles of universal design that everyone can use, including children, the elderly and disabled users.

"Korea Smart Card Open Door System" was designed by Yongtae Kim in 2011. Its design is the best example recently designed based on the principles of equal use principle. The bi-directional design allows the human traffic to flow more regularly, while allowing the wheelchair users to switch freely thanks to the optimum width.

Table 2. Examples of universal design principles in terms of space design

		
Guide Unobstructed Access System Moving Ramp (URL-6)	The Universal Toilet (URL-7)	Kids Together Children’s Playground (URL-8)

The "Guide Unobstructed Access System Moving Ramp", which was awarded the Good Design Award and Design Turkey 2017, was designed by Ataman Özdemir. Inspired by the ramps placed next to the stairs, this project will be applied in stairs with a height of 100-150 cm and has an elevator structure that gradually reduces its slope.

In "The Universal Toilet" designed by Changduk Kim & Youngki Hong, it is not necessary for the users to turn around or turn the wheelchair. Simply sliding the wheelchair forward is sufficient for use.

Located in North Carolina, the park was built as a reflection of the universal design concept to offer playgrounds and artistic activities for children of all ages and physical abilities. By combining natural and artificial landscape elements, the park aims to meet the needs of children and their parents regardless of their ability and age.

Universal Design Principles in Terms of Product Design

Once the individual has used and experienced a product for the first time, he/she compares the performance of the product with the expectations in the mind before using the product. This comparison results in a difference between expectation and performance (perception). This difference indicates satisfaction

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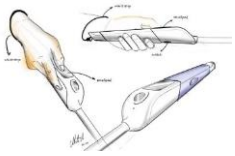
in positive direction and dissatisfaction in negative direction (Bitner, 1990, Oliver, 1997).

A well designed product that is suitable for everyone's use and that produces positive results in terms of universal design principles should allow for equal use and offer flexibility, simplicity, comprehensibility, perceptibility, minimization of danger, comfort and accessibility in accordance with personal preference and abilities.

The product designs of the universal design principles covered in the scope of the research were examined by supporting the following examples.

Table 3. Examples of universal design principles in terms of product design

		
"WeWalk" Smart Walking Stick (URL-9)	Washing machine named "Tilted" (URL-10)	Spoon named "Gyenno Spoon" (URL-11)

The world's first smart walking stick named "WeWalk" is designed to make life easier for sight disabled people. As the holding part of the walking stick goes from thick to thin, it is compatible with all kinds of hand structure and holding. It also offers multiple services to the user thanks to the obstruction detection mode and integration with the phone.

The washing machine named "Tilted" produced by Panasonic in 2003, aiming at offering easy use for the elderly, is equipped with an angled lid design and a hoop which is placed at an angle of about 30 degrees compared to standard washing machines, allowing users to protect their natural body positions without bending effort.

"Gyenno Spoon" is a spoon with anti-tremor feature designed by Google for Parkinson patients. The spoon, which allows the patients to eat more comfortably, is able to perceive the hand tremor and remain in balance at the same time.

Table 4. Examples of universal design principles in terms of product design

		
Scissors named "Soft Touch" (URL-12)	Dinner set named "Eatwell" (URL-13)	Medicine bottles named "ClearRX" (URL-14)

Fiskars company offers the finest examples of the principle of flexibility in use with the scissors with distinctive features. The product provides convenient options for both right hand and left hand users while offering optional usage options with a handy shape and natural movements.

The designer Sha Yao designed a dining set called "Eatwell" that would make life easier for people suffering from dementia. The bottoms of the plates and glasses are designed to be angled so that the dishes and beverages can be gathered on one side with natural inclination to make it easy to take with the spoon and drink. This facilitates the work of patients having difficulties in putting food on spoon due to hand tremor.

Designed for Target Company, "ClearRX" medicine bottles are specifically designed for users with a problem of forgetfulness and reduced vision. The label with large size and hierarchical information enables to distinguish the elements in identifiable shapes by improving the readability to the highest level with the color-coded rings that distinguish the drug type.

Universal Design Principles in Terms of Service Provision

According to the United Nations Environment Program (2009); service design is to meet product systems, services and the necessary infrastructure in a more effective way with the value to be reached both to the business lines and to the customers in line with the demands and needs of the customers. This approach is a model that provides an integrated mix of products and services between value-creation system stakeholders that provide environmentally-friendly economic and competitive new solutions and innovation-based interactions to meet a specific customer demand (Vezzoli, 2014).

The study of systems that offer an alternative to individual use of a product in order to substitute a service with an object is considered within the scope of service design.

The service applications of the universal design principles covered in the scope of the research have been examined by supporting with the example given below.

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Table 5. Examples of universal design principles in terms of service design

		
"VoiceOver" (URL-15)	"Finger Reader" (URL-16)	"Seeing AI" application (URL-17)

"VoiceOver" is the world's first motion-based screen reader developed for use on Mac and OS devices so people with sight disability or low vision can understand and control what's on their device. FaceTime allows users with hearing and speech difficulties to speak using all kinds of face expressions, while offering multi-touch movements with one finger for users with physical disabilities and lack of motor skills.

"Finger Reader" allows the sight disabled to write text by using their hands as a keyboard. Thanks to the sensors mounted on the finger, the hand and finger movements of the sight disabled are transferred to the main computer, and they are translated to the letters coded according to the sign language with the help of a special software.

The "Seeing AI" application by Microsoft, which can work with smartphones or smart glasses, conveys everything that happens in front of the individual to the user. In addition, the application conveys the age, sex and feelings of the people around to the user.

In addition, ÖSYM (Student Selection and Placement Center) and Open Education Institutions providing education and training services in our country provide a special service provision for students with disabilities. Prior to the examinations, if the individuals with disability apply to the centres with a petition and medical report, the individual is taken to the examination room and accompanied by an assistant who will mark the answer sheet for the students who are unable to use their hands.

As can be seen from the examples that are examined, the needs of the users are generally preliminary in the designs of the spaces, the products they use and the services they are in. It is the "average user" needs that are often considered in the design phase, though. Designs in all kinds of spaces, products and service design groups from staircase design to parks, kitchenware to furniture, mobile devices to white goods and automotive sector should provide harmonious coexistence of user friendly and environmentally friendly approaches.

RESEARCH METHOD

Because of the diversity of users in society, as well as important changes in society, technological developments and increasing levels of education; people have begun to live more independently, and the spaces, products and services they have used have become more universal. As this design area expands, the importance of universal design education has also increased. Many departments of design education placed universal design-based approaches in their curriculum, these approaches were studied in the studio lessons as project themes or universal design-focused workshops were organized.

This process, which is open to the development of universal design, led to the need for content and educational materials. For this purpose, an activity was organized by Selcuk University Department of Architecture on 3-4 May 2018 with the theme "Thinking with Universal Design" (Figure 1, 2). The aim of this activity is to understand universal design, to be able to think with universal design principles in design and to offer solution proposals about city and space. At this point, the awareness of young designers is expected to increase. On the first day of the event, the panel speakers gave information to participants about the universal design examples and applications in Turkey and in the world. On the second day of the event, a workshop was conducted under the leadership of the panel speakers, and afterwards the resulting products were presented to all participants.

Figures 1, 2. Event announcement text and poster

In a workshop themed "Group 8: Design Right; Remove the Obstacles", conducted by Assoc. Dr. M. Lütfi Hidayetoğlu, Dr. Inst. M. Kübra Müezzinoğlu and 15 students who have undergraduate studies in different departments in the field of design; it is aimed

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to get to know, listen, understand and even experience a product, service or physical environment together with individuals with different types of disabilities. First, some elements have been identified for students to make universal design more effective, useful and instructive. Opportunities for attitudinal change and critical thinking have been created for students in order to increase the influence of these elements and to increase their skills and knowledge about the process.

Even if differences and diversity in humans are seen and perceived, they may not be sufficiently sensitive to consider the problems they are experiencing. The workshop was carried out with the aim of educating and developing the sensitivity of individuals with disabilities, and for students to communicate with other people and to design by feeling responsibility for them. Within the scope of the workshop, 3 groups were allocated to design space, product and service so that the students would be in equal numbers and each group was accompanied by an individual with sight disability, orthopedic disability and hand-arm deficiency.

Before moving on to the design stage, all groups were provided with a period of time spent with a disabled individual who accompanied them in a social environment for a while. They were then interviewed to find out their personal needs and distress in the community and to develop solution proposals that would eliminate these problems altogether. After an hour of interviews with disabled people, the first meeting was held with workshop directors to find answers to questions about what, how, what measures and what to design for (Figures 3, 4, 5).

Figures 3, 4, 5. Group works carried out during the workshop

At the conclusion of the meeting; the space design group decided to design a universal kitchen for the orthopedically disabled individual who is a wheelchair user, the product design group decided to design an ergonomic and functional work table for the disabled individual with hand-arm deficiency, and the service

design group decided to design an audio library for the sight disabled individual.

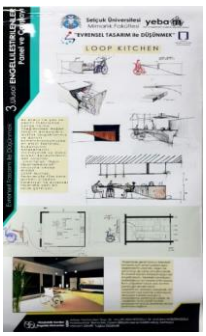
FINDINGS

The designs of spaces, products and services designed in accordance with universal design principles are given below at the end of the designing process, which run from 09.00 a.m. to 17.00 p.m. on the second day of the workshop.

• ***"Loop Kitchen", designed with universal design principles in terms of space design***

The orthopedic disability prevents the body from performing its functions related to the movement. A space designed in this regard should enable the disabled individual to easily handle his own work. The students in the space design group of the workshop decided to design a universal kitchen after negotiations with students, disabled individuals and workshop directors. So as to find an answer to the question of how a universal kitchen should be; literature researches were made, existing samples were analysed, and new material samples and system details were searched.

The group participants completed their designs within the time given to them. To express the result products; technical details were given on the poster design (Figure 6), a model (Figure 7) was designed to facilitate the perception of the three-dimensional effect of the kitchen designed in the space, and a bookmarker (Picture 8) was designed to convey their own designs and give a social message to the other participant panelists and students at the workshop.



Figures 6, 7, 8. The poster, model and bookmarker designed by the space design group

The kitchen design consists of a bench and an island module. The bottoms of all the cabinets in the bench module in front of the wall are left empty to a sufficient height at a level suitable for the knee distance on a sloping ground. This idea is an appropriate solution in terms of universal design principles. This allows the foot of the wheelchair to get down and more convenient access to the

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washbasins and drawers located on the module. Furthermore, the fact that the upper cabinets are designed with elevator system allows the cabinet shelves to be taken out and used. On the island module in the middle is the cooking section and the dining room. In this part which is designed aesthetically, attention has been paid to the under-bench spaces, allowing the disabled user to cook and serve without the need of another person. In addition, the cut-off boards mounted on the bench and the baskets mounted on the cabinet doors are also useful details.

• ***"Zoom Table", designed with universal design principles in terms of product design***

With the product design group, it was decided to design a work and drawing table, which has many functions to meet the user needs at the same time, for the disabled individual with hand-arm deficiency who has undergraduate education in Interior Architecture. First of all, the body measurements of the disabled person were taken, compared with the standard measures, and then the first sketch was started to work in the direction of the individual's need.

During the time given to them, the group participants designed posters, models and a slogan. While there are technical and aesthetic information about the table they designed in the poster and also the suggestions of the materials to be used (Figure 9), a three-dimensional appearance of the table is seen on the model constructed as 1/5 scale (Figure 10). It is meant to emphasize that everybody is likely to be disabled with a slogan saying "put your hand here and try taking off your jacket" with a white hand sign (Figure 11) written on a black background.

Figures 9, 10, 11. The poster, model and slogan designed by product design group

The first goal of this design, due to the discomfort in the left hand of the disabled person, is to reduce the power applied to the right hand of the individual. With this functional and operational details, the needs of the department where the users learn are also considered in this design and the user is allowed to make drawings and models. It is requested to meet all the needs of the

user with the moving shelf system used on the table surface, linear lighting, illuminated glass surface, movable t square, garbage cans on the sides of table and paper storage units.

• ***"Modular Read-Listen City Element", designed with universal design principles in terms of service design***

The service design group decided to design modular read-listen city elements so that sight disabled individuals can socialize within the society and can easily carry out book-reading activities in the city centre. During the time given to them, the group participants designed a poster, a model and black glasses. The technical details of the service unit they designed on the poster were included (Figure 12). The three-dimensional appearance of the city element is seen on the model constructed as 1/20 scale (Figure 13). With the black glasses they designed, other workshop participants were able to understand sight disabled individuals and put themselves in their place (Figure 14).

Figures 12, 13, 14. The poster, model and black glasses designed by the service design group

Designed for the sight disabled, the modular library is portable on suitable grounds and conditions and has easy-to-service details in the locality. Also considering wheelchair users, the bottom surfaces of the indoor fixtures are left empty and the entrance to the library is provided with a ramp. Access to the periodicals published with the Braille alphabet is provided in the modular library. With the internet service available in the library, appropriate environment conditions are provided for the individual to read daily newspapers, research, send and receive e-mails without needing anybody. In addition, they can also print a desired document as Braille Alphabet (relief).

CONCLUSION

When we look at the universal design approach covered in different design disciplines from a wider perspective, it is seen that the common point of all is the “user”, and this design draws attention to the fact that the user exists at every stage of the approach. Although all the studies in the field of universal design until now seem to be a search for a solution to the problems of the

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disabled people at the first perception, they have a concept that goes beyond this intellectual basis, assess the size of the user at a wide range and seek solutions by approaching the usage problems with an integrative attitude.

Scissors, coffee pots and armrests for the left hander to use comfortably; sensor-fitted luminaires, doors, kitchen benches with empty bottoms and bathroom cabinets for the physically handicapped users; door handles opening in a single motion, without any additional or discretion, buses that incorporate wheelchair and baby car users without any additional or equipment; and smart cabinets designed for sight disabled individuals can be given as examples of spaces, products and services that are produced today with universal design conception. In order for these designs to reach the right circles, it is necessary to show empathy and recognize that each individual's needs may differ from one another.

Access of the universal design to the right place is only possible through education, and it is a holistic approach that includes designers, educators, employers and other segments of society. The designer has a different place here. By encouraging designers to recognize the power of designers to see or separate people as a factor in their design decisions and to encourage them to have a more critical view of how to make those decisions, universal design can be regarded as synonymous with good design. The way to do this is to develop the resources and curricula that provide universal design education and training for the designers of the future.

Universal design education should not only include students, but academics, instructors, graduate designers and design industry staff and be widely-esteemed. Human-oriented design education coincides with universal design. Presenting disabled individuals as a routine part of the society and ensuring the involvement of disabled people in social life depend also on the designs produced with universal design principles. The important thing is to ensure that this approach is used consciously.

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Resume

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Thinking with Universal Design in Historical Environment

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Mehmet Topçu**

Abstract

Historical environment is a unique and irreplaceable resource which reflects the social, cultural and economic characteristics of the past societies (Donely, 2011). It is an integral part of local, regional and national cultural idendity. The environment especially consists of historical environment and buildings are significant because of their uses as place where people's daily life activities. Moreover, meeting of social and cultural assets which societies have been figuring from the past with daily life turns into a resource for a sustainable future. However, it is generally impossible that those buildings which have been constructed in their own terms can satisfy the needs of today. In Turkey where the balance of protecting-using is on behalf of the first one, the protection policies and protection regulations exceedingly limit the intervention to the natural environments. Wishing that historical buildings are actualized into daily life on one hand and clamping down on accessing, visiting and using those buildings on the other hand leads to a serious discrepancy. However, the prominent examples which oversee the balance of protecting-using show that historical environments can be intervened through designing which will create or add values without compromising on protection. All sorts of interventions to be conducted consider the potential needs of the users without giving any harms to the originality of the building. Thus, it is expected that everyone can access the buildup area including the historical buildings, products and services and information equally and under equitable conditions. For that reason, making the built-up

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environment accessible, visitable and usable through universal design is one of the fundamental rights for the people who expand their daily living environment through accessibility and universal design.

In this study, accessibility, visitability and usability of Bedesten Historical Site in the city of Konya are discussed through the theme of "Thinking through Universal design" and suggestions of designing are given in various scales (urban scale, street scale and building scale).

INTRODUCTION

When it is considered that common perspective related to designing is shaped according to the needs of the average user group, it isn't quite possible to mention that the diversity of users in a historical environment or historical building(s) and their need are taken account. In fact, in an environment where the borders of intervening in a historical buildings are defined in detail and the balance of protecting-using is on behalf of the former, it is almost impossible to conduct it. For that reason, generating ideas through universal design or trying to turn the designing into universal through humanity conditions in a country where there is no practice of application while discussing the terms of universal design (Goldsmith, 2000, Steinfeld and Tauke, 2002, Ostrof, 2001, Mace, 2013, Evcil, 2014), design for more (Herssens, 2013) and design for the no-so-average may be regarded hyperbolic. In a world where being only a human is necessary, however, it is expected that everybody can access to a built-up area including historical buildings, products and services and information independently, equally and without any discriminations. This is the reason lying under the discussions for the terms of universal design/design for all, design for more and design for no-so-average especially during last few years.

Thinking through universal design in a historical environment, making the accessibility, visitability and usability of the historical area possible for everyone is much more difficult when compared to other buildings in the current and available stock of buildings. This environment which is planned/designed or constructed according to the group of average users in the period it has been established can't be expected to be convenient or comprehensive for the people of today (Heitzman, 2005). Moreover, monumentalizing the buildings especially having historical background through protective approaches lead the completion of their lives, especially financial lives, sooner than expected (Çakmak, 2013). It requires series of intervenes which will create or add values in a borad perspective from regulations to designing. All sorts of interventions to be conducted should be executed through practical and reasonable solutions so that originality of the building isn't harmed and considering the needs

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of potential users. For that reason, the civilized applications in the historical environment or historical buildings which is based on the notion of design for everybody/universal design, and the terms such as accessibility or visitability for everyone are rather limited. It is interesting that those applications which should be standard are extremely limited within the general stocks of the buildings, they are included in designing and sanctions even financial punishment is applied if they are executed. This occasion which needs questioning in terms of designing criteria and occupational ethics may legitimate the noninclusive status of the historical environments/buildings from the optimistic perspective.

