Physically disabled people in higher education buildings

PhD. Eng. Arch.
ROMAN CZAJKA
Wrocław University of Science and Technology
Faculty of Architecture
ORCID: 0000-0003-0318-3140

MSc. Eng. Arch.
JÓZEFINA FURMAŃCZYK
Wrocław University of Science and Technology
Faculty of Architecture
ORCID: 0000-0001-7365-7554

The aim of this study is to present analyses carried out in higher education buildings in terms of accessibility for people with physical disabilities. The essence of the research is to find solutions that improve both the physical and mental condition of people with reduced mobility.

Disabilities in higher education buildings are still an area of great concern. Already at the stage of choosing the university young people with limited physical movement are partially excluded because of a lack of proper equipment. Worth to be considered is the fact, that accessories for the disabled tend to be non-ergonomic and mismatched. We often come across spaces for disabled people, that have been designed in ineffective way and unaesthetically [2]. Obsolete equipment gives spaces an unfriendly character, that deters potential users. Public buildings such as universities should ensure maximum safety and providing students and teachers protection form physical and mental injuries. People with disabilities want to equal users, who can use the space on their own without any type of humiliation. It is the responsibility of the university authorities and designers, to create a safe and comfortable space for all also with physical disabilities, just to mention the senior professors.

Fig. 1. Entrance to the E-1 building at the Faculty of Architecture of the Wrocław University of Science and Technology, marked with elements adapted to the disabled

Archiwum: authors drawings

Aim and methods of research

The way to learn about solutions for people with disabilities was to pay attention to real examples (so called case studies and good practice) and literature. Worthwhile are developments at Faculty of Architecture of the Wroclaw University of Science and Technology. To make the research legible, studied examples are presented in photographs and original sketches relating to the situation. Dimension adjustment was based on valid literature studies from scientific recourses. Particular attention was paid to solutions that facilitate the functioning of people in wheelchairs, due to many architectural barriers still observed in the public space. Deep considerations and observations of the current state of the universities complement and confirm the assumptions made at the stage of literature review. Summing up this part of research was conducted with following methods: at the beginning – gathering and organizing data, then for literature review – analysis and synthesis to draw up conclusions for second part, which was case study. Here critical analysis was based on studies in situ supplemented by graphical analytical review of gathered drawing and photographic documentation.

The main goal of this research was to review practical solutions for people with disabilities in building for higher education, than choose and present those, that according to literature, standards and professional experience, can be referred to as good practice. Moreover, in the conclusions section, it was crucial to point out, that proper design in this respect is not only following ergonomic rules and law, but most of all creating architecture by all users well-precepted.

Issue and solutions

A frequent challenge for designers of public buildings is to create both ergonomic and friendly space for people with disabilities. Incorrect solutions can isolate ones with reduced mobility. The basic good practice is to follow the regulations enforced in each country. In Poland, 'technical conditions' [5] regulate in detail the parameters of the ramp and handrails adapted for the disabled. Looking at foreign trends, it can be concluded that these regulations should become more demanding in terms of newly designed buildings. An additional hint is the standard [6], which was used as the basis for drawing up sketches and diagrams.

