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INTRODUCTION OF ISSUES REGARDING PEOPLE WITH SPECIAL NEEDS TO DESIGN EDUCATION

Pavlina Georgieva ZABUNOVA and Yordanka TSVETANOVA
Forest University Sofia, Bulgaria

ABSTRACT
The aim of this paper is to present the urgent need for timely introduction to design education the problems of people with special needs, and the claim of relevant, appropriate design solutions for them.
The report will show: who are the people with special needs, what is the importance of inclusive design in contemporary urban environment, what are the most common barriers, and conflict situations that people with special needs meet, good practices for creating environment for people with special needs, examples of introducing the problems of disabled people and establishing tolerant attitude from early age, sample projects and tasks acquainting students with the problems of people with special needs proposed by the authors.

Keywords: Design, design education, people with special needs, people with disabilities, inclusive design, urban facilities, urban design

1 INTRODUCTION

Design and application of new technologies create comfort and wellbeing in today's world. They make inventions and innovations available for a large amount of people, improve the function of objects and facilitate greatly their use. They increase the standard of people's lifestyle.
Despite the rapid development of technology and society, there are people whose specific needs do not let them lead life of full value and dwell independently in the environment.
Innovative technologies and designs are those that could significantly increase the standard of living. All the innovations and solutions are in the hands of the young architects, product and engineering designers, as well as the students in engineering specialties.
That is way the authors believe that the training of junior academics about inclusive design would solve the problems of the contemporary environment.

2 FORMULATION OF THE PROBLEM

2.1 Who are the people with special needs

People with special needs are mostly children, mothers with children, elderly people, people with temporary or permanent physical disabilities (by definition permanent physical disabilities the authors consider all people with any impairment in the sensory system, musculoskeletal system as well as blind, deaf, disabled or handicapped people and others). Society must provide specific care for them. They should not remain isolated from the environment in which we live, nor have a lower standard of living than the others. Environment and objects need to be designed in such a way that they can be comfortably used and accessible for everyone.
Technology and design in planning of environments for people with special needs can refer to any time of the daily life. Actions which healthy people perform almost unconsciously, for those with special needs require much more effort, and the participation of caring person.

2.2 Need for designing an accessible environment for all

By the beginning of 2014 according to the statistics 686 812 Bulgarians are with permanent physical disabilities in Bulgaria. This represents almost 11 % of the total population in the country. Throughout the European Union, the records show that around 15-16 % of the population have some kind of

disability. That amounts almost 80 million Europeans that are still discriminated and physically restricted. [1]
Society as a whole begins to understand that it has to adapt to their needs, not vice-versa. People with disabilities should be able to lead satisfactory life and decide freely for themselves. The network offers great potential to improve the social integration for people with disabilities (online operation, e-democracy, access to knowledge and information). However, particular attention should be paid to the issue of accessibility. Serious problem for labour and social equality for people with disabilities represents the accessibility to the surrounding environment. According to the National Institute of Statistics in Bulgaria by 2005 only 5 % of the disabled people admit their surrounding environment as easily accessible, 46% have encountered some difficulties, and 24% identify it as inaccessible (there is not applied information for the rest 25%) [2].
In Bulgaria there is a regulatory act since 2003 for accessibility of buildings, transport, and facilities. More than 10 years after it has been inured, there is still no significant adaptive projects for people with special needs. The greater part of the improved urban spaces and facilities after 2003 has serious gaps in the requirements for disabled people. On the other hand in the process of designing the needs and necessities of these people are considered too late.

Figure 1. Images of a few examples of non-compliance with regulations. Photo 1. Lack of elevator or platform at the exit of the newly built subway station Sofia University "St. Kl. Ohridski "by the side of the King's Garden; Photo 2. Lack of tactile ground and insufficient space for crossing on Blvd. "Vitosha"; Photo 3. Crosswalk ending with high curb at one of the entrances of the church "St. Al. Nevsky"

2.3 Most common barriers and conflict situations for people with specific disabilities

The emphasis here is on the most common obstacles for people with permanent or temporary physical disabilities. The information is consistent with the Access and Facilities for Disabled People Issued by Wolverhampton City Council in 2009 [3].

