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THE IMPORTANCE OF ARCHITECTURAL ACCESSIBILITY IN MODERN SOCIETY

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Abstract

The main goal of architecture, as a field that is aimed at designing, planning, and organizing the three-dimensional space for human needs, is to make an accessible environment. That is one of the main factors for the quality of living in a society. Designing without architectural barriers and raising awareness of the needs of people with disabilities in relation to architectural design is a current topic today. By including the needs of the people with disabilities, architects show the ethical note of architecture and its connection with responsible behavior towards the environment and the people for whom it was created. When we talk about designing environment for human needs and in range to the human abilities, it does not mean only for physically healthy people. Considering that around 15% of the world's population has some form of disability, it is very important to design an accessible environment for as many people as possible. This architectural approach will contribute to increasing the involvement of people with disabilities in daily life activities.

Architectural accessibility is an important thing in society because it affects all groups of people, regardless of age, cultural, social, and religious diversity. It helps in increasing social cohesion which is important for the development of modern society. Architectural accessibility is one of the reasons why inclusive education is not completely possible, and that limits children and youth with disabilities to develop their intellectual potential and include them in the educational process. It means that accessibility is in relation to inclusive education and that is important for every society.

Key words: *disability, architectural barriers, accessible environment, universal design*

INTRODUCTION

The quality of living in a society depends on everything that surrounds us, including buildings and public areas. Considering that society is a cohesion of different ages, habits, behaviors, cultures, and religions, making the built environment accessible for all people is impossible. Therefore, the main goal of accessible architecture is to create a built environment for as large a group of people as possible. This means that accessibility in architecture is closely connected with the concepts of universal design, inclusiveness, and design without architectural barriers. The main goal of all concepts is to create a design that is accessible and easy to use, a mix of functional and aesthetic features.

Many ethical issues are connected with the rights of people with disabilities and their accessibility to facilities, free manipulation in public areas and their involvement in everyday life. It means that creating a universal design is an ethical behavior according to the moral values in a society.

Nowadays, many countries in the world advocate for the development of inclusive education, as the most important link in the development of modern society because the children are its driving force. Designing facilities for education accessible for people with disabilities enables the inclusion of children and youth with disabilities in the educational processes. Buildings accessibility is one of the main problems for implementing inclusive education. That is a real problem, which can be solved by taking measures to remove architectural barriers in existing buildings and by designing new buildings in accordance with the needs that people with disabilities have.

ETHICS AND ACCESSIBILITY IN ARCHITECTURAL DESIGN

Ethics, seen as a way of behaving in accordance with moral values, is a kind of social consciousness and a group of norms that are accepted in community life. Ethics as a philosophical point of view permeates all areas of human living and action. The rights of people with disabilities and their accessibility in the built environment are part of many more issues that ethics involves.

One of the purposes of the *Convention on the Rights of Persons with Disabilities* is a universal design and it is defined as a design of products, environments, programs, and services to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design. Also, one of the basic principles of the *Convention* is full and effective participation and involvement in society, as well as accessibility [1].

Accessibility

The term accessibility means everything that enables people to live independently, to move and participate in society. Accessibility should not be seen only through the prism of physically and mentally healthy people but should also be adapted to people with physical and mental disabilities, for their equal inclusion in all spheres of human life. Spatial accessibility is related to architectural design and it is the result of the application of technical solutions during the design of facilities and public areas, which ensure free access, movement and functioning of persons with disabilities [2].

Marta Bordas Eddy is an architect from Barcelona who works on the concept of accessibility in her professional career. Because of a spinal cord injury that she faced, she changed the way of experiencing the built environment by observing it from a wheelchair. Such a view of things left a deep impression on her perception, identified and contributed to directing her professional career. Marta's research and views on accessibility and her professional experiences in architectural design on the same issue are of great benefit. Her doctoral dissertation with the title "*Universal accessibility: On the need of an empathy-based architecture*" is also related to the same issue [3]. Studying that problem, she discovered that the problem in the existence of architectural barrier mainly originates from attitudes and cultural development in society. Her view of architectural accessibility she presented graphically as an endless loop in which it is clear that the inclusion of people with disabilities is hindered by architectural barriers, and the presence of architectural barriers is the main reason for unequal inclusion of people with disabilities in everyday living, leading to misjudgment and prejudice [4].

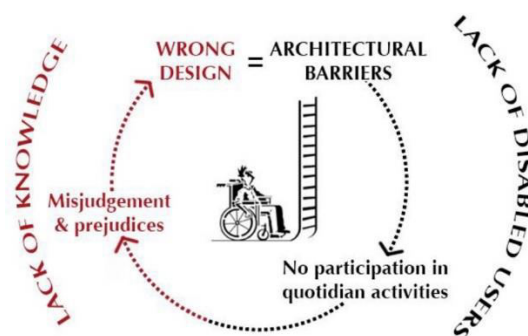


Figure 1. Endless loop, Marta Bordas Eddy

Architectural design

The modern living, the presence of increasing awareness among people about the needs of people with physical and mental disabilities for equal participation in all social areas, makes the topic of accessibility in architecture also relevant, that is, designing without architectural barriers.