In addition to that, the interventions to the historical environment or buildings within this environment, from the smallest to the most comprehensive ones, open the relationships, conformity, discrepancy and functionality of each design to the historical environment/building for discussion. Especially, conditions or standards of reconstruction which are required for some regulations such as accessibility, visitability or attachments and primary protection-based approaches such as assizes make the historical buildings inaccessible in terms of protection-usage balance. However, focusing on the necessity of regulations and why the regulations are needed instead of rejecting any universal-based intervention to the historical building or any regulations to be conducted will allow the comprehensiveness is accomplished. The efforts to make designing universal through humanity occasions and turn it into a value only succeeds through comprehensive approaches of designing. No matter it is in the historical environment or not, it is almost impossible to think the opposite in the designing approaches which are turned into values through putting human in the center. By all means, achieving this in the urban scale, urban designing scale and building scale in the historical environment is a great success. There are limited works which share this success in various parts of the world.

One of the accessible urban design is in the city of Vitoria, in the north of Spain (Figure 1-2). Vitoria has an exceptional medieval old town, situated on a hill. Iwo sections of mechanical In 2012, a design competition for the improvement of accessibility from the modern districts to the Cathedral area was called. A solution was sought for the problem of accessibility between the modern part of the town and the Cathedral through a designing contest and the application which developed through the solutions which enrich designing turned into one of the outstanding examples of accessibility in urban scale.

Another example is the application in Valette, the capital of Malta, which brings the silhouette of historical environment into discussion and considers using the protecting-using balance. The elevation difference over 50 meters between the Great Harbour and the Barakka Gardens and City Gate constructed on the city walls which was constructed in the 16.th century has become accessible through twenty-storey stairs which were built on the external face of the city walls and an specially-designed elevator (Figure 3). Similarly, the ramps, safe-walking zones, lift and stair lift were established for those who were prevented from accessing Acropolis which has numerous antique buildings on a high reef in Athens with architectural and historical importance. Thus visitors were able to easily access the peak of Acropolis which hosts ancient Greek buildings. (Figure 4).

Figure 1-2. The Accessibility of Historical Center of Vitoria Settlement (URL 1)

Figure 3. The Stairs and elevator tower which provide accessibility to the Grand Harbour and the walls of the city in Vallete (URL 2).

Figure 4. The Stairs and platform Elevator Designed for Accessibility to Acropolis, Athens (URL 3)

In Turkey, one of the outstanding examples at the scale of building is Hacı Hasan Mosque in Eskişehir. Although it was registered, its values to be protected were buried under the attachments around it and it encountered incorrect technical and architectural interventions in order to prolong the life of the building. The building which was restorated considering the universal design criteria provides solutions so that orthopedically handicapped, hearing impaired, and visually impaired people independently perform their prayers (Figure 5). The aforementioned solutions involves praying on the wheelchair, seeing the sound of call for prayer, support of sign language related to praying, tactile carpet covering, induction loop systems and Braille Quran set etc. (Tutal, 2012, 2013, Akın Güler-Tutal, 2017).

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Figure 5. Hacı Hasan Mosque interior space for wheelchair users.

The historical environment from urban scale to building scale participates daily life in its original functions through keeping its specific status, through contemporary attachments to the current building at times and being purified from the previously attached attachments at times and through some changes. In all cases, its accessibility, visitability and attachments are aimed to achieve through considering protecting-using balance. For that reason, inclusiveness in planning, designing or adaptation becomes one of the basic rights for the people who are able to participate (visit and use etc.) so long as it expands the daily life space and its borders in accessibility.

This study which deals historical environment in terms of universal design, discusses the participation of users in the place in terms of urban scale, street scale and building scale in the historical Bedesten Çarşısı (Covered Market) in Meram District, Konya The historical Covered Market which has been analyzed within the context of the research is discussed in terms of accessibility, visitability and attachments from urban scale to building scale and suggestions are offered especially for the attachments of the historical environment by all.

KONYA BEDESTEN ÇARŞISI (COVERED BAZAAR)

The Covered Bazaar is the oldest trade center of Konya and it is located on the East of Alaaddin Hill, on the Mevlana Street which is the most important arterial road and is mainly on the south of it. It is a bazaar whose spatial formation dates back to the Seljuk period and it was built around Atpazarı gate, one of 12 gates of the city walls around Konya at that time (Ergenç 1995). (Figure 6).

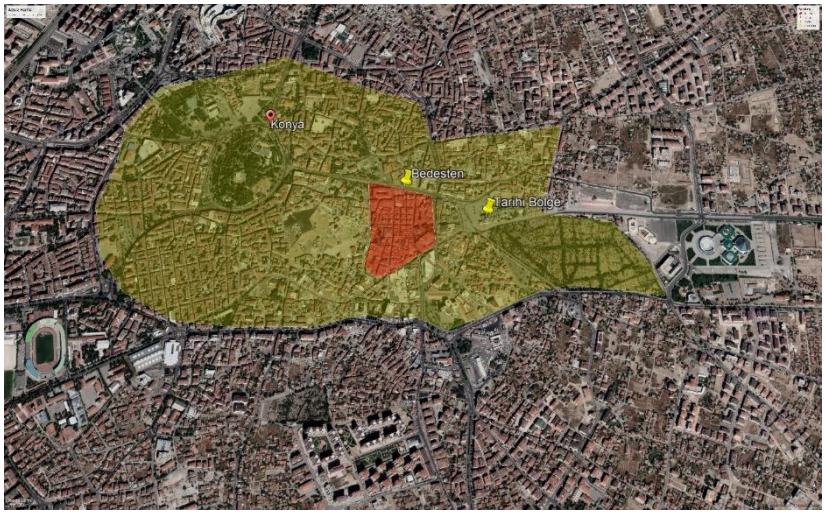

Figure 6. The location of Konya Bedesten Çarşısı (Covered Bazaar) in the heart of historical city.

The traditional Bazaar employs a traditional character in terms of its characteristic shops, the relationships of shops with street, its form in human scale, its proportions which conform to human beings, details of fringe and the way the goods to sell are exhibited. In addition to this, it forms a background for the monumental buildings such as Kapı Mosque, Aziziye Mosque, Bulgur Tekke Mosque and makes those cultural assets more effective; moreover, it has important visual characteristics in general silhouette. Within its body, there are numerous lodgings such as Mecidiye Lodging and Nakiboğlu Lodging which bears the characteristics of late Ottoman architectural period (Aydın, 1989).

Like many other covered bazaars, this covered bazaar encountered few occasions of fire and thus its physical structure has been changed. The most important fire was seen in 1867. The traditional covered bazaar which carries the characteristic features of Seljuk and Ottoman periods encountered the danger of losing its original texture during the Republican Era as a result of structuring which doesn't conform to the traditional pattern in gabarite since new structures are multi-storey in the narrow streets. The reason for current commercial transactions of the shops in the bazaar is the deep rooted commercial institutions of the city, official institutions, specific products (stove manufacturers, hardware dealers, spice-sellers and offal shops etc) and rural bus station which serves to the population coming from around Konya. Moreover, the shopping habits with historical roots and structure and the form of trading which still continues are also effective in this pattern (Uysal, 2004).

Those who come to the town from the settlement areas around for daily shopping are the most important elements which increase the economic potential of the bazaar. Moreover, the location of the bazaar close to the Mevlana tomb also increases the density of its

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usage. Except for Mecidiye Lodging and Nakıpoğlu Lodging which still maintain their commercial functions, there are no more qualitative traditional commercial buildings today. Although the names of the streets are maintained in Konya bazaar today, the activities related to those jobs don't continue anymore – except few ones. Despite all those problems, the pattern of open bazaar which constitutes the Konya bazaar is continued by this place partially maintains physical, social and cultural characteristics (Topçu, 2011).

Konya covered bazaar underwent radical spatial changes through a big-scale improvement project conducted by Konya Metropolitan Municipality in 2013. Within this context, designing of top covering of the covered bazaar, restorating the lodgings in the area in conformity with social activities, restitution, restoration and urban designing applications of the walls of all the structures facing to the street, walls of courtyards and gardens and the patterns of street were conducted. Moreover, arrangements were made for infrastructure lines, floor coverings, street improvements and the walls of buildings facing towards the street (Kocadağıstan, 2015). Within this context, 84 pieces of street façade arrangements, 40 pieces of street arrangements were conducted. Both spatial development of Konya covered bazaar within its historical process and its current status after the improvement process played an important role in selecting it as the sampling field through the perspective of universal design.

METHOD

Thinking with universal design in historical environment/historical buildings from accessibility of travel to historical environment/historical buildings (the type of travel, the access to transportation buildings and vehicles) to accessibility, visitability, attachments and even livability of historical environment/buildings mean continuity among the scales. This continuity is obtained through maintaining the strategical decisions starting at the top level in the scale of detail and the comprehensiveness of designing as well as its originality. The Covered Bazaar which was selected as the application area in this study was discussed and analyzed in terms of urban scale, street scale and building scale (Figure 7).

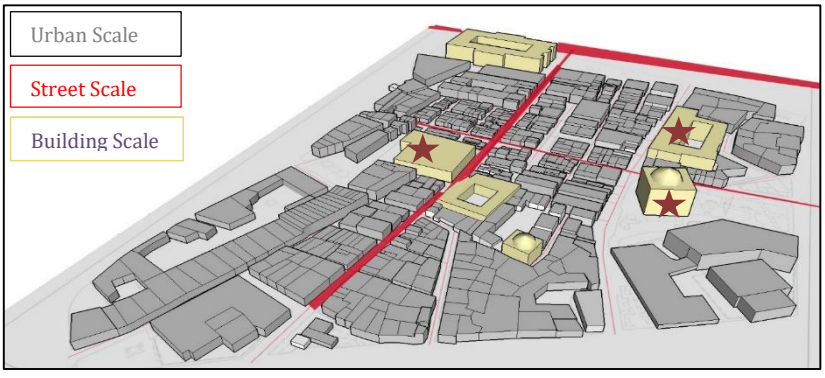

Figure 7. The 3 dimensional display of the study area (analysis were conducted on the buildings with star)

In the urban scale, the region which covers the entire covered bazaar was chosen as the area of investigation. The basic objective in urban design is to build comfortable, safe, quality places which will satisfy the inclinations, needs and preferences of the user. For that reason, the basic director is the individual and the characteristics and expectations of the individual. Depending on the changes observed in the individuals, the characteristics expected from a place will also change. Keeping the individuals with various desires, characters and expectations in the same place and make them happy constitute the power of urban designing. In designing a strong, creative and effective place the basic approach is the approach which is democrat, equalitarian and serving for everybody (Uslu & Shakouri, 2014). The public places seen in this scale were classified in four topics. They are urban furniture, urban landscape elements, lighting equipment and floor coverings.

The researchers conducted at urban scale were supported with the street scale which we called as a lower sub-scale. At this point, three streets in the covered bazaar which are densely used were chosen as the investigation area. The aforementioned streets are Mevlana Street, Tevfikiye Street and Türbe Street. Detailed analysis were conducted within the framework of the principles of universal design mentioned in the chapter of methods for the selected streets. Those analysis were categorized as transportation, car park, horizontal circulation zones, vertical circulation zones, surfaces for walking, and restrooms. Afterwards, they were marked on the current maps and supported with photographs. The conducted analysis examined the elements of transportation system such as main types of transportation, stop-points for transportation vehicles and ticketing points through the criteria of universal design.

Related to the car park, the status of car parks were analyzed in terms of whether they have sections for disabled people or not, whether parking spaces are at the level of traffic way and the status of the accessibility to the pavements. In terms of horizontal circulation zones, the status of pedestrian areas around studying zone including pavements from the point of accessing to the traffic way (cross-roads, car parks and pedestrian crossing) and the status of the buildings (entrances) facing to the streets in terms of access to the pedestrian crossing were considered. As for the vertical circulation zones, each elevation difference in the circulation zones (if available) was analyzed in terms of whether they provide accessibility through ramps, lifts or elevators. The availability of the accessible restrooms and their convenience for using were also considered. The question of whether there is

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tactile walking zones within the urban circulation area, its continuity and conformity to the standards constituted a base for the analysis at urban scale.

At the level of building scale in the street scale which is the bottom scale of the study, one lodging (Mecidiye Lodging) among the monumental buildings around the covered bazaar, 3 mosques (Kapu Mosque, Azizizye Mosque and Bulgur Tekke Mosque) were analyzed in terms of the principles of universal design. Access the lodge and mosques for vehicles/pedestrians, accessibility on the routes towards the mosques (car park/stop-mosque and access to the mosque), parking lot/ parking lots for disabled, horizontal and vertical access to the building, the use of building, ablution zones and restrooms were also analyzed. Especially, the attachments of mosques for different categories of disabled people (orthopedically, vision and hearing) was focused on.

FINDINGS

Urban Scale Analyses

The urban furniture is the group of materials which complete urban external spaces and provide comfort for the individuals in the external space and they should be designed and brought into use according to the principles of universal design. When the field was analyzed in terms of urban furniture, the distributions of elements of structures such as billboards, phone boxes, banks, ATM, litter bins, fountains, landscape elements, lighting elements and surfaces to walk as well as conformity of the urban furniture to the criteria of universal design were analyzed. Such analyses were divided into categories such as urban furniture, urban landscape elements, lighting elements, and floor coverings. The distribution of urban furniture in the research was shown in Figures 8, 9, 10 and 11. The conducted analysis shows that urban furniture isn't available for everyone, it is insufficient in terms of designing criteria which provides attachments for everyone through the designing.

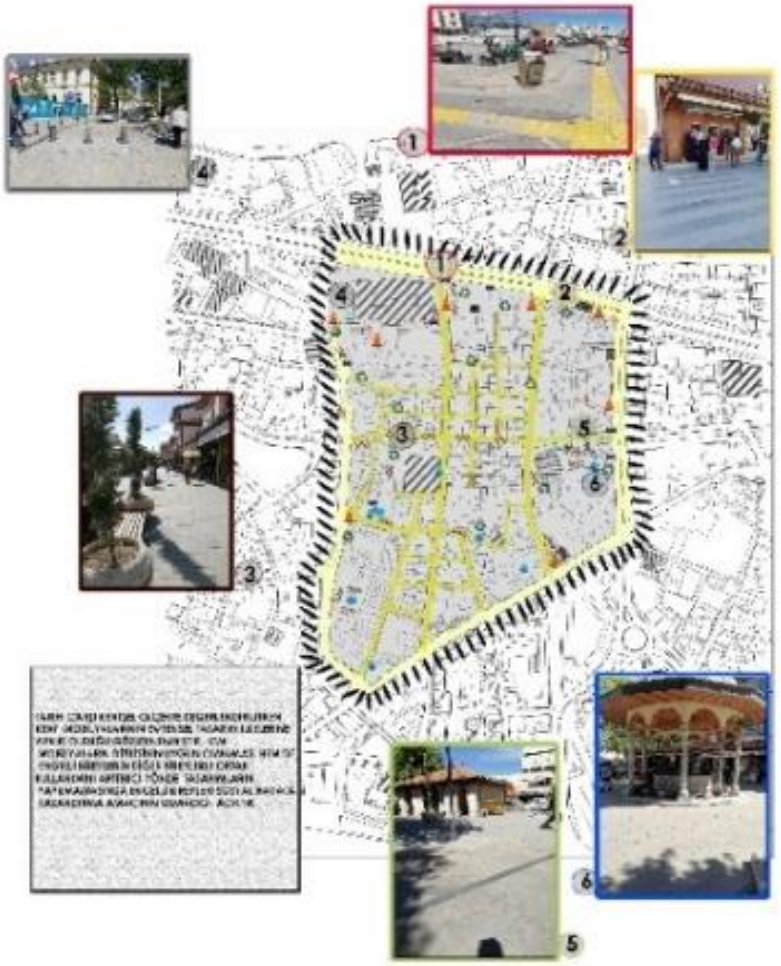

Figure 8. Urban furniture in Bedesten region.

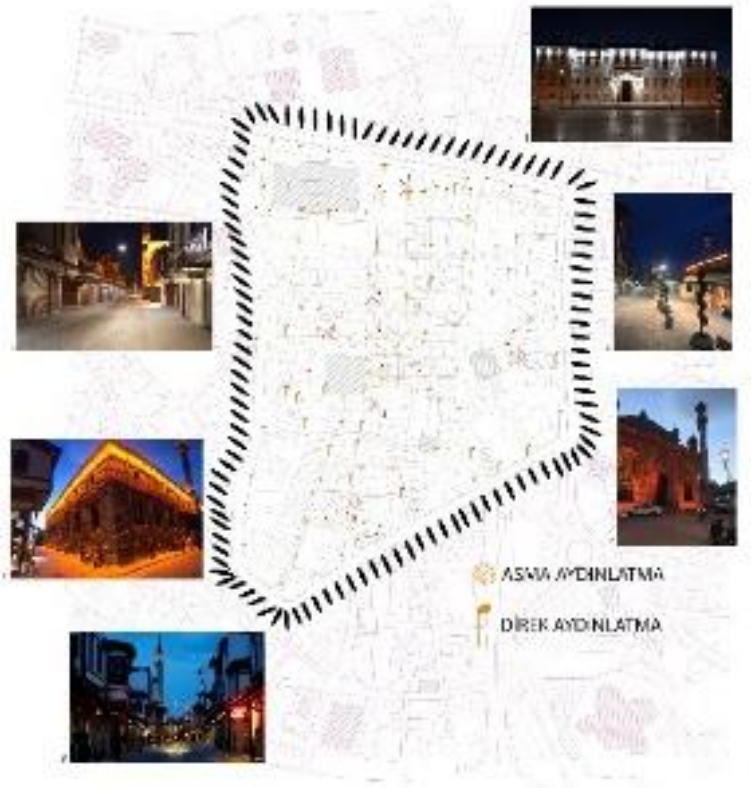

Figure 9. Lightining equipment in Bedesten region.