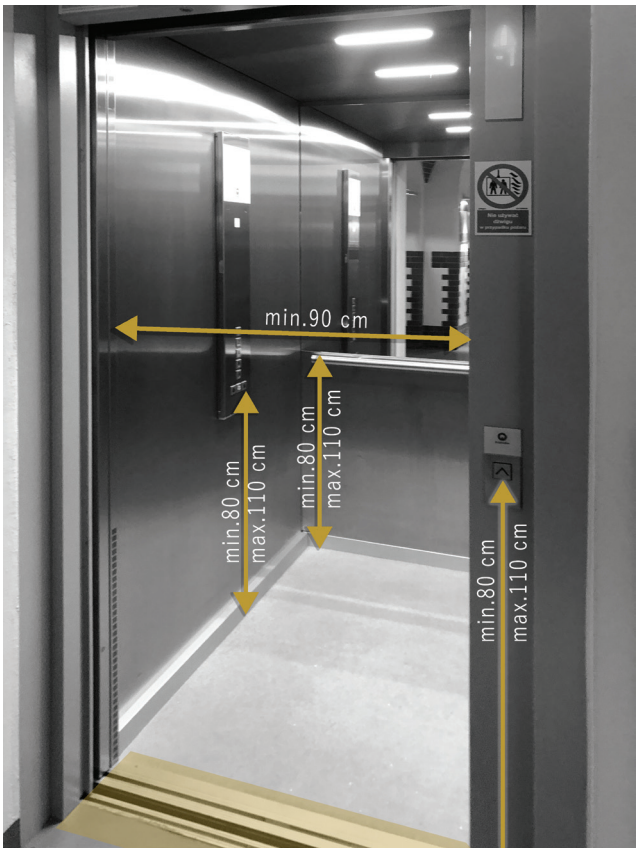

Fig. 2. Elevator in the E-1 building at the Faculty of Architecture of the Wrocław University of Science and Technology with the marking of elements adapted to the disabled

Fig. 3. Side stairlift in the E-1 building at the Faculty of Architecture of the Wrocław University of Science and Technology with the significant manoeuvring space next to the lift marked

A particular issue, while discussing universities' architecture are lecture halls. The rising auditoriums, to provide good visibility and hearing, have been historically provided with stairs, that are extremely difficult to adapt to the needs of motion aid devices. Thus, usually in such audiences', wheelchairs can be settled either in front of the stage or at the crown. Currently, provision of hall entrances from different levels enables a physically disabled person to choose an appropriate place. Here, an important issue may become awareness of the university society and the organization of additional aids for people with reduced mobility. Higher rank schools, in addition to adapting the space, provide also guides and space instructions. This is a proper way to familiarize students suffering from temporary and permanent disabilities with the technical infrastructure of the building.

Case studies

Newly raised buildings, in accordance with the current demanding standards, are planned with full access for the disabled, considering each entrance and room. Modern university buildings represent a high level of care for people with disabilities. Among them we can distinguish Delft University of Technology or University of Turin. Situation is quite different considering schools set out in historic, monumental buildings. In reference to this issue, during studying the case of the Faculty of Architecture of the Wroclaw University of Science and Technology (FA WUST), we can observe the good design practice. Of course, in historical buildings, it is possible to introduce adaptations. First element are main entrance doors, which state a significant obstacle, for in the adapted university there are heavy, large, historic doors, which, are difficult to open for an able-bodied young person, and are almost impossible to open for the disabled in a wheelchair. Therefore, in FA WUST a different, additional entrance (Fig. 1.), was designated. It was properly marked and became the main communication for a person with reduced mobility. Moreover, this entrance was equipped with call button, which should be located at 80-110 height from floor [1]. Another necessary condition, from the point of view of the applicable standards and regulations, is functional design of all devices and at appropriate heights. When proposing an elevator (Fig. 2.), it is important that the level of the upper floor of the room is equal to the floor level of the elevator, due to the users with various types of disabilities. The buttons should be available on height from 80-110 cm up to 150 cm (the upper rim), hence should be adjusted to the capacity of a person sitting in a wheelchair. Minimal wideness of doors is 90 cm [7][8]. The side stairlift (Fig. 3.), most often used between the half-floors, should be designed in a place where adequate space will be provided for its unfolding and for the approach [7][8].

Toilets for people with disabilities remain the primary issue. Based on the relevant standards [6], the distance diagrams of the toilet equipment are shown. A significant moment of transferring to the toilet bowl (Fig. 4.) is facilitated by movable handles and collision-free access, which, if possible, should be provided from both sides due to various types of disability [3]. The issue of the height of the toilet (upper rim in range between 40-45 cm) and the distance from the paper tray is also significant (Fig. 5.) - 20-25 cm from toilet bow's rim and at max. height of 100 cm). The disabled toilet designed at the Faculty of Architecture of the Wroclaw University of Science and Technology is a correct example of compliance with both the principles of ergonomics and aesthetics (Fig. 6.), which is non-less important [Brawly]. The colours do not dominate, they do not disturb the sense of space, while taking care of the psychological comfort of the user by diversifying the floor and walls. Materials and firm and resistant, of a high quality, which is necessary for building of public function, where toilets are constantly used [7][8].