Architecture, as an essential element in the creation of a quality urban environment, with its branches and subdisciplines, creates the human environment in accordance with life needs, takes care of the built environment for a humane and comfortable environment. The architect, as an intermediary between new construction technologies and users, has the task of creating an architectural design intended for the largest possible group of people. Salwyn Goldsmith, as a precursor of the concept of universal design, in his books writes about architectural accessibility, and he takes the view that legislation should not refer to "access for people with special needs", but should be defined as "access for everyone". [5, 6] This makes a relation between architecture and ethics like two types of sciences.

The quality of an architectural solution is not only valued from an aesthetic aspect, but also the important thing is its practical application as a common good, its environmental aspect and its ethical aspect from the architect to the user. In architecture, in comparison to other forms of art (music, sculpture, visual arts), function is considered a fundamental element [7].



Figure 2. Spiral concrete ramp, Paulo Merlini Architects



Figure 3. Enabling village, Singapore



Figure 4. Spiral accessible bathtub in Japan, Issei Suma

Showing awareness of the obstacles that exist in our environment and striving to keep them to a minimum, we act ethically and responsibly, respecting the basic rights of people with disabilities. As in other fields, architecture influences the implementation of inclusive education, by designing buildings for education that are based on the needs of people with disabilities. Therefore, architecture indirectly influences the development of human potential and contributes to the development of society.

ACCESSIBILITY AND INCLUSIVENESS

Inclusiveness as a concept is closely related to accessibility, universal design and design for all. The real definition of inclusiveness means that it is the quality of aiming to include and integrate all people and groups in activities, organizations, political processes, etc., especially people who are disadvantaged or marginalized, who have suffered discrimination, or are living with disabilities. Today we can read very often about inclusive design, as a synonym for universal design or design for all. These different concepts mean the same thing, but they are used in different ways in different countries in the world. For example, the concept "inclusive design" is used in Great Britain, while in several European and Scandinavian countries the concept "design for all" is commonly used. America, as the country where the concept "universal design" originated, uses the terms inclusive and universal interchangeably [3].

Nowadays, we can read very often about inclusiveness in education. That concept means inclusion of children with disabilities in the educational process. This is a complex field that includes transformation from an educational point of view, as well as from an architectural point of view if we talk about accessibility to and in facilities for education. It is clear that increasing accessibility will contribute to increasing the inclusion of children with disabilities in the educational process. This point of view supported by Auf-Franic at al. (2003), points out that a person with a physical disability can develop his/her full potential and civil rights only if the entire environment is adapted for their free movement [8].

In our country research was conducted about the *Inclusion of children and youth with disabilities in mainstream secondary education* by the Ombudsman's Office of the Republic of North Macedonia with the financial support of EU IPA program and UNICEF. The main goal of this research was to provide insight into the current state of inclusion of children and youth with disabilities in regular secondary education, which serves as a base for making recommendations for the improvement of inclusiveness of the Macedonian educational system [9].

Physical accessibility is one of the main factors for the inclusion of children with disabilities in the educational process in our country. Within the mentioned research, 92 schools throughout the country were included. The research has shown the following:

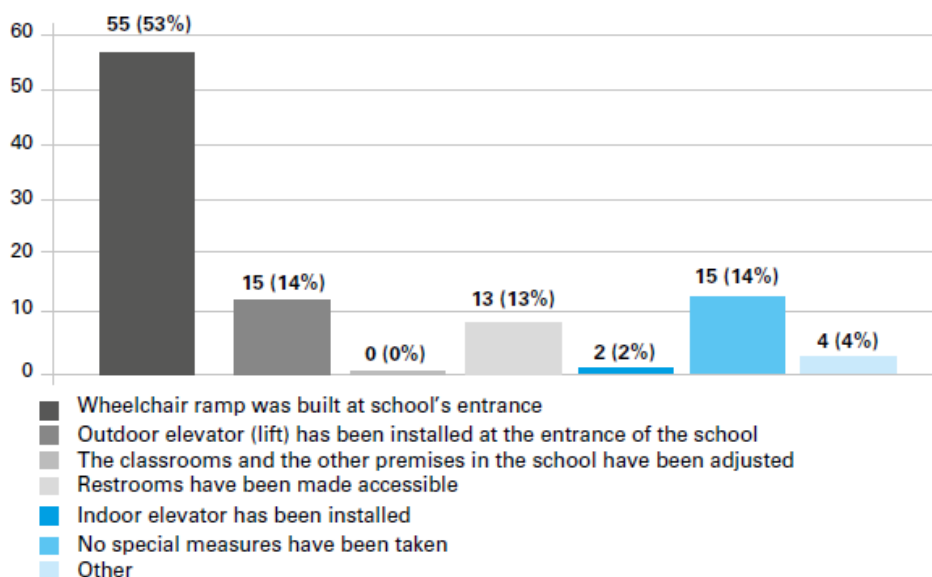


Figure 5. Diagram of physical accessibility in schools [9]

From this diagram we can see that the situation for physical accessibility in our schools for secondary education is not good, and that makes the inclusion of children and youth with disabilities difficult. During field tests they received some of the following answers about physical accessibility from the students with disabilities:

"The wheelchair ramp at my school is too steep, so I can't go up and down on my own" [9].