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Figure 10. landscape equipment in Bedesten region

Figure 11. Walking surfaces in Bedesten region

Street-Scale Analyses

Within the framework of the analyses conducted in the street scale, a map section shown in Figure 12 was formed for analysis and evaluation. When the determinations in the map section was analyzed, it is understood that the stop points for mass transportation vehicles and the stop points don't conform to the standards for the principles of universal design. In the car park zone, there is a space for disabled people and the parking zones for disabled people is at the same level with traffic way and the pavements are accessible. When the field of study was analyzed in terms of horizontal circulation zones, there was a discrimination of vehicles and pedestrians on Mevlana Street, the pedestrian-zones in this street were accessible to the traffic way and no

problem was determined on Tevfikiye street and Türbe street in terms of accessibility since they are pedestrianized. When the buildings with façade to the pedestrian's road (entrance) are analyzed in terms of their accessibility through pedestrian's way, it was seen that the different of level at 5% wasn't taken into consideration. When the streets were analyzed in terms of vertical circulation areas, the access was obtained through elevators in Mevlana Street and the criteria of accessibility was considered in the transition areas. On the other streets, there are no difference of level and ramps and thus it was impossible make such a determination. As for the toilets for handicapped people in the zone, it was observed that there are public restrooms but no sensibility was observed there related to handicapped people, for example, there is no convenient space to use wheelchairs. When the application of tactile walking surfaces are analyzed within the urban circulation zone, it was observed that the tactile surfaces to walk were only applied on Mevlana Street there was accessibility for handicapped people but there was no such an application on Tevfikiye Street and Turbe Street. Under the light of those findings, it is understood that an arrangement is necessary for the use of public toilets by the handicapped people, the tactile surfaces for walking should be applied to the whole area, and more tactile solutions are necessary in terms of the accessibility between the entrance of the buildings and pedestrian ways.

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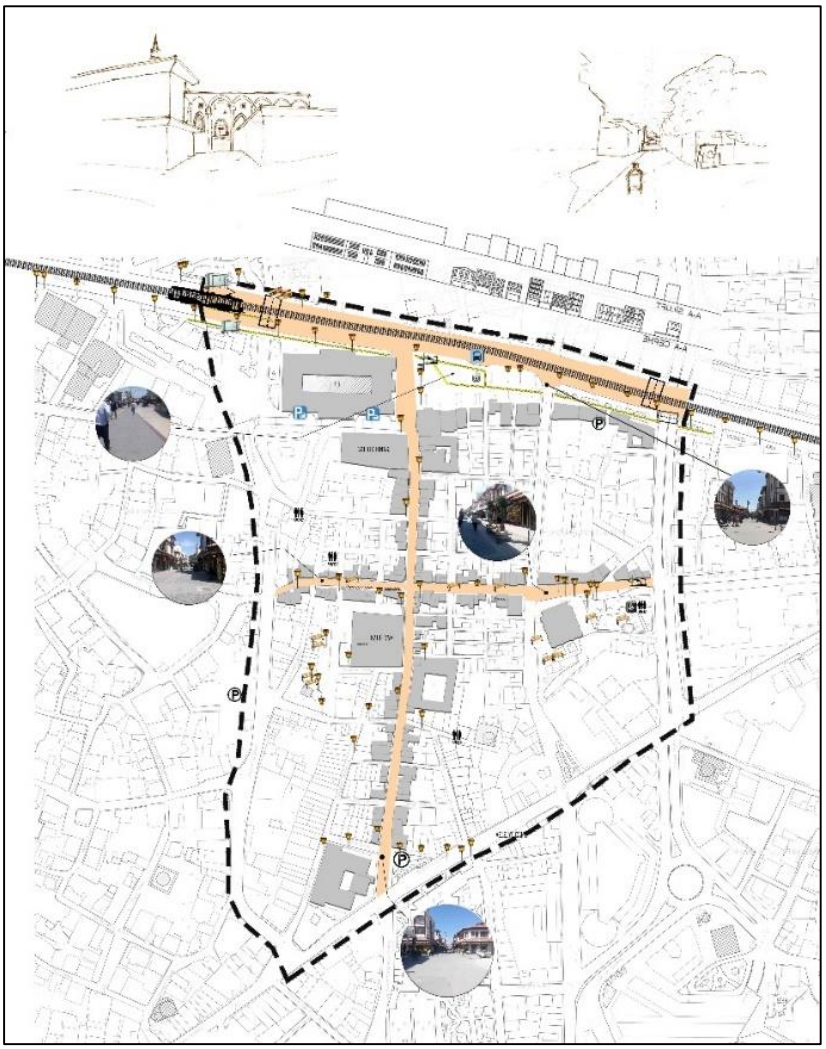

Figure 12. Determination conducted on the streets of Mevlana, Tevfikiye and Türbe.

Building-scale analyses

In terms of the building scale, Mecidiye Lodge, Kapu Mosque, Aziziye Mosque and Bulgur Tekke Mosque were analyzed in terms of accessibility and the map sections of Figures of 13, 14, 15 and 16 were formed for the buildings according to those analyses. It was especially observed that the Mecidiye Lodge and Bulgur Tekke Mosque weren't easily recognized within the pattern at the scale of human being for finding directions/ways/places.

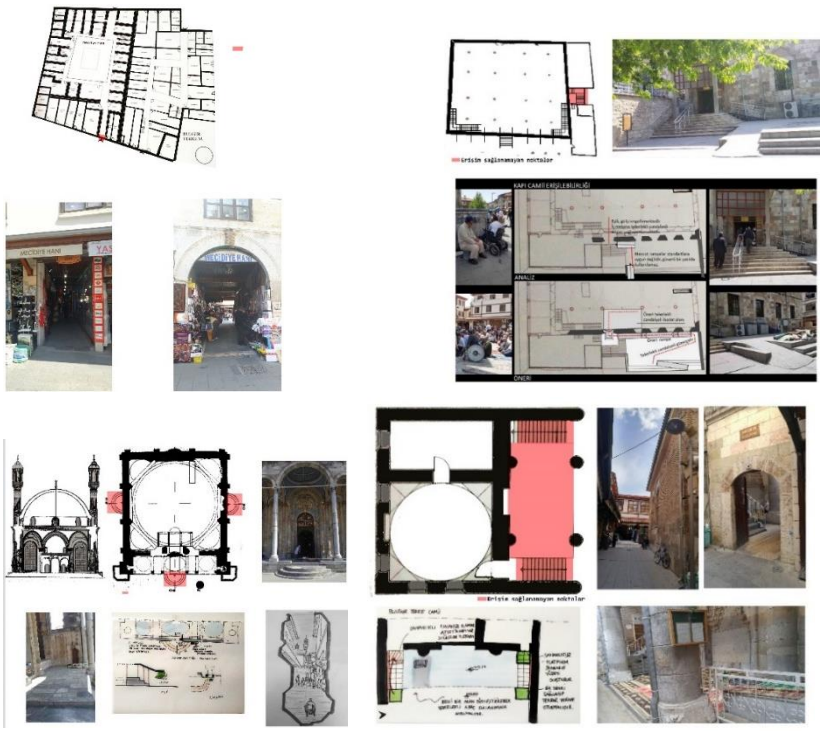

Figure 13. Mecidiye Lodging.

Figure 14. Bulgur Tekke Mosque.

Figure 15. Aziziye Mosque.

Figure 16. Kapu Mosque.

Due to the location of the buildings and the entrance to those buildings were surrounded (enclosed) by the commercial activities around, their entrance gates are limitedly realized. On the contrary, the Kapu Mosque and Aziziye Mosque turned into two important focusing points due to their locations and their domes and minarets which forms a reference point in the narrow streets of the Covered Bazaar Region. The Mecidiye Lodge which was separated from the buildings of worshipping in terms of its functions are affected inaccessibility. Especially, the goods of the trading houses which overflow onto the courtyard make the entrance difficult. Horizontal accessibility is available in general sense however the upper floor of the lodge can't be accessed (Photo 17-18-19). In addition, there is no accessible toilet which serve in the lodge.

Photograph 17-18-19. Mecidiye Lodging entrance, courtyard and stairs to upstairs.

The mosques encounter accessibility problems which can be sorted out through tiny interventions. It was observed that the accessibility until the main entrance gate of the mosque is insufficient in general sense but it isn't unsolvable. The elevation

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between natural ground and ground of the building is inaccessible. The current solutions related to the difference of levels is far from satisfying the standards (Photograph 20). Especially, ablution space, restrooms and space for worship have limited access (Photograph 21-22).

Photograph 20. Inaccessibility around the mosque.

Photograph 21-22. Ablution and participation to worship of wheelchair users.

Thereby, the analyses conducted related to the building scale indicate that some current solutions are only those with movement restriction. The solutions except those which are degraded to carparks, ramps, elevators and toilet commonly seen in our country do not cover the disabled people except orthopedically disabled ones. For that reason, especially comprehensive approaches which cover different age and handicap category should provide accessibility and attachments from urban scale level to building scale level.

CONCLUSION

Universal design which differentiates since it brings the equally accessible, adaptable patterns and designing to the fore is applied in a very large scope of fields from urban scale to building scale

(Hacıhasanoğlu, 2003). Especially, historical environment is the most important scale among the others. The balance of protecting-using is on behalf of the former related to historical environment and it leads monumentalization of the buildings and decrease in their economic life. However, enabling historical buildings for being accessed, visited and used in their own terms will allow the participation of historical buildings with their original or revised functionality to the daily life and their economic life will be extended. Although the protection-based regulation related to historical buildings and the related regulations are consistent in themselves and reflect important decisions in detail, it isn't possible to mention about an integrative approach. Although the related legislations present the rules that should be obeyed within itself, it is insufficient in terms of the types of the interventions to each historical building which differs due to their originality and determining the borders of those aforementioned interventions. In the legislations, there is no directing instruction about how to provide accessibility or the principles of universal design in a historical environment at the higher level or historical building. If a building is registered according to the Regulation for determination and Registration of Immovable Cultural and Natural Properties Needing Protection, the related commission may not conduct necessary observations and inspections related to the accessibility of the building. This occasion displays that there is no integrative approach among the legislations.

This study conducted in Konya Covered Bazaar reveals that the activities of improvement and restoration which have been implemented in the area in recent years have been very limited in terms of universal design principles unless integrative approaches are employed and continuity is provided although they employs some sensibility in terms of accessibility. From urban scale to building scale, every interrupted approach of planning and designing negatively influence accessibility, visitability or attachments. For that reason, life quality for everyone who wishes to expand the borders of daily life through universal design principles, especially, accessibility require integrative and with continuity in order to participate to daily life.

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URL 3 http://mila.izkustvo.net/wp-content/uploads/2009/06/athens-acropolis-elevator.jpg

Resume

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Geographic Information Systems (GIS) Based Accessibility Modelling Approach in Micro Scale Considering Physically Disabled Users: Case Study of Mimar Muzaffer Campus, Selcuk University

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Abstract

The concept of physical accessibility refers to the availability, capability, comfort, convenience of transportation processes considering different urban obstacles / barriers and costs. In this context, there are many approaches for the measurement and evaluation of physical accessibility in the literature which are used extensively as a decision support especially in transportation, geography and city and regional planning related disciplines.

Although there are large number of modelling approaches on physical accessibility modelling in macro scales (such as national, regional, city and town scales), the research on physical accessibility modelling, in micro scales (such as street, human, neighbourhood scales), which could

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consider all the details of the perceived space seem to be extremely limited.

This study, which emerged from this lack of accessibility modelling literature, proposes a Geographical Information System (GIS) supported methodology to demonstrate how physical obstacles / barriers such as "buildings, landscape areas, walls, steps, stairs, pits, unfitted street furniture, other (garbage, rubbles, trees etc. that prevent access) etc." and transitions such as "ramps with appropriate slope, elevators and/or "removing walls / steps" could be defined in GIS environment and how access and circulation in (outdoor) urban space could be modelled considering these physical obstacles / barriers and transitions especially taking physically disabled users (users using wheelchair, bicycle, baby's car, market car etc.) into consideration in the micro scale.

The proposed accessibility modelling methodology is conducted at Selçuk University, Faculty of Architecture, Mimar Muzaffer Campus Area. A polyline-based spatial GIS database has been developed to demonstrate how physical barriers and transitions could be modelled in micro scale in GIS environment in order to evaluate physical accessibility. The results of the study could provide an accessibility based decision support environment by visualizing and presenting how physical obstacles in urban space prevent physically disabled users from access and circulation and how the elimination or removal of these physical obstacles and creation of transitions will create a difference in access and circulation for the users in a comparable manner especially in micro scale.

This study is thought to make a significant contribution to increase accessibility levels of physically disabled users (users using wheelchair, bicycle, baby's car, market car etc.) in the outdoor urban areas in terms of demonstrating their accessibility and circulation capabilities.

The primitive experimental model related with this research was carried out with the participants of the accessibility measurement and modelling session at the 3rd National Disability Workshop which is held in Selcuk University, Mimar Muzaffer Campus dated 2-3 May 2018.

INTRODUCTION

The concept of physical accessibility is an important concept that reveals the level of ability, comfort, convenience etc. of transportation against different urban barriers and transitions.

Physical accessibility measures are widely used especially in macro scales (such as national, regional, city and town scales) to check the benefits of urban and regional plans and/or transportation networks as a planning control tool. They help to evaluate proximity and availability of several urban/rural services like health, education, recreation, emergency or trade etc. by considering population (supply and demand relations) and several transportation types like by seaway, airway, railway, road

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transport (national / regional scale) or by pedestrian, bicycle, car, public transport etc. (city / town scale) for a defined threshold of time or distance (e.g. 500 meters, 1 kilometres, 1000 kilometres or 5 minutes, 60 minutes, 24 hours etc.) (Kuntay 1976ab, Kuntay 1990, Halden et al. 2000).

The accessibility measures could generally help decision makers working in architecture, urban and regional planning and geography related disciplines to

- identify regions that have inadequate or excessive service,
- select appropriate sites for new or re-located services,
- test and improve the performance of the transportation system.

That is why, accessibility measures can be accepted as key variables for supporting supply / demand, location / allocation and service/catchment area related planning policies and strategies at national, regional, and local levels (Makri 2002, Juliao 1999, Kuntay 1990, Halden et al. 2000, Radke and Mu 2000).

Numerous accessibility measures, ranging from simple to sophisticated, can be found in the accessibility modelling literature and are used extensively as a decision support tool in the transportation, geography and urban and regional planning related process. Some of the basic ones of these accessibility modelling related researches can be summarized as follows;

a) Travel time/distance measures, service/catchment areas (travel time or distance to nearest supply/demand calculated from Euclidian/Network-based costs) (see Ghio et al. 2007, Joseph et al. 2006, Fortney et al. 2000, Sylvie 2007, Brabyn 2002, O'Sullivan et al. 2000, Juliao 1999, Ebener et al. 2005, Liang & Zhang 2018, Saghapour et al. 2017),

b) Cumulative opportunity measures (consider the total amount of demand/supply inside the catchment areas) (see Chapelet and Lefebvre 2005, Boulos et al. 2001, Nadine et al. 2006, Black et al. 2004, Goulias 2007, Gallego et al. 2014, Langford Fry & Higgs 2012),

c) Population to provider ratio measures (supply to demand ratios, calculated inside the catchment areas) (see Luo 2004, Scott et al. 2006, Bagheri et al. 2006, Bauer et al. 2017, Higgs et al. 2017),

d) Kernel density measures (use the Gaussian kernel approach to calculate the density value of each demand/supply) (see Yang et

al. 2006, Gibin et al. 2007, Matthew et al. 2009, G. Cheng et al. 2016, J. Q. Cheng, et al. 2013, Delso et al. 2017, Nieves, 2015),

e) Gravity-based measures (a combined indicator of accessibility and availability by considering the attractiveness of supply/demand) (see Kwan 1998, Chen 2000, Guagliardo 2004, Delamater 2018, Vadrevu & Kanjilal 2016, Xu & Cui 2012),

f) Two-step floating catchment area measures (2FCA) (repeat the process of catchment area calculation for both supply and demand points and consider both of the overlay areas (see Mitchel et al. 2008, Luo and Wang 2003, Luo 2004, Yang et al. 2006, Scott et al. 2006, (Langford et al. 2012, Ye et al. 2018).

In the light of the accessibility modelling literature, it can be easily observed that; although there are a large number of researches and modelling approaches on accessibility modelling on **macro scales** (such as national, regional, city and town scales), the researches on how to model access and circulation in **micro scales** (such as street, human, neighbourhood scales, that can be perceived with all the details of the urban space) seem to be extremely limited.

This study, which emerged from this lack of literature, proposes a Geographic Information System (GIS) supported methodology (*GIS could be defined as a system that could store, query, analyse and visualize location based datasets*) to demonstrate how physical obstacles / barriers such as walls, steps, stairs, pits, unfitted street furniture, other (garbage, rubbles, trees etc. that prevent access) etc. and transitions (ramps with appropriate slope, elevators and/or removing walls / steps) could be defined in GIS environment and how access and circulation in urban space could be modelled in (outdoor) urban space especially for the physically disabled users (users using wheelchair, bicycle, baby's car, market car etc.) considering these physical obstacles and transitions in the micro scale.

When physical accessibility is modelled **in macro scale** studies, the transportation infrastructure is generally introduced to the GIS environment as “road centre-lines” and the accessibility is generally/frequently modelled by taking these “road centre-lines” into consideration. The types of physical obstacles introduced to model on these macro scales are generally “road closures” because of disaster, maintenance or accident etc.

On the other hand, modelling of the accessibility or circulation process **in micro scales** have to be significantly different from the macro scale approaches in terms of their complexity, as micro scales need to consider all the details of the perceived urban space. In order to able to model physical accessibility in micro scale, “integrated regular network structures” are created to represent the sidewalks, squares, large / narrow passing’s etc., instead of “road centrelines”. The types of physical obstacles

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introduced to the model are the walls, steps, stairs, pits, unfitted street furniture, other (garbage, rubbles, trees etc. that prevent access etc.), instead of "road closures". Moreover, transition types and locations such as "ramps with appropriate slope, elevators and/or "removed walls / steps" etc are also introduced into the model in GIS environment.

The proposed accessibility modelling methodology in micro scale is conducted at Selcuk University, Faculty of Architecture, Mimar Muzaffer Campus Area. A polyline-based approach has been developed in GIS environment to demonstrate how physical barriers and transitions could be modelled in micro scale.