1. Difficulties that people in wheelchair face: high curbs, stairs, loose gravel and cobblestone pavements, narrow doors and hallways, not enough space to manoeuvre, lack of sanitary facilities, etc.
2. Difficulties that blind and visually impaired people face: lack of signage, confusing layouts, steps with insufficient width or have no contrast to highlight risers and treads, lack of tactile surface, obstacles, and hazards along the way, such as furniture, billboards, cars parked on the sidewalks, road works, etc.
3. Difficulties that hearing impaired people and deaf people face: noisy environments, poor acoustics and lighting environments, lack of visual information.
4. Difficulties that people with ambulatory disabilities face: lack of handrails, ramps or stairs, steep slopes, long distances and no resting places, lack of rest areas, lack of seating places, difficult to use door handles.

The design and organization of the urban and interior environment are those who can offer a solution to the mentioned problems.
From everything that is observed directly, the authors believe that the boost in solving these kind of problems comes from young designers who after graduation will be factored into practice and engaged in this cause. Design students need an extensive examination of the various types of disabilities and difficulties that these people face. Thus future designers would be more responsible while designing, in order to meet the relevant requirements for the people with special needs.
Today, the capital city of Bulgaria, Sofia, which is among the oldest European capitals, still has to solve many problems regarding the disabled people. Although the alert in various media and

institutions has started paying attention in that direction, there are still many things to correct that consider the design of private and urban environment.
There is a study course "Design environment for people with disabilities" with a minimum 45 hours of workload in the University of Forestry. During the course students are working on three assignments. Every assignment takes five weeks and the students work individually. The first task is to design a kitchen, living room, or dining room interior where a person in a wheelchair will reside. The second one is to create a community space as a library, bus station etc. appropriate for disabled people. The final task is furnishing a home for adults where the students have to design the common room and bedroom for 1 to 4 people.
Unfortunately this useful information is available only for students studying Master degree course majoring "Living Environment" which is about 5 to 10 students a year. The rest of the Engineering Design students /numbering about 250, are not given any projects related to the needs of disabled people. Such is the case with the authors of this paper. In order to learn independently the problems of the inclusive design, the authors present their 3 projects that are personal idea and offer an adaptation of the assignments to the disabled people needs. Other majors as "Product Design" and "Urban design", despite the direct relationship with people with disabilities are not tutored in this discipline.
The proposal of the authors is that the discipline should be taught to all young designers and included in the curriculum at the beginning of the bachelor course in every design or architectural university. It is possible to extend the knowledge through additional annexes in disciplines such as ergonomics, graphic design, furniture construction, etc. Students could learn the basic ergonomic requirements for the disabled people, or where they could use Braille, how to create a clear and understandable signs for deaf people etc. In the course furniture construction for example students can construct specific furniture, to learn and explore different mechanisms for full opening of doors for easy passing, various sliding and automatic doors, ramps, mechanisms for hospital beds and others.

2.4 Best practices for creating a supportive environment for people with disabilities using the means of design

In some states in the U.S. in government primary schools, along with the alphabet, addition, and subtraction, the kids study sign language as well. They learn how to introduce themselves to a deaf person, how to greet and how to assist when needed. This creates a culture of tolerance and understanding from quite an early age.

Figure 2. A card for learning the alphabet. [4]
The sound "A" is transmitted through the drawing of an apple and the sound "A" is marked in three ways - letter, braille letter and sign language. Apple is presented by the Scratch & Sniff as well, that way the new information is embraced through all the senses. The kids are unconsciously taught that things should be done for everybody.