In the hand washing area, the issues of appropriate dimensions are also important. Height, accessibility, and distance from the battery are the basic parameters determining a properly designed washbasin for the disabled (Fig. 7.). Equally important is the correct selection of a mir-

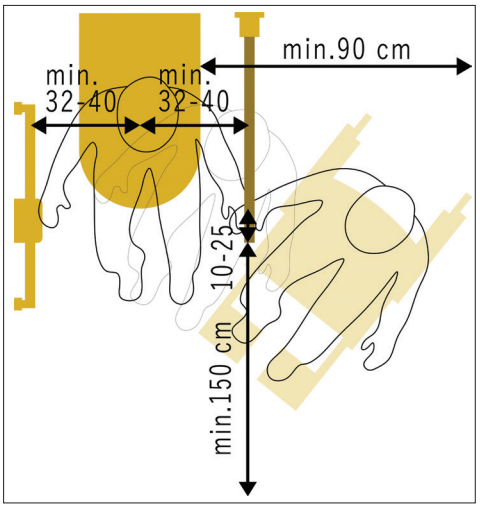

Fig. 4. Diagram of a disabled toilet showing transfer from a wheelchair with dimensions in accordance with ISO 21542:2011

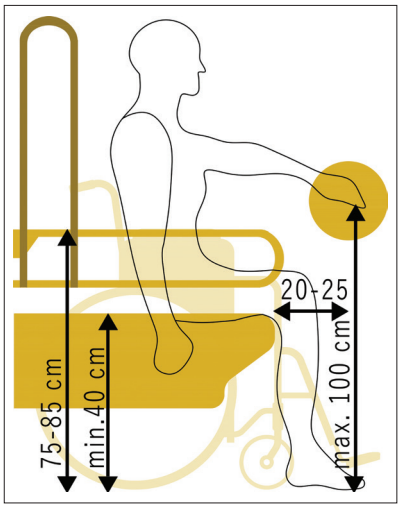

Fig. 5. Diagram of a toilet for disabled people, showing the distances to individual items of equipment, in accordance with ISO 21542:2011

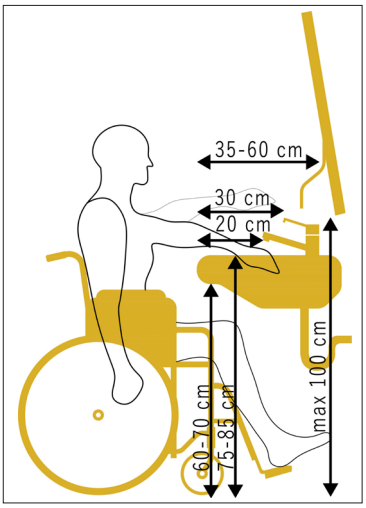

Fig. 7. Diagram of a sink for people with disabilities, showing the distances to individual pieces of equipment, in accordance with ISO 21542:2011

ror that will allow adjustment so that a person sitting in a wheelchair can see on reflection. The example presented in the photo (Fig. 8.) implements the basic assumptions, and all the necessary elements.

What for a non-disabled person may seem irrelevant to a person with physical or mental health imbalance may be a problem . Such mundane issues as paper trays locations, soap dispensers or mirrors can make valid difference and raise overall comfort. Also, awareness that foot opened litter bins, are not suitable in these cases. Moreover, they should be at the right height – from floor around 45-60 cm the upper rim [1] – and distance from the sink or toilet (wheelchair's operation wideness cannot be less than 80 cm) and opened by hand. An automatic lighting system that facilitates operation is also advantageous, if it is properly adjusted so that the light does not go out while using the toilet [7][8].

Not only building solutions but also urban ones for higher schools must be provided. By focusing only on the building, we will not design a comprehensively functioning space. The example of the Luigi Einaudi Campus in Turin presents excellent solutions of the main entrance zone with appropriately designed driveways and public green areas [4]. There are elderly and disabled people among university professors, and for this reason, devices facilitating the functioning of people with disabilities should be located in zones intended

Fig. 6. Toilet for disabled people in building E-5 at the Faculty of Architecture of the Wrocław University of Science and Technology

Fig. 8. Sink for disabled people in building E-5 at the Faculty of Architecture of the Wrocław University of Science and Technology

for teachers. In public spaces, it is worth proposing a convenient and easily accessible car park and a driveway with a taxi stand that can be used by disabled students and professors. Routes for people with physical disabilities should become shorter, simpler, and more accessible. By providing comfortable ramps already at the design stage (new or adjusted building), the designer enables independent functioning for people with reduced mobility. The contact between the inside and outside should remain collision-free, designed with care for the absence of thresholds and curbs. Delft University of Technology has created an accessible space, bearing in mind the disabled, who are free from any obstacles preventing movement. The website of this university has a map that shows disabled parking spaces on campus. The outer roof of TU Delft Library is a very advantageous space, which, thanks to the ramp, can also be used by less able students without any problems.