The results of the study is thought to provide an effective accessibility based decision support environment especially in "micro scale" by visualizing and presenting how the physical obstacles on the spaces that we use in our everyday life prevent us from access and circulation in space and how the elimination or removal of these physical obstacles and providing transitions will create a difference in the access and circulation process in a comparable manner.

This study is thought to be a guiding research in the accessibility modelling area because of its scale and could make a significant contribution to increase the accessibility levels of all kinds of physically disabled users (users using wheelchair, bicycle, baby's car, market car etc.) in the outdoor urban areas by demonstrating their circulation possibilities and capabilities.

Using the larger data sets of the proposed model, especially on the web environment, is of great importance in terms of understanding the access and circulation capabilities of particular urban indoor and outdoor spaces considering particular users, obstacles and transitions.

METHODOLOGY

The process of modeling physical accessibility in micro scale was applied in Konya Selcuk University, Faculty of Architecture, Mimar Muzaffer Campus.

The study consists of 4 main parts, which are listed below and described in detail;

- Constitution of continuous network structure to be used in the modeling process of physical accessibility at micro scale,
- Establishing a spatial database of barriers and transitions that physically affect the continuity of the accessibility / circulation,
- Modeling of physical accessibility at micro scale in the context of different before and after case scenarios,
- Conclusion

Constitution of Continuous Network Structure to Be Used in The Modeling Process of Physical Accessibility at Micro Scale:

In this context, the approximate boundaries of the study area (Mimar Muzaffer campus area) is digitized and stored in a spatial GIS database using 30 cm resolution of Google satellite image of the nearby environment (Figure 1).

Figure 1. 30 cm resolution Google satellite image of the nearby environment

Although it is enough to model transportation networks at macro scales with only center-lines, in micro scales, a more complex modeling environment is required to define circulation in much more detail and in a continuous manner. By this reason, in order to able to model physical accessibility and / or circulation in micro scales, a regular continuous grid network structure is created within the working area boundaries by using the Fishnet function of GIS. With the help of the Fishnet function, the workspace could be covered with a network of rows and columns at the level of precision desired by the decision maker.

In this research, the study area is covered with a network of lines in 1 meter intervals. The level of sensitivity of the network structure can be regulated according to the sensitivity level required in the model and characteristics of the used computers (such as 0.5 meter, 1 meter, 2 meters, etc.).

Increasing the sensitivity level of the network structure increase the data size stored in the computer and increase the processing time in the modeling process. On the other hand, reducing the sensitivity level of the network structure could reduce reality in the model. However, it decreases the data size in the computer environment and reduces the processing time. Therefore, when deciding the level of sensitivity of the network structure, it is necessary to determine a reasonable level of network sensitivity considering the level of reality, area size, computer capacity and the aim of the study by the decision maker.

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In this research, a network structure with a 1-meter sensitivity level is created for the case study area, when the sensitivity level required in the model and characteristics of the computer used in this study is considered (Intel core i5 processor, 4 gb ram, 1 gb video card). However, as mentioned before, the sensitivity level can be increased or decreased according to the aim of the study and the characteristics of the computer systems used in the modeling process (Figure 2).

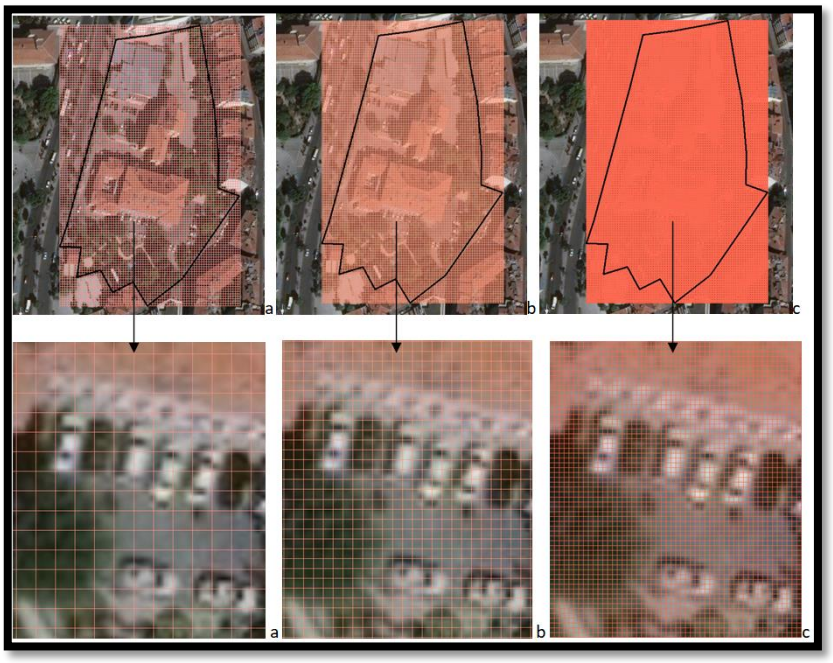

Figure 2. Examples of network structures at different sensitivity levels that can be used in micro level accessibility modeling processes (a: 2 meters, b: 1 meter, c: 0.5 meter sensitivity level)

It is important to know that; the linear network structures generated by the "fishnet function" in GIS environment is not directly usable in the physical accessibility modeling process as the line components forming the network structure need to be separated from their intersection locations.

For this reason, firstly, the intersection locations of the linear network structure subject to the network analysis is exploded with the help of the "feature to line" function of GIS environment (Figure 3).

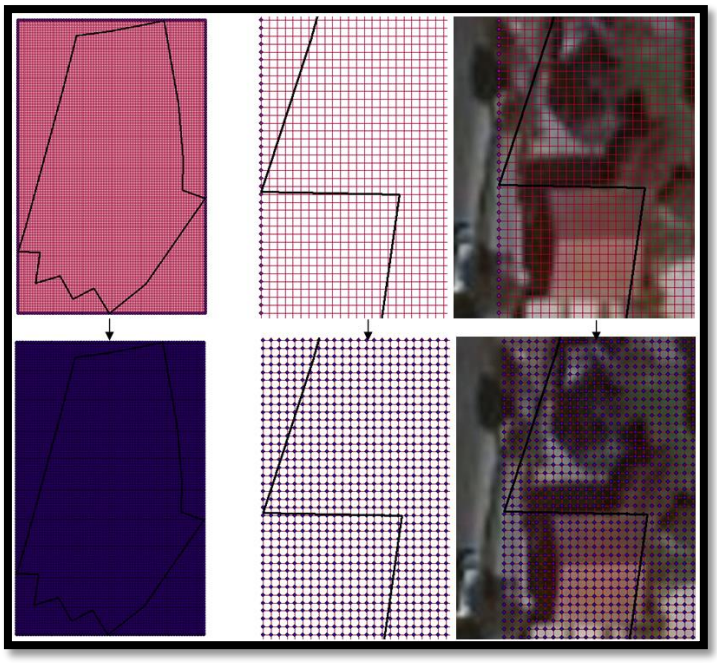

Figure 3. Exploding process of network structure with the help of the "feature to line" function of GIS environment (so that it can be separated from the intersection locations)

In the next step, the network structure is simplified by deleting parts which are out of the study area by using "select by location" function of GIS environment. Finally, the network structure is introduced to GIS network analysis environment by using the "create network" function of GIS environment (see Figure 4).

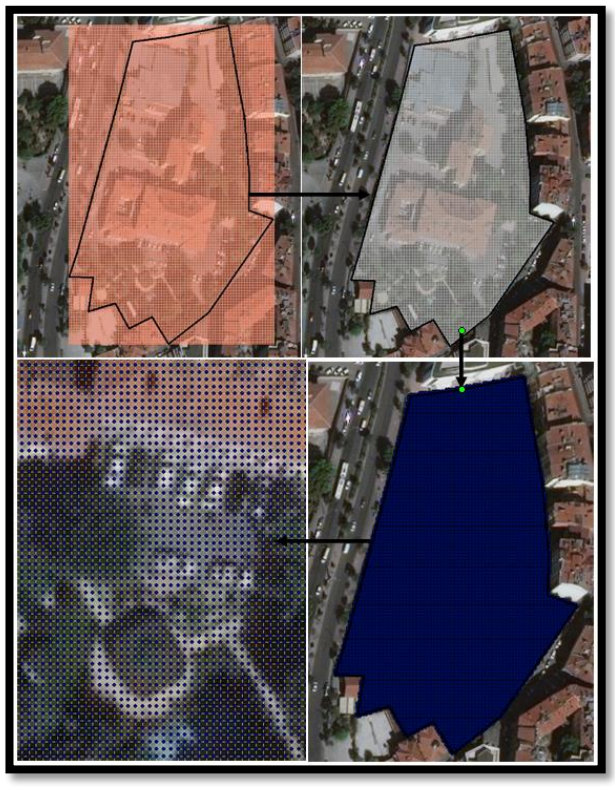

Figure 4. Elimination of network parts that are out of the study area and preparation for use in network analysis with "create network" function of GIS environment

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The presence of a continuous line in the network structure between intersections mean that; it is possible to access between locations without any physical obstacles.

Establishing a Spatial Database of Obstacles / Barriers and Transitions That Physically Effect The Continuity of The Accessibility / Circulation

In this part, the **obstacles / barriers** that physically divide / disrupt continuity of outdoor circulation such as buildings, landscape areas, walls, steps, stairs, pits, unfitted street furniture, other (garbage, rubbles, trees etc. that prevent access etc. and the **transitions** such as "ramps with appropriate slope, removing walls, steps and/or elevators" have been identified in Selcuk University, Mimar Muzaffer Campus study area especially considering physically disabled users (users using wheelchair, bicycle, baby's car, market car etc.) and a polyline based database has been developed in GIS environment to demonstrate how these physical barriers and transitions could be modeled in micro scale.

While a single object (a single point, line or area geometry that intersect a network segment in the form of a barrier) may be sufficient for the representation of barriers in macro scales (*for example, when the path is closed due to accident, maintenance or disaster etc.*), there is a necessity to use many objects together in GIS environment (*point, line and/or area geometries*) in an integrated and harmonious manner considering the sensitivity of network structure for the representation of the physical barriers and transitions in micro scales.

The details of the physical barriers and transitions created in GIS environment are given below;

The physical barriers/obstacles→ The physical obstacles can be created in GIS environment by cutting the network structure by the barrier objects (point, line or area) in the regions where access is not possible. The presence of a point, line or area object that intersect with the network structure means that there are physical barriers on the network at that location; such as buildings, landscape areas, walls, steps, stairs, pits, unfitted street furniture, garbage, rubbles, trees etc. that does not allow mutual access.

In other words, the barrier objects are created on network structures and when a barrier object (point, line or area) is created in such a geometric form that intersect with the network structure, it means that it is not possible to access for physically disabled users (users using wheelchair, bicycle, baby's car, market car etc.) on that part of the network structure.

Transitions→ Transitions could be created on the barrier objects, where access is possible by partial or total removal of the barrier objects (point, line or area) on network structures. Providing a gap on a barrier object (either polyline or polygon) mean that the access is possible between locations through that gap (especially for users who are trying to access with wheelchairs, bicycles, children's cars, market cars, etc.). These gaps could be used to represent transitions in GIS environment and could be used in locations where access is provided by such as “ramps with appropriate slope”, “removing walls or steps” or “elevators”, etc.

In summary, the absence of an obstacle object (point, line or polygon barriers) on network structure means that the access is provided, spatial continuity is ensured and there is no any limitation on space that prevent circulation. On the other hand, the presence of an obstacle object on network structure means that access is not provided, spatial continuity is not ensured and there is limitation on space that prevent circulation such as walls, steps, stairs, pits, unfitted street furniture, other (garbage, rubbles, trees etc. that prevent access etc.) (figure 5).

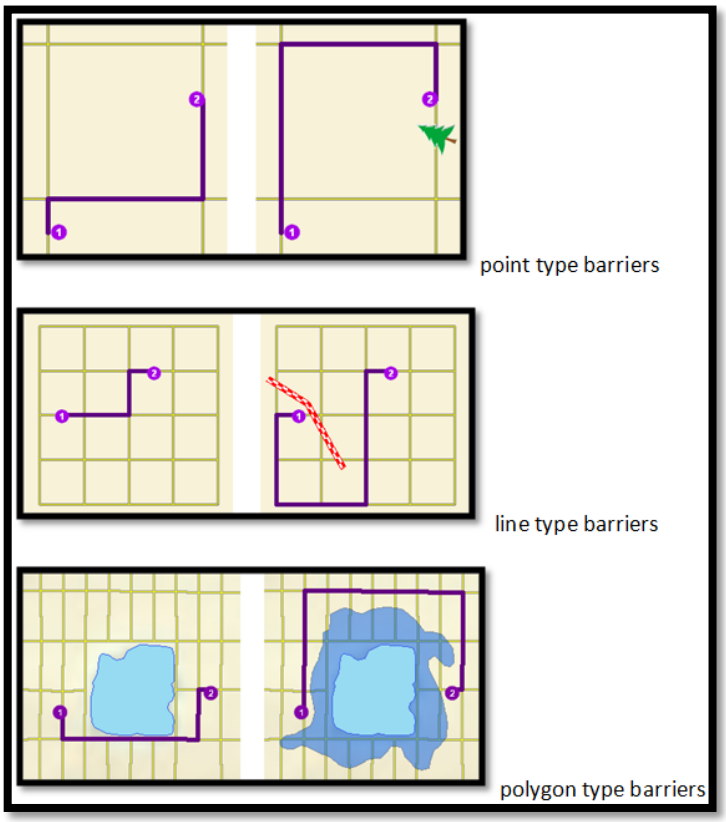

Figure 5. Representation of accessibility between locations considering point, line and polygon types of barriers (*http://desktop.arcgis.com)*

In this study, line type barriers are used to model physical obstacles and transitions in the study area, as lines could successfully enable representation of point and area type barriers

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because of their geometric characteristics (e.g.: a short line object could behave like a point type object or a polyline object which's starting coordinates are the same with the ending coordinates behave like a polygon type object). However, all of the three types of barriers (point, line and polygon) could also be used together to represent barriers in GIS environment.

Besides representation of different types of obstacles such as "walls, steps, stairs, pits, unfitted street furniture or other" and different types of transitions such as "ramps with appropriate slope", "removing walls, steps" or "elevators", barrier objects created in GIS environment could also represent different types of land use regions that have continuity of internal circulation such as pedestrian roads, landscape areas, vehicle roads or buildings etc. (see figure 6, figure 7).

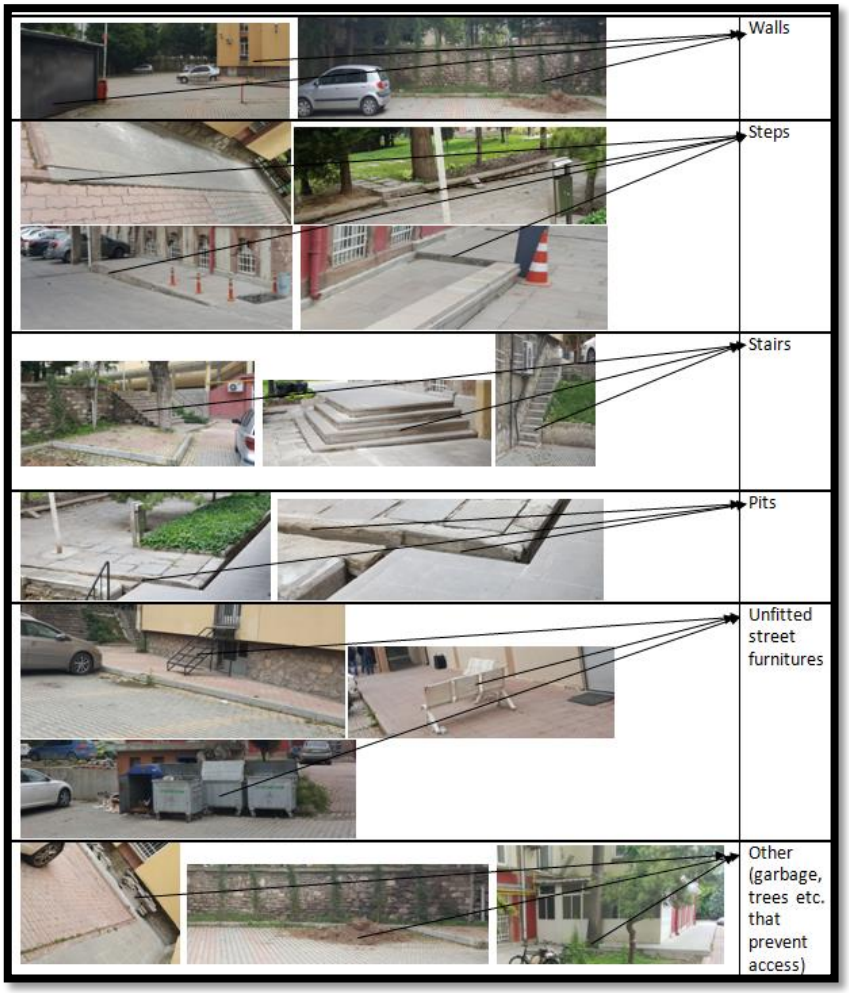

Figure 6. The type of physical obstacles that could be defined in a GIS database

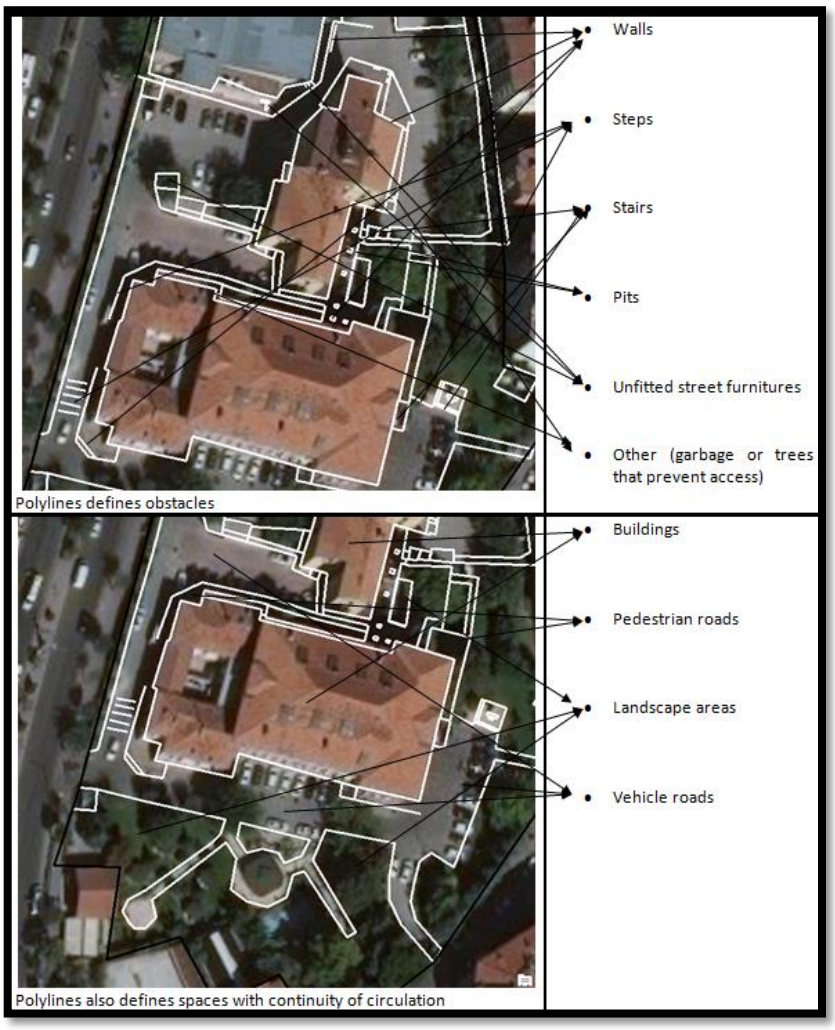

Figure 7. Examples of polyline objects that both represent "obstacles" and "different types of land use regions that have continuity of internal circulation"

For the study area, the physical obstacle objects created in polyline format are presented below (see figure 8, figure 9, figure 10, figure 11). As described above, in GIS environment, these polylines could also be used to identify different types of land use regions that have continuity of internal circulation.