In 2006 the Council of Europe and Committee of Ministers accepted Disability Action Plan. [5] The fundamental principles and strategic goals according to action line number 6 are to create "An accessible, barrier-free built environment encourages equal opportunities, independent living, active involvement in the community and access to employment. By applying the principles of Universal Design an environment that is accessible to people with disabilities can be established and the creation of new barriers can be avoided."
Another positive example is German capital Berlin. Since 1990 people in the city have been working to improve the accessibility in the city. In the past 2013 Berlin received the Access City Award [6]. One of the greatest achievements was the supplement of the entire bus network with wide opening

doors and platforms for a better access. The goal is by 2020 to have equal accessibility in the metro and trams.

3 SAMPLE PROJECTS AND TASKS ACQUAINTING STUDENTS WITH THE PROBLEMS OF PEOPLE WITH SPECIAL NEEDS PROPOSED BY THE AUTHORS

In the fourth year of the undergraduate curriculum, design students should be given several projects and tasks related to people with some kind of disability. The authors suggest that students should be acquainted with the needs of these people through several tasks included in the subjects studied in the general curriculum. The projects could be done individually or in groups, the implementation period should not be less than ten training hours in order to enable students to find solutions about the particular problem.

For instance, in the course “Furniture Constructing” students can go in for construction of beds, chairs, cabinets with specific purpose or mechanisms for full opening doors for easy access, ramp, and sliding door devices. In “Residential Interior Design” classes students could design an interior space that will be used by a person with disability. “Public Furniture Design” could include designing of one or more public facilities as bus or subway station, kindergarten, school, library or administrative building with all the necessary equipment for disabled users. Thus students will become familiar with the regulations and ergonomic requirements. The authors have tried to organize in three versions their own sample projects. The first one is urban facilities design, the second and the third ones are resumption of pedestrian zone and cultural area. In these three proposals the initial tasks were adapted to the greatest extend to the topic of design for people with disabilities.

1. Development of the project for urban facilities design got transformed into "Playground for Art Therapy." In the process of creation the student meets different types of art therapies, gets familiar to the fundamental requirements for facilities for disabled and healthy children design and safety regulations. Consultation with experts is required, where necessary.
   The playground has two facilities: musical whirligig and water pump.
   Musical whirligig for children without disabilities and children in wheelchairs. In the base of the whirligig there is an installed hurdy-gurdy. The rolling plays preliminary chosen music melody. Rotation helps to strengthen the vestibular system, and the music acts as a therapeutic tool.
   The second part of the playground is water pump with wooden channels in which the water drains (designed by the company Richter Spielgeräte GmbH). Next to the channels there is a pool with clay. By using clay and water children can create different forms themselves. This therapy develops children’s haptic sensation. It is believed that in most cases the water has relaxing features. In some cases of mental disabilities if modelling with hands incite interest in the child, it might be a sign of future development.

Figure 3. Proposed design elements for the playground

2. The second project is reconstruction of central pedestrian area in Sofia, Bulgaria. The topic of the thesis is "Rest and Relaxation Accessible for All". The area is situated at the very centre of the city and Perlovska River flows right through it. The name of the site is “Evlogi and Hristo Georgievi” Boulevard. The main aim of the project is to create an environment with more verdure and green areas suitable for recreation, walking, and relaxation by all citizens: pedestrians, cyclists, mothers with strollers, elderly people, blind and deaf people, wheelchair users and others. The place has a special significance for the city. It is surrounded by gardens and parks, has a rich history, and is situated next to a busy road. In the project the author provides paths with appropriate grounding for easy passing for everybody. Benches equipped with wheelchair spaces for relaxation are placed at a suitable distance. The information boards for public transport and the boards with historical information include text, audio, and braille. At the junction all the curbs are oblique for free passing. The tactile paving and the sound traffic lights direct blind and deaf people. There are two bus stops in the area and the student designs boarding ramps for wheelchair users, strollers, or elderly people. In the project the area is supplied with pergolas with greenery creating a visual border with one of the busiest streets in the city and establishing a feeling of natural comfort. Function of the river which now has the appearance of a channel is renewed with the arrangement of large river stones and rockeries on both shores in a natural way. The green meadows along the riverside may be used for exhibition spaces of contemporary artists.
3. The third project is called "Culture and Information for All" and its main purpose is to recover an area that is located in the administrative centre of the capital of Bulgaria. Here many sites of national cultural and historical significance are included, such as the Basilica "St. Sofia ", Temple Monument" St. Alexander Nevsky ", National Assembly Building, the building of the Bulgarian Academy of Sciences, the National Academy of Arts, National Printing House (currently functioning as the National Gallery for Foreign Art), the Central Military Club etc. The area covers green sections, two gardens, and various other elements of urban design as well. All of these objects are declared monuments and sites of tourist routes.