Conclusions

To adapt the building of higher education, we must consider many aspects. The basis is the applicable regulations; however, they are not enough and at occasion hard to follow (adaptations in historic buildings). A European Disability Strategy has been created to make Europe free from barriers. According to this strategy, accessibility explains that people with disabilities have access, on an equal basis with others, to the physical environment, transportation, information and communications technologies and systems (ICT), and other facilities and services.'[9]. It is the mission of architects to ensure these basic needs of people with disabilities are met. Whereas directive on the accessibility requirements [10] expands the concept to include specific products and services. Such regulations make it easier to enforce solutions that help in navigating public spaces and not only for people with reduced mobility. Therefore, following guidelines where additionally provided, based on this study and aforementioned considerations:

- interior must be integrated with exterior – the way of wheelchair must be continuous, without steps and thresholds from parking or public transportation stop through outside, inside, halls, sanitary areas, corridors, elevators lecture rooms and theatres, to professors' and staff offices,
- elevators, cloakrooms, facilities, sanitary rooms cannot be just adjusted, for proper measurements, equipment, and its placement, with high quality materials and aesthetics must be provided,
- lecture theatres should be accessible in many places, not just designated for people moving on wheelchairs,
- overall design should be so called 'democratic', for all.

Architects should ensure that these modern and ergonomic spaces also become visually attractive. Despite of many years of customizing spaces for universal access, these still need for further improvement. especially in historic built substance and for different types of disability. Thus, the research will be continued.

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Abstract: The aim of this study is to present analyses carried out in higher education buildings in terms of accessibility for people with physical disabilities. The essence of the research is to find solutions that improve both the physical and mental condition of people with reduced mobility. Methodology of this paper was introduced on two levels. First was analysis of literature and design solutions, that have a direct impact on the movement of disabled students and employees around educational institutions. Second was preparation of sketches and diagrams presenting the research results (graphical method). The above research and analyses extend the study field on the concept of movement of people with physical disabilities to issues of educational facilities and present a series of design guidelines, that can be proposed in this type of space. People with physical disabilities are very often excluded from academic life due to insufficient adaptation of facilities to their needs and capabilities. well organized space ensures physical safety, protecting the user from injuries, while the design of the aesthetics of the interior space can contribute to the improvement of mental health.

Keywords: disabled, higher education, building, education, architecture

Streszczenie: OSOBY NIEPEŁNOSPRAWNE RUCHOWO W BUDYNKACH SZKOLNICTWA WYŻSZEGO. Celem niniejszej pracy jest przedstawienie analiz przeprowadzonych w obiektach szkolnictwa wyższego pod kątem dostępności dla osób niepełnosprawnych ruchowo. Istotą badań jest wyszukanie rozwiązań poprawiających zarówno kondycję fizyczną, jak i psychiczną osób o ograniczonej zdolności poruszania się. Metodologia pracy obejmuje dwie płaszczyzny badań. Pierwsza to analiza pozycji literaturowych oraz rozwiązań projektowych mających bezpośredni wpływ na poruszanie się niepełnosprawnych studentów i pracowników po placówkach edukacyjnych. Druga obejmuje sporządzenie szkiców oraz schematów prezentujących wyniki badań (metoda graficzna). Powyższe badania i analizy rozszerzają pole badawcze poruszania się osób niepełnosprawnych ruchowo o problematykę obiektów szkolnictwa, a także prezentują serię wskazówek projektowych możliwych do zaproponowania w tego typu przestrzeniach. Osoby niepełnosprawne ruchowo bardzo często zostają wykluczone z życia akademickiego ze względu na niedostateczne dostosowanie obiektów do ich potrzeb i możliwości. Odpowiednio zorganizowana przestrzeń zapewnia bezpieczeństwo fizyczne, chroniąc użytkownika od urazów, natomiast projekt estetyki pomieszczeń może się przyczynić do poprawy zdrowia psychicznego.
Słowa kluczowe: niepełnosprawni, szkolnictwo wyższe, budynek, edukacja, architektura