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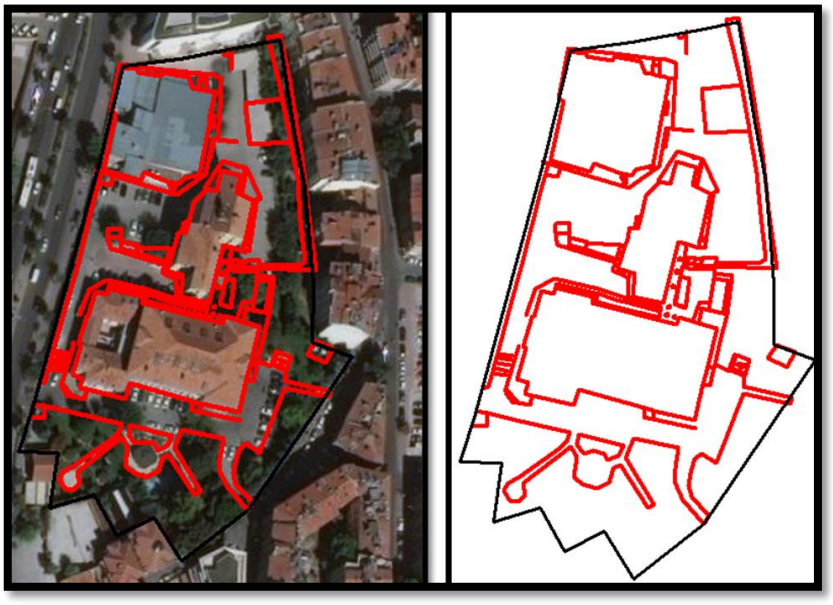

Figure 8. The created GIS based polyline objects which defines physical obstacles and different types of land use regions that have continuity of internal circulation in the study area

Figure 9. The examples of created polyline objects which define physical obstacles and different types of land use regions that have continuity of internal circulation (Some examples→a: stair, step, pedestrian road, b: stairs, step, landscape area, c: pits, step, landscape area, d: columns, step, landscape area, e: stairs, f: stairs in entrance, pedestrian road, step on pedestrian road,)

Figure 10. The examples of created GIS based polyline objects which define physical obstacles and different types of land use regions that have continuity of internal circulation in study area (Some examples→a: stairs, wall, landscape area, b: building used for garbage storage, unfitted street furniture on pedestrian road used for ventilation, c: landscape area, pedestrian roads, d: step that separate pedestrian road, e: walls, long steps on vehicle road, f: partial steps, walls, landscape area

Modeling of physical accessibility at micro scale in the context of different before and after case scenarios

In this section of the research, by using the previously created model components of "network structure" and "physical obstacle layer", the answers of the following questions are analyzed in a comparable manner through different scenarios in the GIS environment;

- how the physical obstacles in micro scale block the access / circulation in the study area?
- how the presence or absence of these obstacles will make a difference in the access / circulation?

The base map that defines the main entrance and exit locations of the buildings in the study area are given below in order to help understanding of the before and after case scenarios (figure 12).

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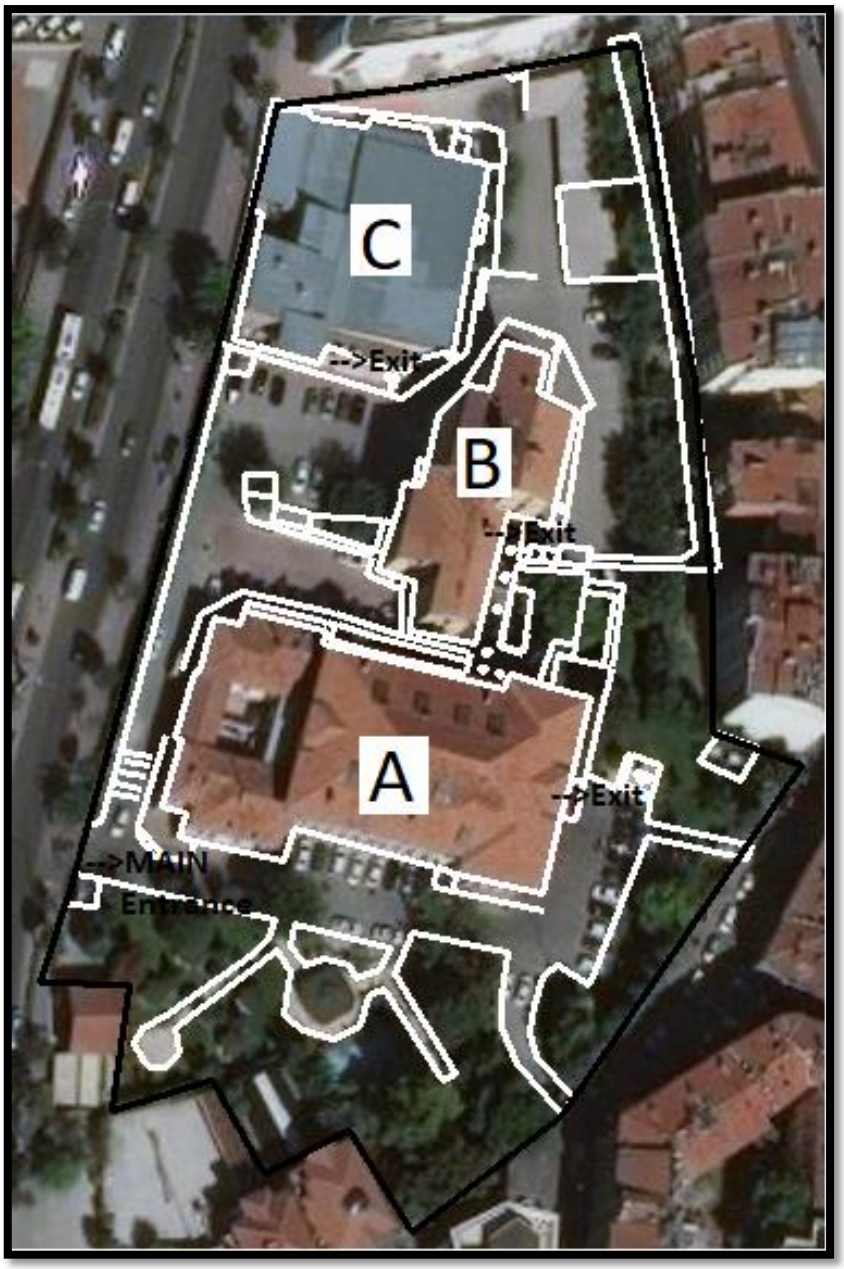

Figure 12. The base map that defines the main entrance / exit locations of the buildings in the study area

The first scenario (scenario 1) demonstrates the accessibility of locations starting from the exit of "building A" considering the effect of a stair obstacle. In other words, by the help of the scenario 1; decision makers could understand the effect of elimination of a step obstacle on circulation from the exit of "building A". Understanding from the figure 13, elimination of a stair obstacle by the help of the transitions triggers a huge accessibility / circulation zone for the physically disabled users (such as people with wheelchairs, bicycles, baby's car or market's car etc.) (see figure 13).

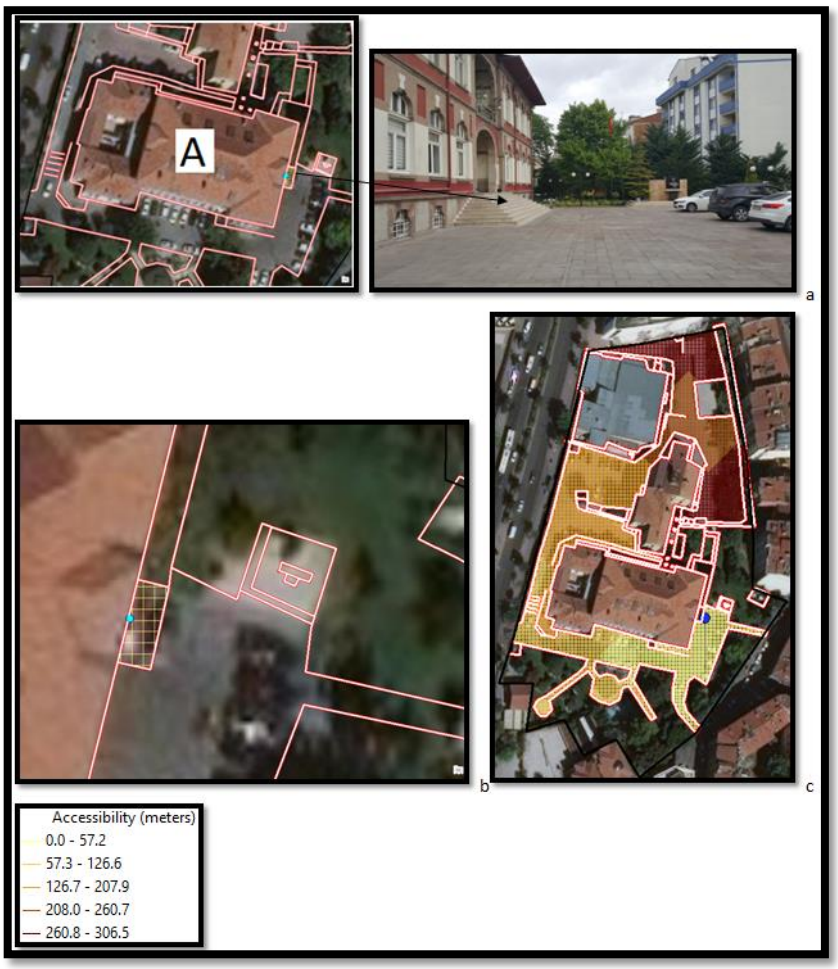

Figure 13. Scenario 1 → The accessibility / circulation starting from the "building A" exit; a) the obstacle (stairs) b) accessibility / circulation before eliminating the stairs obstacle c) accessibility / circulation after eliminating the stairs obstacle (Blue point → is the starting location, Grid zone → is the accessible region starting from the "building A" exit)

The second and third scenario (scenario 2 and scenario 3) demonstrate the accessibility of locations starting from the exit of "building B" considering the effect of step and stairs obstacle. In other words, by the help of the scenario 2 and 3; decision makers could understand the effect of elimination of a step and stair obstacle on circulation starting from the exit of "building B". Understanding from the figure 14 and figure 15, elimination of step and stair obstacle triggers a huge accessible zone for the physically disabled users (such as people with wheelchairs, bicycles, baby's car or market's car etc.) (see figure 14 and figure 15).

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Figure 14. Scenario 2 → The accessibility / circulation starting from the "building B" exit; a) the obstacle (step) b) accessibility / circulation before eliminating the step obstacle c) accessibility / circulation after eliminating the step obstacle (Blue point → is the starting location, Grid zone → is the accessible region starting from the "building B" exit)

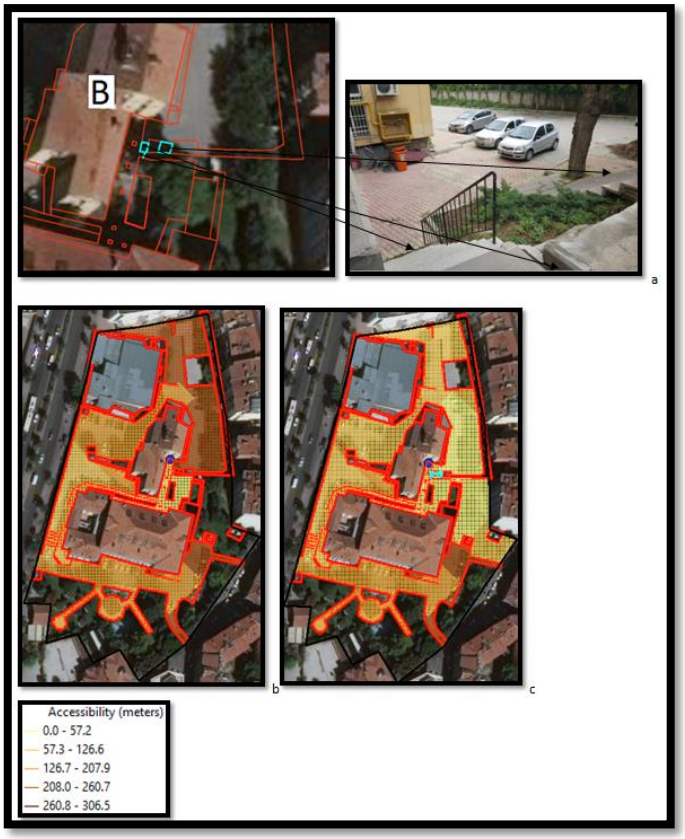

Figure 15. Scenario 3 → The accessibility / circulation starting from the "building B" exit; a) the obstacle (stairs and pits) b) accessibility / circulation before eliminating the steps and pits obstacle c) accessibility / circulation after eliminating the steps and pits obstacle (Blue point→ is the starting location, Grid zone→ is the accessible region starting from the "building B" exit)

The fourth scenario (scenario 4) demonstrates the accessibility of locations starting from the exit of "building C" considering the effect of step and unfitted street furniture obstacles. In other words, by the help of the scenario 4; decision makers could understand the effect of elimination of a step and unfitted street furniture obstacle on circulation starting from the exit of "building C". Understanding from the figure 16, elimination of the step and unfitted street furniture obstacles triggers a huge accessible zone for the physically disabled users (such as people with wheelchairs, bicycles, baby's car or market's car etc.) (see figure 16).

Figure 16. Scenario 4 → The accessibility / circulation starting from the "building C" exit; a) the obstacle (step and unfitted street furniture) b) accessibility / circulation before eliminating the steps and unfitted street furniture obstacle c) accessibility / circulation after eliminating the steps and unfitted street furniture obstacle (Blue point→ is the starting location, Grid zone→ is the accessible region starting from the "building C" exit)

Starting from the exit of buildings, the grid zone represents the accessible zones where colors mean distance to starting point / location (exit of building A, B, C). Light colors mean that the location is close to starting location and darker colors mean that the location is far to the starting location. The locations that have no color mean that there is no access to this location by the users.

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CONCLUSION

This study demonstrates a GIS-supported methodology on how physical obstacles / barriers such as buildings, landscape areas, walls, steps, stairs, pits, unfitted street furniture, other (garbage, rubbles, trees etc. that prevent access) etc. can be defined in the GIS environment and how access and circulation could be modeled for the physically disabled users (users using wheelchair, bicycle, baby's car, market car etc.) against these physical obstacles in the micro scale.

The proposed methodology is conducted at Selcuk University, Faculty of Architecture, Mimar Muzaffer Campus Area. A polyline-based database has been developed to demonstrate how physical barriers should be modeled in micro scale in a GIS environment. The results of the case study provide an accessibility based decision support environment especially in micro scale by visualizing and presenting how physical obstacles on urban space that we frequently use in our daily life prevent us from access and circulation and how the elimination or removal of these physical obstacles will create a difference in access and circulation in a comparable manner.

As the researches of accessibility modeling in micro scales (such as street, human, neighborhood scales) considering the space in detail is extremely limited, this work is thought to be one of the pioneering works in its area.

This research is thought to make an important contribution to increase the accessibility levels of physically disabled users (users that use wheelchair, bicycle, baby's car, market car etc.) in the outdoor urban areas and could effectively help decision makers to demonstrate their circulation possibilities and capabilities.

As a future work, adaptation of the proposed model, to the web environment, could create a vital effect in terms of understanding the access and circulation capabilities of particular urban spaces considering different types of users, physical obstacles and transitions by the large segments of the society, decision makers, researchers and especially by the physically disabled users.

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Disability and Otherization: Readings on Cinema in The Light of UD Principles

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Abstract

Cinema and architecture are universal with their inclusiveness in the mental process. The mental process is often generated by the sense of sight in modern times. In this sense, cinema, as a visual art, has started to take an active role in the intellectual, conceptual and creative actions of modern man. With the cinema, the realities of the virtual world have become more convincing than the dreams of the real world. It involves person-environment relationships which might not be ours but "look like ours". Universal Design (UD) also puts forward a proactive interaction in-between man and environment. UD is based on equitable, flexible, intuitive, perceptible, tolerant-to-error access with appropriate size and space. While its conceptual basis with its guidelines are commonly constructed on the spatial needs of people with disabilities, it highlights disability does not focus on only permanent, visible, bodily or intellectual (dis)abilities. Every kind of "otherization" creates disability in society. This study aims to investigate how the relationship between architecture and disability in cinema is portrayed by reading through films that are masterpieces covering experiences of different disability groups. Using Visual Analysis method in the study, the codes and categories generated based on the UD Principles are associated with selected visual images and dialogues according to the frames of meaning of the scenes in the films. In this way, this study aims to question the

Keywords: *Cinema, disability, otherization, physical environment, universal design*

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location of UD parameters in physical and social environment through cinema.