Figure 4. Borders of the developed area and part of the included objects

Figure 5. Examples of facilities that the authors consider as appropriate samples in designing the project "Culture and Information for All" and "Rest and Relaxation Accessible for All" still in progress. Photo 1. The city of Sidney prototypes of street signs providing information to blind people; Photo 2. Braille map that emits a little beeping noise in Tokyo Metropolis, Japan. The raised yellow marking exist all over the city and guide the blind to safe crossings all over the busy streets; Picture 3 Garden furniture for commercial and public use; Picture 4 Ramp for special needs accessibility in a raised bus station in Curitiba Brazil

Along with general requirements in the area, there are specific problems related to the usage by people with disabilities. Therefore the project provides in the zone facilities and furniture with the following elements of urban design:

Ramp with the required size, gradient, handles and flooring for the garden in front of the Church “St. Sofia” and the Cathedral “St. Al. Nevski”,

- Green pavilion (with space for wheelchairs or baby stroller) combined with bike racks,

- Green benches with space for stroller stand-alone and same benches in combination with ergonomic rotary tables for both healthy people and people with disabilities,
- Renewed information board outside the church "St. Sofia" with two text fields a normal printed and in Braille,
- Information column display and Braille keyboard showing and telling the story of Sofia and cemetery discovered beneath,
- Information stand with display and Braille keyboard will tell stories about the city history and the cemeteries discovered beneath the Cathedral,
- Audio – visual art installation "Invisible Presence" will show the people what lies beneath their feet. The installation represents a combination of holograms arranged in conical space, creating the illusion of depth and framing the boundaries of the necropolis. For blind people the information is recreated by auditory perception delivered with artistic narrative.

3 CONCLUSION

In conclusion the authors consider that the problem with the environmental and product design for people with disabilities or special needs is relatively new. Nevertheless, it should become a subject of study by all design and architectural fields, not only within the borders of Bulgaria, but all over the world. After all, the care for the weak and vulnerable is the character that defines us as society.

REFERENCES

[1] Information about the disabled people in Bulgaria that receive smart money by the end of 2013, given by Ministry of Labour and Social Policy on 2014, February 7.

[2] Statistics for people with disabilities. Available online: http://www.network-hv.com/component/content/article/26-myblog/2079 [Accessed on 2014, 01 March].

[3] Access and Facilities for Disabled People: Creating an Inclusive Built Environment. Wolverhampton City Council, 2009 Available online: http://www.wolverhampton.gov.uk/CHttpHandler.ashx?id=1496&p=0 [Accessed on 2014, 01 March].

[4] Alphabet cards and other methods for education for blind students and kids on: http://www.pathstoliteracy.org/resources/sensesational-alphabet-touch-feel http://www.sensesationalalphabet.com/

[5] The whole lines of Disability Action Plan is available on: "Council of Europe Action Plan to promote the rights and full participation of people with disabilities in society: improving the quality of life of people with disabilities in Europe 2006 –2015" In: https://wcd.coe.int/ViewDoc.jsp?id=986865&Site=CM&BackColorInternet=C3C3C3&BackColorIntranet=EDB021&BackColorLogged=F5D383.

[6] More information about the Access City Award on the website of the European Commission: http://www.accesscityaward.eu/registration/initialize.xhtm?lang=en.