"The hardest thing for me in school is not being able to use the restrooms, because they are not accessible..." [9].

The easiest adaptation that schools made in relation to ensure the accessibility of children and youth with disabilities is teaching all lessons in a classroom located on the ground floor. But this would be possible if there was accessibility to the facilities. So, it is not enough to provide only accessibility to the facilities or in the facilities. The inclusion of the children and youth with disabilities in the educational process needs full accessibility in and out of the facilities.

CONCLUSION

Insufficient education and awareness of people about the needs of people with disabilities for equal inclusion in society contributes to their limitation in terms of accessibility. It is difficult to change that whole point of view quickly, but by changing the existing attitudes and points of view, by finding new solutions in architecture, by perceiving the already applied positive examples and experiences, it is possible to influence the raising of awareness among people. Nowadays, more and more attention is being paid to the process of designing new buildings, to taking into account the needs of people with disabilities. However, the entire process of changes in the existing buildings is long and cannot be realized in its entirety.

Schools, like other facilities, are very important to be accessible and to ensure free manipulation around and in the facilities. It will increase the percentage of children with disabilities who will be able to participate in the educational process. That is a step up towards inclusive education that many countries around the world are advocating for.

By showing awareness of the obstacles that exist in the everyday environment and trying to reduce them to a minimum, we act ethically and responsibly respecting the basic rights of people with disabilities. As in other fields, the thesis of Professor Stephen Hawking is valid in architectural design too, which says that *"In fact we have a moral duty to remove the barriers to participation, and to invest sufficient funding and expertise to unlock the vast potential of people with disabilities"* [10].

REFERENCES

1. United Nations (2006): *Convention on the Rights of Persons with Disabilities and Optional Protocol*;
2. Коробар В., Пенчиќ Д., Дамчевска С., Карпенко Џ. (2006): *Пристапност – прирачник за обезбедување непречен пристап до отворените простори и до објектите*, Полиоплус, Скопје;
3. Bordas Eddy M. (2017): *Universal Accessibility: On the need of an empathy-based architecture*, Tampere University of Technology, School of Architecture;
4. Perez Liebergesell.N, Peter-Willem Vermeersch, Heylighen A. (2018): *Designing from a Disabled Body: The Case of Architect Marta Bordas Eddy*;
5. Goldsmith S. (1997): *Designing for the Disabled: The New Paradigm*, Routledge, London;
6. Goldsmith S. (2000): *Universal design. A Manual of Practical Guidance for Architects*, Architectural Press;
7. Boltis.B. (2019): *Moralni aspekti u filozofiji arhitekture*, Završni rad, Sveučilište u Zagrebu;
8. Auf-Franić, H., Olujić, V., Žarnić, T., Bertina, M., Rister, L., & Rot-Čerina, V. (2003): *Arhitektura bez barijera u zgradama za obrazovanje*, Arhitektonski fakultet Sveučilišta u Zagrebu;
9. Ombudsman's Office of the Republic of N.Macedonia (2018): *Inclusion of children and youth with disabilities in mainstream secondary education*;
10. World Health Organization (2011): *World Report on Disability*, Geneva.

ВАЖНОСТА НА АРХИТЕКТОНСКАТА ПРИСТАПНОСТ ВО МОДЕРНОТО ОПШТЕСТВО

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Резиме

Архитектурата е област која е насочена кон проектирање, планирање и организирање на просторот во согласност со потребите на човекот и во рамки на неговите способности. Имајќи во предвид дека околу 15% од светската популација има некаква форма на попреченост, неопходно е да се проектира животна средина пристапна за што е можно поголема група на луѓе. Овој архитектонски пристап придонесува за зголемување на вклученоста на лицата со попреченост во секојдневните животни активности.

Образованието, како најважна алка во општеството, е поврзана со архитектонската пристапност во овозможување на слободен пристап на децата и младите со попреченост до и во објектите за образование. Со тоа се дава слобода на децата со попреченост да ги развијат своите интелектуални потенцијали и да се вклучат во образовниот процес. Од тука може да се каже дека, архитектонската пристапност е поврзана со инклузивното образование, а тоа е важно за развојот на секое општество.

Покажувајќи свест за препреките кои постојат во секојдневното опкружување и настојувајќи тие да се сведат на минимум, постапуваме етички и одговорно почитувајќи ги основните права на лицата со попреченост. Како и во останатите сфери така и во архитектонскиот дизајн важи тезата на професорот Стивен Хоакинг која вели дека „Всушност ние имаме морална должност да ги отстраниме бариерите за учество, и да вложиме доволно средства и експериза за да го отклучиме огромниот потенцијал на лицата со попреченост.“

Клучни зборови: *попреченост, архитектонски бариери, пристапна околина, универзален дизајн*