INTRODUCTION

Architecture is evaluated with many art disciplines on the level that contributes to the conceptual development of each discipline by the nature of interdisciplinary studies. Cinema has a closer dialogue with the discipline of architecture since they commonly deal with not only the way of interpretation and representation of facts in space and time contexts but also the way of describing and comprehending lived spaces (Pallasmaa, 2008). They define the multilayered dimensions of (un)real spatial environments while referring or creating experimental stages in life (Pallasmaa, 2008). By this way, they also interpret the objects of the social phenomena. Even, Herein, the context of 'reality' has a significant role on the basis of the benefits of the reciprocal development of these two disciplines. In films, virtual architectural spaces which are not used in reality can be presented, or real architectural spaces can be reproduced in their virtual universe (Tanyeli, 2001). They can create environments in which one can individually experience establishing a new, unknown, and impressive relationship with life matters and occasions. In this sense, the films have a quite effective representative means in the intellectual, conceptual and creative actions of modern man. Therefore, they have potential to promote architecture in terms of advancing new ways of seeing and (re)producing spatial environment (Alkan Bala, 2015). In these basic mechanisms, there are often references to disability, people with disabilities, 'disabled' spaces and social environment. Polat (2011) pointed out by referring Karpf's study (1997) that the image of disability on the television and cinema screen is basically medical in an indisputable and unchangeable appearance. In addition, there has been many studies about disability and cinema such as Reichman and Healey (1983), Keller, Hallahan, McShane, Crowley, and Blandford (1990), Kennedy (2009), Safran (1998), Taggart, McMillan, and Lawson (1999), Dwoskin (1997), Pointon (1997), Morris (1997), Salvesen and Undheim (1994), Hargis, Gickling, and Mahmoud (1974).

Disability is closely related to the spatial experiences of people. These experiences are issued in the films, sometimes as a representation of reality in a critical manner, or as a dream environment in virtual spaces. In each occasion, relationship between the context of disability and experienced space gives crucial messages to architecture, which can contribute to the development of spatial environment in a multilayered manner.

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This is one of the reasons of reading the films within the context of (dis)abling spaces. While comprehending the films, it is believed in this study that Universal Design (UD) philosophy can respond all boundaries of experiences in the (un)real spaces which even work as leading actors.

UD sees people with disabilities as a part of pluralistic social life. This pluralist view addresses spatial arrangements that respect diversity among individuals. Based on a human-centered context, Universal Design (UD) refers an inclusive environment which is open to its all members. The spatial environment produced on the basis of this approach can guarantee creation of a population who are productive and actively involved in a community (Oliver, 1996). At this point, UD philosophy does not only address the design of physical environment, but also it works as a catalyst for social participation of persons in public life (Barnes and Mercer, 2010).

This study, on the basis of UD philosophy and its seven principles, primarily aims to evaluate the films representing different disability groups within the contexts of *inclusiveness* and *otherization* from physical and social aspects. Visual Analysis method (Collier & Collier 1986) is used as an exploration tool which helps to close link between the films and UD context based on the scenes, images of specific time, and dialogues referring *physical/spatial* and *social/behavioral* circumstances. Six films which are masterpieces in their times are selected with the dimensions that would light on UD Principles: "Tamam Mıyız? (Are We OK)" (2013- Çağan Irmak), My Left Foot (1989- Jim Sheridan), Forrest Gump (1994- Robert Zemeckis), Scent of Women (1992- Martin Brest) and are selected to explore life stories of individuals with physical disabilities; Avatar (2009- James Cameron) and American Beauty (1994- Martin Brest) are selected to understand experiences of marginalized persons and society.

UNIVERSAL DESIGN AND CINEMA

UD is the design of all products and environments that can be used by people of all ages and (dis)abilities at the highest possible level (Story, 2011: 4.3). For UD, it is essential that every element of the physical environment and the communication and information technologies be used by all members of a society as much as possible for their equal participation in public life (Iwarsson and Stahl, 2003: 62; Imrie, 2012: 874). From this point, UD focuses on the inclusivity of the physical environment for a democratic social life (Iwarsson and Stahl, 2003: 62). It is natural that every

individual of society has different needs, pleasures and preferences. As long as the design responds to these diverse needs, a democratic and rights-based public environment can be supported and this is the target of UD. This social and democratic view of UD attaches importance to designing spaces that respond to their needs and the same equal presence as everyone else, while highlighting inclusion of individuals (Saltoğlu and Öksüz, 2016; Meşhur, 2013). Additionally, the target of UD covers participation in decision-making process, and all vital activities as well as social life.

Inclusion of people with disabilities in society in an equal manner is possible through the *internalization* of the situation. When the needs of people with disabilities in spaces come into concern, we, as architects, are usually engaged in accessibility due to its *compliance*. UD, however, advocates the design *beyond compliance*. "Social Model" of disability has been formed by the right-seeking process emerged with this emphasis. It is clear that 'social view' of disability determines the position of any situation related to disability in society. The development of this intellectual framework has been influential for the realization of an equitable spatial arrangements. There have been important breaking points advancing the development of this point of view. Disability Rights Movement in the 1960s and Independent Living Movement and Quality of Life approach in the 80s and 90s are among the most significant ones. These are reactive formations towards spatial and political problems which seize the right-to-life of people with disabilities and their families. The main purpose of these efforts is to provide equal opportunity for all members of a society involving those with disabilities in all areas of public life (i.e. daily life, work, education, participation in cultural activities, safe access, and social participation). Thanks to those efforts, the voice of questioning and controlling all situations of public life for equalization of opportunities has been started to rise further. From this point of view, it might be said that Social Model has been evolved since the 1960s (Barnes & Mercer, 2010). As a result of this strong civilian response, the political attitude which has to respond to this intellectual framework needs to be changed to protect their rights with laws. For example, following the Disability Rights Movement in the United States, the section which legally supports the participation of people with disabilities in social life added to the Rehabilitation Act of 1973. This forms the basis of the American Disability Act (ADA, 1990). The social and political developments resulting from these reactionary movements has also taken place in the field of architecture. The architectural approach responding to the

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disability in the view of Social Model has been developed over time with different names in the historical process:

- Design for All,
- Lifelong Design,
- Accessible Design,
- Inclusive Design,
- Universal Design.

Table 1. The Universal Design Principles (*Ostroff, 2011; Story, 2011*)

UD Principles	***Descriptions***
1. Equitable use	The design is useful and marketable to people with diverse abilities.
2. Flexibility in use	The design accommodates a wide range of individual preferences and abilities.
3. Simple and intuitive use	Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills or current concentration level.
4. Perceptible information	The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.
5. Tolerance for error	The design minimizes hazards and the adverse consequences of accidental or unintended actions.
6. Low physical effort	The design can be used efficiently and comfortably and with a minimum of fatigue.
7. Size and space for approach and use	Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility.

The philosophy and principles of Universal Design (UD) (Table 1) have been discussed, evaluated and developed in different disciplines since its publication in 1997. It has been continued to present a conceptual framework for scientific studies in different fields such as education, healthcare, social transformations, especially in the fields of architecture, design and planning. The study of UD in different research fields affects its conceptual development. In the literature, intensive use of UD among other regarding concepts depends on its clear framework from theoretical and practical aspects. This precise and clear framework sometimes leads to a deterministic approach, which prevents it from advancing conceptually (Imrie, 2012). Its theoretical development could be advanced with the evidence-based approaches based on man and environment interaction in referring time, population, technological developments, ideological approaches, political environment, working environment, life culture and thereby, the change of lifestyles (Imrie, 2012: 873- 874; Çakmak, 2006). The question of 'what we

do not know' for the development / updating / reproduction of knowledge constitutes the basis of the scientific production approach (Imrie and Hall, 2001). It is believed in this study that reading UD in cinema will contribute to be emerged more ideas questioning many themes above.

Table 2. The Selected films as the object of the Otherization, Disability and Universal Design

Film	**Year/ Director**	**Location**	**Characters, Stories, Concepts, Subjects, Time, Place, Icons**	
Tamam Mıyız? (Are We OK?)	2013, Çağan Irmak	Turkey	Physical disability	**Universal Design Principles** 1. Equitable use 2. Flexibility in use 3. Simple and intuitive use 4. Perceptible information 5. Tolerance for error 6. Low physical effort 7. Size and space for approach and use
Avatar	2009, James Cameron	USA, UK	Physical disability	
American Beauty	1999, Sam Mendes	USA	Otherness	
Forrest Gump	1994, Robert Zemeckis	USA	Mental disability	
Scent of a Woman	1992, Martin Brest	USA	Visual disability	
My Left Foot: The Story of C. Brown	1989, Jim Sheridan	England, Ireland	Physical disability	
CINEMA		⟷		**UD**

Cinema and architecture are universal with their inclusiveness in the mental process. Architecture and the city involves, in essence, not only the built environment but also senses, perceptions, and cognition of human being. In this study, the movies of life-stories that are not ours but “look like ours” are evaluated by UD concept which puts forward a proactive interaction man and its physical environment. Responding to the needs, requirements, preferences, and pleasures of people by a tool can be limited by its level of representation. However, movies are the first encounter moments of facts for many of us and film scenarios and characters have the potential to significantly influence the audience's ideas and perceptions. Image and reality, experiences, lifestyles, emotions, actions make the audiences substituted for the actors, which presents an enriching plane for multidimensional handling of the relationship between individual, life and space. Cinema has an important mission at this point.

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METHODOLOGY

In this study, the analysis of films in the light of the concept of UD and its seven principles is made using Visual Analysis method (Collier & Collier 1986). In the analysis of the visual recordings, the dialogue between the researcher and the images should often include two questions of visual analysis; (1) "What do I see?" and (2) "How do I know this?" or "What is the effect of the visual record I see and define?" (Collier & Collier 1986: 171-172). In this way, the Visual Analysis method allows the researcher to reveal unrealized reality. This reality is examined through visual and symbolic materials and dialogue-based meanings with regards to the perceptions of the researcher. In this respect, Visual Analysis method allows the researcher creating a more internalized meaning, a semantic and conceptual language, an expression of relational and critical projections, development of the empathy, and questioning aesthetic sensitivities.

Each of six films selected in this study has potentials to be an object of UD concept in terms of its theme and story (Table 2). The reading of the films in the 80s, 90s and 2000s representing different disability groups is believed to make sheds light on how disability is portrayed in cinema and to question the location of UD criteria in literature and social life. This process was carried out by a collective consciousness with a group of 10 students at the graduate and undergraduate level participating "Readings on Universal Design in the Cinema" studio carried out by the authors in the context of "Thinking with Universal Design" workshop which was held in cooperation with Selçuk University Faculty of Architecture and YEBAM on 3-4 May 2018.

According to the Visual Analysis method, while the films are analyzed in the context of the UD concept, the data sets are primarily coded. The codes and categories created on the basis of UD Principles are associated with selected visual images and texts according to the “frames of meaning” of the scenes of the movies. In this sense, we watched movies repeatedly and keeping notes on the critical scenes, cut the scenes and images by which the data was determined in accordance with the conceptual and theoretical framework of UD and its seven principles. Auditory, visual, and thematic moments associated with UD measures in the selected scenes of the films are analyzed according to four stages below:

1. *Observation and Listening of the Data*: All the data are monitored, listened, deciphered, and evaluated semantically and spatially according to UD criteria;

2. *Examination of the Data*: General examination of the contents for the castings and arrangement of the categories for the physical environment based on UD criteria;

3. *Dictation of direction through specific questions*: Having determined and deciphered the visuals and dialogues in the films, the data are subjected to open, axial and then selective coding, respectively, in order to reach the study findings;

4. *Reliability of the Findings*: Scenes, words, the sequence of events, music, venue, light, the movement matched to UD Principles and establishing a concept map revealed the results of the study.

ANALYSIS OF THE FILMS IN THE LIGHT OF UD PRINCIPLES

As pointed by Barnes and Mercer (2010), UD works as a catalyst for social participation of persons in public life in appreciating the design of the physical environment welcoming for all. This two-dimensional interaction can be comprehensively explained as follows (Dinç Uyaroğlu, 2017):

1. Physical- Spatial Aspect: Physical requirements of individuals with disabilities should be enhanced for the fulfillment of their involvement in society in an equal manner. This causes a bilateral development: (1) It contributes to the creation of a productive and peaceful society by supporting individuals' independent and equal participation in society; (2) Spatial environment includes all individual differences and every individual of society is equally benefited from all opportunities of public life.

2. Social- Behavioral Aspect: Behavioral situation changes depending on the social and/ or institutional point of view. It has a strong influence on guiding the situations of inclusiveness and otherization. It plays a dominant role in the design of spaces and continues to play an active role in the use and transformation of spaces. The fact that presence of all members of community are equally visible in social life is a proof that social life sustains in a democratic way.

Within this perspective, the films are handled not only in their originality in cinematographic context but also in the light of the interaction between physical (spatial) and social (behavioral) circumstances (Table 3), referring UD Principles.

Tamam Mıyız? (Are We OK?)

"Tamam Mıyız?", directed by Çağan Irmak in 2013, is a film about the emotional story of the unusual friendship of İhsan who is a

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paralyzed man and uses a wheelchair and the sculptor Temmuz who always sees himself as the 'other'. Paralyzed Ihsan, who has no legs and arms, is being a guide to July who is trying to stand on his feet and cannot move within the uncertainty of his artistic mind. These two half men will be 'complete' together. Experiences of the characters in terms of their physical and mental impoverishment, are matched with UD criteria throughout the film. Firs instance, after Ihsan and Temmuz become friends, they would like to make a "give me five" movement joyfully by sharing their natural reflexes, but there are no arms of İhsan (Figure 1). This scene finds its meaning towards the end of the film with the movement of knocking their heads together (Figure 2). From UD approach, this shows experiencing diverse (dis)abilities cannot be an obstacle if the relationship (with someone or something) is flexible in endeavoring appropriate positions and possibilities.

Figure 1. The time when İhsan and Temmuz want to make a "give me five" movement.
Figure 2. The movement of knocking their heads together.

The mother of Temmuz who experiences otherization with sensitivities of an artist stated that "Do not be so fragile and emotional! You are crying when ants are crushed, the world is being yours when flower blossoms come out. They are ants, doomed to be crushed." Her statements based on the separation of him from general population display the representation of *otherization*. In the other dialogue, İhsan make a reaction when Temmuz stated he wanted to die, and at the moment, a fly put on the edge of İhsan's mouth, but he was not able to chase it. He said "Why did the God create me like this?". Temmuz with his high empathy ability replies that "We are all the same with our joys, troubles, friendships, capabilities, and inabilities". This dialogue addresses the nature of UD concept in referring its emphasis on "we are all equal with our differences in a society". The statement in the film, "the purest color is white and it consists of a mixture of all other colors", also highlights the pluralistic approach of UD. Moreover, the film covers these social discourses by referring the physical environment. Ihsan with his wheelchair is trying to get on the bus in the city, but he experienced himself as the *other* because of inadequate physical arrangements. This shows the vital necessity of UD's Equitable Use principle on the holistic design of pavement, road, and bus stop. During the film, Ihsan also has many difficulties in reaching, touching and using in spaces where there is no measurement, posture and action analysis (Figure 3). Herein, the emphasis of the UD concept is on

everyone's right to equitable use in urban spaces and public vehicles should be addressed.

Figure 3. The parts of the scenes indicating inaccessible pavement, road, and bus stop.

My Left Foot

"My Left Foot", directed by Jim Sheridan in 1989, describes the real-life story of Christy Brown, who was born as a paralyzed. Christy Brown, a respected figure in Irish literature, is dependent on a wheelchair and his mother (Figure 4). When Christy realizes that his left foot is not affected by the body stroke, he sees it as an opportunity. He started to focus on writing and painting by using his left foot (Figure 5). This effort generated the emergence of his intelligence and ability hidden within his disabled body. Experiences of Christy matches to UD criteria throughout the film. Christy is ten years old and his mother who is quite overweight is trying to move his son to upstairs with difficulty. Expressions of both mother and son, music, light describe the feeling of suffering, strain, and the suffocated effect of being forced to depend someone. At this movement, her mother feels dizzy and she leaves her son at the top of the staircases for his safety in an instinctive reflex while she falls. Christy follows, with plaintive eyes, the body of her mother who rolls down and stretches without moving in downstairs. He will plan: he pushes his paralyzed body and moves himself by stepping on stairs (Figure 6). In this scene, it deeply highlights the importance of independent access for safety of all users in the physical environment.

Figure 4. Christy's mother always assists to him.

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Although Christy is a paralyzed and slow-paced person but he is a child and he wants to play games. He has fun with the other children on the street through riding his in a trolley (Figure 7). This scene is an indicator that participating in social life involves different tools. Although the experience in this scene is disputable from different manners, such user experiences gives design ideas on flexible usage of the equipment in the games of children with disabilities.

Figure 5. Christy writes and paints by using his left foot.

Figure 6. Moving himself by stepping on stairs.
Figure 7. He has fun with the children on the street by a trolley.

Forrest Gump

Forrest Gump, a 1994 American film directed by Robert Zemeckis, is a story of the otherization and frustration of a man who uses orthopedic shoes and metal leg braces in his childhood years and mental disabilities throughout his life. To illustrate, Forrest does not want to be taken to the public school because of his mental abilities. His mother usually tries to cope with the prejudiced behaviors of the community, as understood from below dialogue:

> Mrs. Gump: *You are the same as everybody else, you are not different*
> The principal of the elementary public school: *Your boy is different, Mrs. Gump. Now, his I.Q. is seventy-five... The state requires a minimum I.Q. of eighty to attend public school, Mrs. Gump. He's gonna have to go to a special school.*
> Mrs. Gump: *"What does normal mean, anyway? He might be a bit on the slow side, but my boy Forrest is going to get the same opportunities as everyone else.*

His words address what the real problem is. It is primarily based on social behaviors without any consciousness of equal right to access for all in any field of public life as UD appreciates in general.

The film also emerges critical relationships among people with disabilities and the physical environment. For instance, Forrest's brace is caught in a gutter grate when he and his mother walk

across the road. At the same time, two old men sit and stare at them in front of a shop. When she notices them, she says: “What are you all staring at? Haven't you ever seen a little boy with braces on his legs before?”. She then talked to her son by changing the paradigm: “Don't ever let anybody tell you they're better than you, Forrest. If God intended everybody to be the same, he'd have given us all braces on our legs.” In addition to the social exclusion of Forest with his metal leg braces, urban facilities and urban infrastructure also creates problems of equitable use, flexibility in use, inadequacy in size and space context for use (Figure 8).

Figure 8. Images emphasizing the questions of “Who is normal?” and “The city is for whom?”.

Scent of a Woman

One of the most interesting films narrating disabled characters is Scent of a Woman directed by Martin Brest in 1992. It is the story of Col. Frank Slade, who cannot see with his eyes but with his intelligence and senses. There are two main characters in the film: Charlie, a college student, cannot adapt to his rich friends because he is a scholarship student. He is excluded by his friends because of his poverty. Since he needs money, he has to work as a 'babysitting' for a blind man. Col. Frank Slate, retired from American army, is a soldier who is decent, compassionate, sometimes grumpy, even rude, but fighting for justice fearlessly, having strict rules, and skills in many fields. He does not give up his weapons despite being blind, in fact he is a fearless and self-confident character who does not abandon anything about life. Hence, he is motivated to travel to the other side of the world on behalf of his personal expectations. In short, he is disabled but he is competent in accordance with an ‘average’ person. The film's most striking scene in the context of UD criteria covers the following dialogue (Figure 9):

> *Frank Slate: Would you like to learn to tango, Donna?*
> *Donna: Right now?*
> *Frank Slate: I am offering you my services... Charlie, I am gonna need some coordinates here, son.*
> *Charlie: The floor is about 20 by 30 and you are at the long end. There is tables on the outside. The band is on the right.*

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Figure 9. Frank's tango scene

Frank's tango scene emerges inspiring ideas for architects and designers to think and live with UD, especially in terms of equitable, simple, intuitive, and perceivable use (Figure 9). Finnish architect and architectural theorist Juhani Pallasmaa (2005), referring to the "raising the quality of life" feature of architecture in his work "Eyes of the Skin: Architecture and the Senses", emphasizes that the primary task of architecture is mental accommodation and integration. This approach might well explain the nature of the film's messages. The ultimate meaning of any building has many multifaceted dimensions. When the built environment is inclusively designed, our consciousness will also be transformed into the one in the desired world. For example, when architects/planners design a high-speed road, they design competition, noise, speed, and horn sound within the defined area. They also offer different life experiences for all when designing pedestrian network with diverse textured stones on the ground, trees on both sides of the road, bird sounds, safety, and urban equipment for recreation and socialization.

In the relationship between man and environment, users of spaces spontaneously establish ownership, spatial values, and collective memory belonging to the life. In this respect, architects are responsible for designing spaces in appreciating various senses of individuals to enhance a real community life. Therefore, architecture needs a holistic approach including a comprehensive evaluation of the perception of spaces with sight, hearing, and touching (Dinç Uyaroğlu, 2010). It should be mentioned here that all senses, even including vision, are extensions of the sense of touching, referring to Pallasmaa (2005).

The other two films selected in this study are American Beauty and Avatar, which depict relationship patterns that covers difficulties about otherization and social participation in society, although they do not involve the representation of persons with mental or physical disabilities. Since the nature of UD concept

addresses the embodiment of both social and physical spatial experiences of all people in a holistic approach, it also serves a reliable framework in evaluating those.

American Beauty

American Beauty is a 1999 American drama film directed by Sam Mendes. It is a film about a closer look at fallacy, falsity, and confusion of the middle-class American suburban life. The success of the film depends on its perfection on dealing with the issues of ordinary everyday experiences of unusual conflicts in family and business life. The issues of competition, pedophilia, repressed homosexuality and associated homophobia are covered in these relations.

Figure 10-11. The shift of the power as a reflection of otherization.

Individuals who are alienated to their own soul are exposed to otherization in society throughout the film. A red rose throughout the film is an object that actually masks the oppression and destruction experienced in social life. It is displayed as a dream with an obvious sign of inaccessibility, power, legitimacy, falsity, and fragile aspects of the consumer society. For instance, the red roses are seen on the dinner table when Lester is silenced under the dominance of his wife (Figure 10). In the other scene, the roses on the table are removed when Lester lives in a kind of enlightenment and thereby opposing the rules imposed to him and focusing on his personal desires and preferences as equal as the others in the family (Figure 11). The shift of the power displayed by two scenes are subjected to the dignity and equitable way of behavioral approach towards members of a family as well

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as a public environment. This is vital for the success of the democratic public life as supported by UD concept.

Figure 12. The only space he freely uses for his bodily exercises is the garage.

The film displays American suburban life morphology with two-storey and human-sized houses very close to each other and regular paths in an over-thought-out, over-sterile and highly fictional way. The neighbors follow each other by confrontations in the outdoor spaces, front gardens, and in front of the semi-public garages and even controls each other from a distance by fretless and louvred windows of their houses. 'Abnormal' persons in these spatial settings are humiliated and labelled as the 'other'. Lester is unable to find a place in the home as a result of the oppression of her wife who holds more money and thereby has a unique power in their life. At the beginning of the film, the only space where Lister can feel free as a member of the house is the bathroom. Then, he tries to search for a place of his own with the revolt against this order. Her wife is so dominant and repressive that he can find a space for his bodily exercises, to feel freedom and strengthen his combative spirit, in the outside of the house, a garage (Figure 12).

Figure 13-14. Otherization is symbolized by framing the character and capturing it behind the fence.

Another living space where American beauty is described outside the home is Lester's office. A space in which Lester is left alone and excluded in a space by the hegemony of business life due to inappropriate size and space for approach and use, referring UD (Figure 13). This type of otherization has also been emphasized in many parts of the film by framing the character and capturing it behind the fence (Figure 14).

Figure 15. Lester's workspace in the message of "look closer".

The space of work and business relations produced by the modern society is an open-office system. It does not care about the personal assets and privacy of the individual, rather, it only prioritizes the work and control of the individual. Social prestige and spatial power of middle-class men have been significantly decreased with this mechanism. In the film, the director emphasizes the message of "look closer" especially to the audience by addressing cramped spaces and life in referring to appropriate size and approach in the Lester's work environment (Figure 15).

Avatar

"Avatar," directed by James Cameron in 2009, is a film about contradictions in between two different worlds, Earth and Pandora. Jake Sully, a paraplegic marine, is dispatched to the Pandora as avatar for a unique mission. While the film depicts the matriarchal, blue, green and colorful nature of the Na'vi people in the Pandora planet in which abstract values such as empathy, love, protection, and communion are considered as wealth, it critically highlights patriarchal, materialistic, selfish, destructive, militarist, and pressure systems and human in the World.

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Figure 16. In Pandora, every part of the environment is connected in a unified consciousness.

In Pandora, the Na'vi have designed spaces and equipment that are inclusively used by all without segregation with regards to their status, sex, and age. They live in a total harmony with their environment and they acknowledge that every part of the environment is connected in a unified consciousness (Figure 16). From this manner, it gives reference to the Neolithic period when we had to use our senses in contact with our body and our hands while engaging in hunting. We had perceived the environment by smelling, touching, and experiencing and finding ourselves to capture the point of internalizing the outside world. However, now, we are reaching out the information by digital databases. The transfer of the information composed of virtual images and data and the kind of perception of the world transforms a human towards being 'as if'. In this manner, our productions in the world are also emerged as being 'as if'. Avatar gives rise to the thought of what real and virtual is in comparison with human and Na'vi. At this point, it might emerge ecological aspects on the bilateral relationships between user and its environment. Since the 60s, the main focus of the studies regarding the problems of the relationship among human being and the environment is to explore solutions to create a harmony in between them (Göregenli, 2018). As a part of this efforts, UD is based on normative design principles aiming at the accomplishment of social and spatial harmony to create a livable environment. Referring it, the success of Pandora reflects a network of 'oneness': Spaces, spatial equipment and tools integrated with the nature are very flexible according to Na'vis' needs. For specifically, the organic structure of the trees and plants flexibly works as a

sleeping unit that respond to the needs of both an individual and family (Figure 17). Man, on the other hand, might move the modest sleeping action far beyond functionality and flexibility on account of different sociological and symbolic beliefs (Figure 18).

Figure 19-20. Comparison of the leaves of the plants and glass in terms of their ways of responding to individual needs.

As displayed above examples, in Pandora, the spatial attributes are formed as parts of the nature in harmony: they are easy to understand, flexible, sophisticated, simple, and instinctive so the physical power is minimal. The deep ties with the nature make it necessary to focus on the sense of tasting, hearing and touching. These features of the Pandora natural environment are very much linked to UD principles, equitable use, flexibility in use, simple and intuitive use, low physical effort. For instance, the leaves of the plants that are used to drink liquid can be well matched with UD concept with its principles of flexibility, simplicity and low physical effort when compared to glasses (Figure 19-20). In general, while the designs are universe and sufficiently minimalist in keeping with all UD parameters in the avatar universe, the designs are unnecessarily exaggerated without concerning anthropometric criteria in the human universe.

Figure 17-18. Comparison of the spaces for sleeping in Pandora and our world.

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Table 3. Analysis of Movies with UD Principles

UD Principles	*Films*	*Event series matched with UD Principles*
Equitable use	**TAMAM MIYIZ? (ARE WE OK?)**	Ihsan with his wheelchair is trying to get on the bus in the city, but because of the inadequate physical arrangements, he experienced himself as the "other". This shows the vital necessity of application of UD's Equitable Use principle on the design of pavement, road, and bus stop.
Flexibility in use		In the film, it is seen that Ihsan with the wheelchair and her mother have severe physical difficulties in urban public routes and vehicles. The infrastructure of the cities should flexibly respond to the various needs of each individual in public pedestrian ways.
Low physical effort		
Size and space for approach and use		During the film, Ihsan has difficulties in reaching, touching and using spaces where there is no measurement, posture and action analysis. In analyzing those, the emphasis of the UD concept on low physical effort as well as equitable access in urban spaces and public vehicles should be concerned.
Equitable use	**MY LEFT FOOT**	The only possibility to go upstairs is the staircases prevent Christy and his mother from equitable way of access in their house.
Flexibility in use		If suitable environments and equipments are enhanced, Christy can also be a productive person in the field of art as well as others in the society. This is also valid when Christy takes part in the children's game at the street by the trolley.
Low physical effort		Due to inaccessible parts of the house, Christy's mother has to carry on him, which needs a huge effort, which results in physical and psychological deformation of them as well as the decrease of their self-esteem and values as human beings.
Tolerance to Error		The scene of falling of the mother from upstairs and Christy's effort of descending the stairs to help his mother shows that staircase as well as other parts should respond to these facts to preserve and sustain vitality in housing environments.
Size and space for approach and use		When suitable environment was provided according to (dis)abilities and body measurements of Christy, he could make his paintings and novels freely.
Equitable use	**FORREST GUMP**	Forrest's brace is caught in a gutter grate when he and his mother cross the street. For safe and equitable access in the city, the urban infrastructure should be designed in a maximum level of tolerance to error.
Tolerance for error		
Equitable use		Forrest's braces are difficult to be utilized due to its high level of physical strength. The design of assistive devices as well as spaces is an important theme for providing low physical effort to people with disabilities.
Low physical effort		

Simple and intuitive use		When Forest used metal leg braces at the first time, he adapted to it in a short time. Its use was so simple and intuitive that he does not require prior knowledge according to UD paradigms.
Equitable use	**SCENT OF A WOMAN**	Blind persons can use the spaces like all persons if the environment gives equal opportunities for all.
Perceptible information		Col. Frank Slade independently uses the spaces for various activities as equal as others with the necessary information that Charlie gave him. Herein, it is essential that the spaces have a clear layout for orientation to enhance simple and intuitive use.
Simple and intuitive use		
Size and space for approach and use		The boundaries in spaces in which different types of behaviors are made should be clearly defined in size and approach in order to allow people with visual disabilities to use spaces independently.
Equitable use	**AMERICAN BEAUTY**	The shift of the power is subjected to the dignity and equitable way of behavioral approach towards members of a family as well as a public environment. This is vital for the success of democratic public life as supported by UD concept. Power struggle symbolized by the Red Rose is due to the need for physically and socially equitable access in the society.
Flexibility in use		Transforming the garage space into the fitness space flexibly gives opportunities of private activities in the house.
Size and space for approach and use		The space organization on the basis of the authority and hierarchy among the individuals is symbolized by the size and location of the fittings in a space. More specifically, spatial dimensions of size, approach and use in modern offices are expressed by the hegemony in business life.
Equitable use	**AVATAR**	In Pandora, the Na'vis live real democratic life in which spaces and fittings can be used by everyone in an equal manner without excluding any status, sex, and age. They adopt 'oneness', the belief of being whole and being together.
Flexibility in use		Referring a network of 'oneness', spatial fittings integrated with the nature are very flexible according to Na'vis' needs. The organic structure of the trees and plants is flexibly used as a sleeping unit that respond to the needs of both an individual and family.
Simple and intuitive use		In Pandora, spatial equipments are formed as parts of the nature in harmony. They are easy to understand, flexible, sophisticated, simple, and instinctive so the physical power is minimal. The leaves of the plants that are used to drink liquid are matched with UD principles of flexibility, simplicity and low physical effort.
Low physical effort		

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CONCLUSION

Equitable life obviously needs turning onto being 'normal'; however, the subject in this thought is not an 'individual' but a 'social and physical environment'. Universal design mainly appreciates *oneness* and *harmony* among spaces and its users in rejecting *otherization*. Hence, equality, respect to freedom, justice, support of diversity, and even democratic environment are the concerns of UD (Alkan Bala, 2016). From this manner, social and political structure of modern life should be considered by expanding the scope. Those structural mechanisms mostly live in the films in terms of real or virtual manner. It is believed in this study that reading on the films gives an opportunity to deal with the themes of otherization and inclusion from different manners they comprise in a bounded time but expanded story.

Architecture and cinema are an interpreter and referrer of experiences, preferences, wishes, pains, and horrors of human being. Although they share the same goal in that sense, architecture have a role beyond those values. It is, unquestionably, at the center of building, transforming, developing or disordering community life in real world. As seen from above analysis, referring to the architectural attributes, the films can obviously present physical needs of people with disabilities in the built environment. For instance, how a blind person can perceive the spatial attributes or how spaces create difficulties for an autistic individual are clearly and comprehensively represented in the films. The language of the behaviors in the scenes show that there is a deep relationship of people and its environment. This relationship changes according to the differences of people. Spatial environment created by ignoring these differences incontestably causes unfair social life, which then affects the health, peace, and even presence of the community. In this sense, while involving various and many-sided experimental facts, they address how physical design affects their inclusion in social life. The dominance of the thought which focuses on the 'inabilities' far beyond 'competencies' in adhering to the physical image of individuals is the greatest obstacle for the realization of an equitable social life for all. This way of approach is frequently emphasized in the films "Tamam mıyız?", "My Left Foot", and "Forrest Gump", additionally "Scent of a Woman", "American Beauty", and "Avatar" especially from social aspects.

Moreover, having been addressed in the discussions on the films, public perceptions on disability formed with social and institutional prejudices excludes the power of ability. Although they are based on intellectual facts, they appear by spatial

structures supporting those misconceptions. To exemplify, in the films, women, especially mothers are tackled with the problems of otherization due to the prejudices of the society and they try to find solutions intuitively to overcome the physical and social limitations. The mother of Forest Gump, for instance, labels his leg support as a "magic feet" although the doctors insist on its insolubility. Also, Forest's girlfriend, even she is a child, triggers a realization of a miracle by giving the 'run' command against the children's misbehaviors. In "My Left Foot", constructive effects of social and physical supports and faith of Christy's mother towards him are seen. In Avatar, Na'vi woman's efforts to teach Jack about the beliefs and lifestyles in Pandora displays empathetic, facilitating, helpful, and consequently citizen-friendly attitudes.

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Resume

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Independent Movement Experience with The Other Senses

Özlem Belir*

Abstract

According to Lynch (Lynch, 1960, 1997), who uses legibility as a reference to easily recognize and remember a space, *the more the environment supports envisioning, the more legible it is*.

It can be seen that the students who are studying design, have developed imagination with the sense of seeing. This illusion leads students to be concerned only with the effects of visual sense in the design process.

Selçuk University faculty of Architecture organized panel and workshops "Thinking with the Universal design" which included "direction finding" group study with students using smell, hearing and other senses except sight. At the "Architect Muzaffer" campus and its immediate surroundings, three different routes were set in the workshop and six students were asked to experience these routes using a blindfold. This study shows that when somebody looses their senses, they can use other senses more effectively. Students become aware of using other senses instead of using only sense of seeing. The secondary target of this workshop is to attract the attention of educators involved in design education.

Keywords: *Independent movement, spatial legibility, multi-sensory, multiple perceptions, sensory maps*

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INTRODUCTION

It is known that the creatures in the wild explore their environment, communicate and interact with each other by using sensory organs. Human beings also use the natural or built environments besides interacting and communicating. They shelter, attend school, go to hospital, engage in social activities and so on.

People need to perceive the environment they are in, so that they can use the environment they live in. They need to interpret the information they receives. The person who can use the environment and the environment, in which it is available, is unobstructed and therefore accessible.

Accessibility can be achieved by the perception of the physical consciousness of the person. Physical conditions such as seeing, hearing, touching, etc. are provided by our senses.

Perception in the concept of space has great importance in architectural education. Perception of space is often realized with our existing senses.

Broadly defined, human perception refers to what people come to know about objects, environments, and events without being told about them. This knowledge generally results from seeing, listening, touching, smelling, or feeling heat and air movement (Guth, Rieser, & Ashmead, 2011).

Hearing, touching, seeing, smelling, and so on, are the pieces of perception.

HUMAN – SPACE INTERACTIONS

Human beings using built environment or buildings have various physical and mental features. Buildings that human beings live in, effects to feelings and interactions. In broad sense, disabled person is not only a human being with visually or motional impaired. As a matter of fact, disabled person is a human being with various sensory disorders who are ignored by the society. This person of the definition could be someone tired, pregnant, sad, mad, fat, short, tall, a lady with high heel shoes, a youth who is busy with a cell phone or could be slightly visually impaired, motional impaired.

Elder person with hearing loss and weak reflexes will be slower in reaction or will need more lights in the surroundings. They will need more handlers because of balance issues. If they live in nursing home they might be confusing their rooms because of

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obliviousness. We could come up with a lot more instances. Therefore if we could develop more senses into our architectural skills, and not see the physical differences as obstacles while shaping spaces and creating designs, we could create spaces where everyone could enjoy, be happy and be safe.

Human beings are in movement to explore their surroundings and also in the habit of learning what guiding their movements. When viewed from this angle, it could be said that, important and descriptive feature of perception is, it includes human research activity and environmental knowledge gained by seeing, listening, touching and moving. Researches about special perception show that human cognitive map develops with movement (Guth, Rieser, & Ashmead, 2011).

Entire urban space could not be seen or experienced well enough from the point where human being stands. Human being needs the movement, collect the pieces in time and combines the collected data in mind. It is known that external factors help understanding the space as well as seeing.

According to Gibson (1966), some perceptual characteristics may vary due to the circumferential changes and the condition of the perceiver. Although other senses will remain the same (Guth, Rieser, & Ashmead, 2011).

SENSES

According to Lynch (Lynch, 1960, 1997) a good environmental image gives its possessor an important sense of emotional security. He can establish a harmonious relationship between himself and the outside world. It is important to acquire the ability to interpret the senses received. The fact that the spaces are open to the senses facilitates the movement of the person. If it is necessary to briefly explain the senses except the sense of sight;

Sense of hearing: It is accepted that a person with visual impairment or visual insufficiency is affected by sound.

Vision and hearing are the senses best suited for perceiving things at a distance. For persons with visual impairments, hearing can provide an essential awareness of events beyond their immediate personal space. Many objects and environmental features can be identified and located through listening (Neuhoff, 2004).

Many persons who are accustomed to travelling without vision become skilful users of sounds from self-produced actions such as footsteps, cane contacts, and vocalizations. The focus here is not

on what makes the sounds, but rather on how the sounds are affected by the environmental context. Because these actions are performed consistently, the person becomes familiar with how the sound is affected by environmental features. For example, properties of the walking surface just ahead are evident from how sharp or muffled cane taps sound. The size of a room can be perceived by listening to how much the sounds of one's footstep reverberate (Guth, Rieser, & Ashmead, 2011).

It has been suggested that only visually impaired people have improved their ability to use sound to find directions. However, it has been proved by various researches that this is not the case. "*The senses of the blinds do not show any superiority in respect of their senses according to non blind person. Their only supremacy is their experience of interpreting the stimuli they receive through these senses.* " (Enç, Çağlar, & Özsoy, 1985).

Sense of smell: The sense of smell has a certain importance during independent circulation. There are always a lot of smells in the surroundings that can tell exactly where a person who is not seeing is exactly. A pharmacy has a drug smell, a doctor's office has antiseptic smell and a restaurant smells like food (Özyürek, 1995).

Touch and haptic sensation: Touching is used to discover the properties of the immediate surroundings. In the formation and development of concepts related to the external world, the hand has great importance as the sense of touch and as a touching organ. It is very difficult to understand the true nature of an object without touching it, seeing it with eyes, hearing it with ear, and smelling is not sufficient. Our hands are our organs that will affect our mental activities. The hands are regarded as eyes of the blind and they are trained for this job.

With a long cane, pedestrians who are blind can extend their touching 1 to 2 meters beyond their arm's reach (or foot's reach). Long canes are powerful perceptual tools with which skilful users can, for example, perceive the material, slope, and elevation of the upcoming walking surface and the location and dimensions of the obstacles and openings along their paths (Guth, Rieser, & Ashmead, 2011).

The perception is the haptic sensation, which allows you to reach the whole from piece by piece. In addition to touching, information comes from the sun and the wind. For example, in areas crowded with tall buildings, wind flow perpendicular to the line of travel is often a cue that a street is being approached or that an alley or some other break in a row of buildings is being passed.

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In open areas, the wind's direction can sometimes be used to identify one's general facing direction (Guth, Rieser, & Ashmead, 2011).

Kinaesthetic sensation: besides objects with very small dimensions, size, distance, and proportion are perceived by the presence of the kinaesthetic (muscle) sensation, together with the feeling of touch. Muscle sensation or muscle memory, in fact, all the people use, but are unaware of, is recognized and gained importance in sight disabilities. Kinaesthetic sense is to be aware of an action or keep it in memory. The people who have visual impairments benefit from muscle memory to determine when to return, to climb stairs, or to measure distances (Özyürek, 1995).

The Portuguese architect Carlos Mourao, who lost his sight afterwards, in an interview during a visit to Turkey in 2010, says that, when the architectural structures became areas for multiple senses, he believed that the lives of the disabled would become even easier, and he showed the Suleymaniye Mosque as an example "*Now they do not use courtyard in architectural structures, but courtyards are spaces where visually impaired people can perceive voices well without feeling uncomfortable ... Suleymaniye is wonderful in this sense*" used the expression. Mourao explains that historical places in Istanbul are made to appeal to many senses, "*I enjoy being in historical places in Istanbul, the architecture is so extraordinary that I can perceive the space thanks to acoustics and smells*" (Mourao, 2010).

In this sense, architecture involves many sensory experience areas that interact and fuse with each other rather than pure sight or classical five senses.

ORIENTATION AND MOBILITY

Orientation and mobility refers to the skills and techniques required for independent travel by persons who are blind or visually impaired. Orientation refers to the ability to establish and maintain an awareness of one's position in space, while mobility refers to the act of moving through space in a safe and efficient manner. When the two are integrated, the result is purposeful and directed movement. Both are dependent on accurate perception resulting from the successful interpretation of **sensory clues** into meaningful travel information (LaGrow, 2011).

If somebody feels safe therefore it is able to act independently. People can only "knowingly" provide their own security (Weisman, 1981).

Berkeley (1973), Dixon (1968) and McKean (1972) report that anger, hostility and indignation resulted when users were faced with illegible public buildings (Weisman, 1981). According to Evans (1998), stress can occur when physical surroundings make the prediction of schema knowledge difficult (Başkaya, Wilson, & Özcan, 2004).

Lynch uses legibility as a reference to easily understand and remember a space (Lynch 1997) Weisman defines legibility as the ease of the navigation (Weisman, 1981). Passini uses the term legibility in relation to navigation, as an environmental quality which easily opens up and offers comprehensible information (Passini, 1984). Legibility of a space is due to features of the place, depending on the markers they have and the scheme of the plan but the sensory clues of the person's features and space also affect the formation of the cognitive map in the mind of the person.

With this theoretical knowledge, thanks to the field experience whit the participation of the students, the aim was to change the perception that special solutions should be made for special people.

METHODOLOGY

Six students participated in the workshop. The profile of the students is given in the table below (Figure 1). There are variety of data because of the participant's different point of view due to their study at different universities and different departments.

#	Gender		Campus and surrounding		Department	Degree	use Blindfold	Experiment Area
	F	M	seen	not seen				
1	x			x	Urban and Regional planning	post graduate	x	Inside the campus
2	x		x		Architecture	under graduate		Inside the campus
3	x		x		Architecture	under graduate	x	Square
4	x		x		Urban and Regional planning	under graduate		Square
5	x		x		Architecture	under graduate		The streets
6		x	x		Urban and Regional planning	under graduate	x	The streets

Figure 1. Student participant profile

Selçuk University Architect Muzaffer Campus and its surroundings were selected as the experiment area. Region is divided into three areas. (Figure 2)

1. Inside the campus. Total route: 400 meters
2. The streets around the campus (Şerafettin Street, Ankara Street, Görücü Street). Total route: 650 meters
3. Kültür Park Square near the campus. Total route: 635 meters

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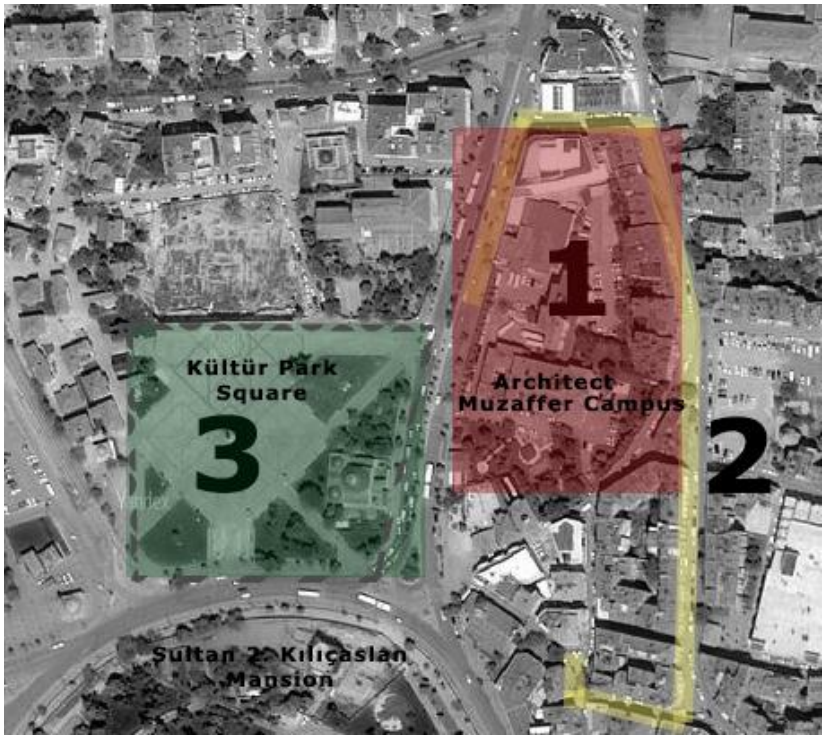

Figure 2. Area Map

Two students were selected for each study area and students from different disciplines were matched for each region. Students have been in their area for 2 hours and have experienced their routes. The study was conducted in May at a temperature of 23 degrees Celsius and from 10:30 to 12:30 hours.

One of the students in each area used eye bond and a white cane, the one who were not blindfolded has alerted his friend to the danger and recorded his findings about the environment. Students were briefed how to use the white cane before their experience.

It was requested from the blindfolded student that he/she should tell the student without the eye bond about what he/she hears, feels while following the route. It was also requested from the student without the eye bond, keep the intervention minimum with the blindfolded and ask frequently about their whereabouts.

At the end of the 2-hour, students should demonstrate their feelings about their routs on a field map and the students which are using blindfold were asked to write their feelings and senses. For this reason, they were asked 5 questions;

1. Did you feel the floor differences in your field?
2. Which building elements you have benefited from for orientation?
3. Do you feel smell in your area?
4. How are voices in your area and distance-related feelings?
5. Explain this experience in one word.

RESULTS

The notes given by the students during their field experience are summarized in the table. (Figure 3)

SENSORY			
Smell	Sound	Tactile	Haptic
diesel, gasoline odor	high vehicle	material surface difference	solar heat
fruit, vegetable odor	bicycling	sand on the sidewalk	wind
garbage smell	electric bicycle	supermarket trolley	shadow
pastry	slowdown of vehicles	motorway	
rose	wheelchair suitcase	barriers on the sidewalk	
	footstep	hole	
	bird	tree	
	plane	soil	
	water	electrical box	
	television	paving stone	
	cardboard box sound		
	door opening sound		
	children		
	crackle of dry leaves		
	car horn		
	dog		
	the sound of saw		

Figure 3. Area experience notes

In that study three students which are using eye bond responded to the 5 questions directed to them as follows:

Q 1 Did you feel the floor differences in your field?

The students working on the campus and in the square stated that they could not feel the floor differences and thus lost their direction (routes). High platforms without guardrails and grids on the ground have been obstacles to navigating and have caused them to be frightened.

Students travelling around the campus have noticed the difference between sidewalk, road, or pavement material. However, potholes on the pavement or on the road were dangerous for them. The raised grounds which are knee level are dangerous when they do not notice it with their white cane.

Q 2 Which building elements you have benefited from for orientation?

Students have benefited from pavement edges, water gutters or borders. However, students who experiment in the square are often confused their direction because of the monotonous coating. The fact that the square is always sunny is also the cause of the loss of direction.

Q 3 Did you feel smell in your area?

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The students have noticed the smells of trees, flowers and grass, on campus and in the square.

For students travelling around the campus, noticed the grocery store vegetables smell and noticed gasoline smell at the gas station at the start of the route.

Q 4 How voices in your area are affected the distance-related feelings?

The student on the campus was afraid of the noise of traffic and human crowds in the area due to the silence of his area and he did not know which direction to go. The student in the square felt disturbed when he heard dangerous noises (there was construction noise beside the area during the experiment) and felt the sound sources as it is closer than in fact.

Q 5 Explain this experience in one word.

Unconsciousness, indecision and ambiguity are the feelings of the 3 learners who use the eye bond.

Students using eye bond tried to protect themselves against possible hazards with a white cane. During these movements, they noticed parked vehicles, telephone or electrical boxes, sign boards, water channels on the ground. They often needed to touch the building elements, which they notice with white cane. At the same time they tend to drag their feet to feel the ground while walking. This could be caused due to the lack of texture variety in spaces.

The students easily perceived the natural effects such as the temperature, the shadow, because the work was done at noon on a day when the air temperature was 23 degrees. They notice the winds were cut or increased, and they tried to interpret this situation. They were able to perceive the movement of the sun and so predicted their direction.

Noises like sudden and persistent noise, such as high vehicle sound and horn sound, disturbed students with eye bond, this caused them not to feel safe. The sound of plane disturbed them and pressed other voices that they might receive data. This often caused them to lose their sense of direction.

All students have been quite successful in interpreting the voice they hear. They figured they were by the car wash because of the water sound, also noticed car loading because of the cardboard sound.

Almost at the end of the workshop one student stated that the cars were turning left. When asked how he/she came up with that idea, he/she explains that the cars slow down and their noise becomes distant. This shows students success of interpretation after repetitive processes.

The texture change on the ground surface is another disturbing factor. Unidentified floor coverings without texture differences prevent students to understand their whereabouts in the space and created nondirectional feeling. The water gutters, which are continuous, have become a guiding element.

Smell became important and noticeable sense for the blindfolded students. When student, who experienced the space beforehand, smelled the fruits when passing by passed by the grocery store, predicted his/her whereabouts. Vegetables and fruits smells were something students never paid attention before. Grocery store became sensory landmark for the student who noticed the smell. The gas station located in the beginning of the route is also a sensory landmark for the blindfolded student.

Nondirectional, instability and uncertainty are results of students not being able to perceive the space. This is not caused by they are unable to see, but there are very little sensory landmarks in the space.

After the student experience, they have prepared the desired sensory map in digital environment and as a 3D model. They have classified the distinctive features outside of sight that they perceive during the experience, and they place the points on a map (Figure 4) In order to express the digital map to a person who does not see it, they have modelled the "sense map" they prepared with different materials and benefited from natural materials (Figure 5).

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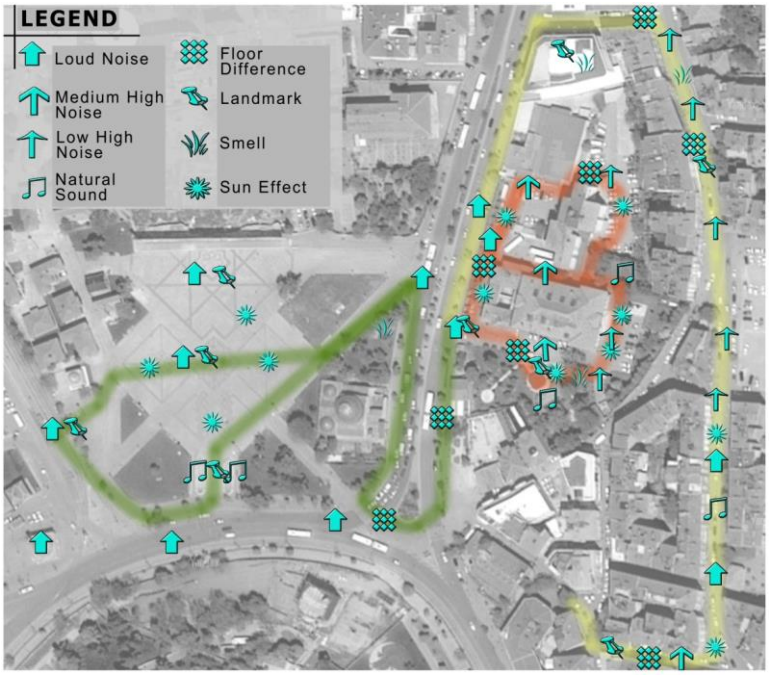

Figure 4. Digital Sensory Map (above)

Figure 5. Sensory Map (below)

CONCLUSION

This piece of work has built and idea that design students must research solutions that affects all of human beings senses in their designs. They are now close to the idea of a design, that affects multiple senses, make spaces more legible.

Students became more aware of the senses they do not use frequently even though those senses exist.

Features that affects hearing, smelling, touching alongside with seeing creates liveable and accessible spaces.

Spatial legibility ensures proper navigation and successful movement, so it will be available for everyone.

This little work which is done with the blocking of the sight can be done with preventing the sense of hearing. The person with any sense of weakness will use the existing sense to bring down the most disadvantageous situation.

From the concept of universal design, the solutions that will create multisensory senses for the senses outside the visual in indoor and outdoor designs will not need to produce a “special solution” to some people.

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Resume

Ozlem Belir (PhD 2013) has been working at Istanbul Gedik University, Faculty of Fine Arts and Architecture, Department of Architecture. She worked as a project manager in an architectural office in Istanbul between 1985-2013. Therefore her architectural experience is quite high. She is focused on Universal Design, accessibility, space perception and space design.

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