

# Student and community engagement to increase the implementation of an inclusive environment

Lenka Suláková, Zuzana Čerešňová & Natália Bošková Filová

Slovak University of Technology in Bratislava  
Bratislava, Slovakia

**ABSTRACT:** In the context of teaching the course Universal Design in the Faculty of Architecture and Design at Slovak University of Technology in Bratislava, Slovakia (FAD-STU), research on how to increase student and community engagement focusing on environmental analysis and participatory planning was conducted. The intention was to advance students' knowledge of how to work with the universal design principles and the user experience aspect of functioning in selected buildings with the aim of creating solutions that support inclusive environments for all. In the analysis of the built environment, emphasis was placed on the issues of the seven principles of universal design, whether in residential or public buildings, which are an essential part of architectural design. The research findings indicate that the building users were largely unaware of whether the environment in which they live was equally designed for all people, but they agreed that it is important to design according to inclusive principles. For a more complete participatory design process, it is necessary to raise public awareness of the universal design principles.

## INTRODUCTION

The Universal Design (UD) course has been a part of the curriculum in the Faculty of Architecture and Design at Slovak University of Technology in Bratislava, Slovakia (FAD-STU) since 1995, and is one of the courses that encourage students to develop an inclusive and human-centred design of the built environment. Similar topics are also explored in a wide range of other courses in this Faculty, from urban planning, through architecture, to design. Vitková et al address *teaching urban design related to the issue of social inclusion in studio work* [1], and Čerešňová et al investigated the implementation of UD principles in *the [studio] works of students in the second, fourth, fifth and sixth year of study in architecture* [2]. Also design courses concerning body conscious design and humanisation of microenvironment led by Kotradyová relate to this topic in terms of *the problematic of the well-being or the complex comfort in the built environments, in general, particularly requires a holistic approach* [3]. Multisensory comfort, taking into account human comfort zones, is influenced by the shape and layout of the building, which are also aspects that should be more emphasised when teaching architecture, as Legény et al state *an empathic façade invites people to get closer or enter the building* [4].

At the beginning of the semester, students in the UD course explore the built environment in empathy exercises from the perspective of people with different disabilities, such as persons using wheelchairs or those with visual impairments, to better understand the diverse needs of individuals in the environment and to build the empathy which supports the design of inclusive architecture. In the seminar work, students already have the opportunity to apply the acquired knowledge to practice in solving various topics using the human-centred approach involving users of the environment in the design process.

## METHODS

As part of the UD course, research was carried out with the collaboration of students in order to increase interest in participatory planning and the involvement of users of the environment and the whole community in the process of designing the built environment, and to increase their awareness of the principles of universal design.

Students were asked to work on one of four proposed topics and focus on it under the guidance of a teacher during the whole winter semester 2023-2024. After choosing the topic, students selected one residential or public building located in Slovakia or abroad, which they analysed in detail by on-site research, review of available sources and documents, or a questionnaire survey. One of the topics included the analysis of accessibility of a residential building and a selected residential space, supplemented by a research part through questionnaires addressed to residents of these buildings. Questionnaires were chosen as a tool to determine the awareness of the issue and to identify existing barriers with the help of the residents of these buildings. The questionnaire data were processed in the form of graphs based on answers to open questions. The method

of questionnaire research among users of the built environment, in combination with other research methods, proves to be relevant for identifying the conditions for inclusion and well-being. Hanták and Končeková used this method, for instance, in research with a *questionnaire oriented towards teachers and educators* [5]. In the context of residential architecture, Taraszkiewicz and Taraszkiewicz also conducted research using questionnaires in the Faculty of Architecture at Gdańsk University of Technology, Poland [6]. The *tear-off questionnaires* type of research has recently been applied by Boháčová and Schleicher to explore theatres that should *become more inclusive, more accessible* [7].

Data gathered from the questionnaires helped students gain a comprehensive view of the needs of residents, while emphasising the importance of universal design in providing an inclusive environment for all people. Participation in the form of questionnaires was intended not only to increase student engagement in the learning process, but also to teach students how to work with focus groups and demonstrate the importance of responding to people's needs and being able to react to their requirements in the built environment.

## RESEARCH ON UNIVERSAL DESIGN IN THE RESIDENTIAL ENVIRONMENT

One of the four seminar topics was focused primarily on residential buildings in Slovakia in the context of the seven principles of universal design. A pair of students chose one apartment building, and the condition of their choice was that they had access to the building and could get into all the spaces as much as possible, whether common or private spaces of the selected apartment. In the first stages of the seminar work, students visited the buildings of their choice. Personal contact with the building, as well as the inhabitants, was an important part of the analysis process. Different tools were applied to process the assignment, such as photo-documentation of the designed buildings, supporting documents, such as maps, site plans, floor plans of the apartment units and questionnaires. Through photographs, they mapped the exterior and interior residential space of the apartment building, from the exterior parking areas, entrance doors and vestibules, elevators (if they were part of the building), vertical and horizontal circulation spaces, to the apartment unit, in which they documented every room.

Seminar work was submitted by students in the form of a poster, which consisted of several parts: basic information and photographs of the building, situation, description of the task and the aim of the analysis, floor plans of the apartment, photographs of the analysed spaces (exterior and interior) and a questionnaire. The situation was examined in terms of the key contexts, such as the nearest public facilities, the location of the building in the urban context, parking, public transport stops and walking distances. The textual part of the seminar papers analysed the problems and barriers found and explained the proposals for adaptations of the residential environment and space in relation to the seven principles of universal design. The floor plans of the selected apartments were divided into the negative and positive aspects. Photographs and graphic parts presented research using the design method by drawing the identified problems and barriers directly into photographs taken in the field, sketches, diagrams and other graphic elaborations.

As part of the research, questionnaires were chosen as a tool to determine awareness of the issue and to identify existing barriers from the perspective of the residents of the apartment building under study. Involvement with the residents enabled the students to better understand the needs of the users and to properly design appropriate modifications to the living environment.

## CASE STUDY SLNEČNICE

Students Katarína Lojová and Kristína Lipiaková analysed an apartment building located in Bratislava (Figure 1 to Figure 3), in the Petržalka district in the development called Slničnice (Sunflowers) by Compass Architects (part realised in 2015 - 2018). Slničnice is the largest newly built residential district in Slovakia and has been developed by the developer Cresco Real Estate. Juraj Benetin and Matej Grébert, principal architects at Compass Atelier, say ... *We think that good architects make environments like Slničnice for all generations. For everyone - from babies to old people with a cane* [8]. This statement, as well as the fact that in Slničnice ... *the quality architecture of the buildings by Compass Architects is associated with good transport accessibility, nice public spaces and, above all, great amenities* [8], show that architects care about inclusion and universal design. Given this fact, and because the research into this significant new neighbourhood development has yielded some notable findings, it has been selected for a more detailed presentation in this article.



Figure 1a: Exterior spaces of the analysed apartment building in Slničnice (seminar work, winter semester 2023-24, photographs by students: Katarína Lojová and Kristína Lipiaková).



Figure 1b: Exterior and interior spaces of the analysed apartment building in Slněčnice (seminar work, winter semester 2023-24, photographs by students: Katarína Lojová and Kristína Lipiaková).



Figure 2: Floor plans of the analysed apartment in regard to the identified negatives (l) and positives (r) in the apartment building in Slněčnice (seminar work, winter semester 2023-24, students: Katarína Lojová and Kristína Lipiaková).



Figure 3: Analysis of the interior spaces of the selected apartment in the apartment building in Slněčnice (seminar work, winter semester 2023-24, students: Katarína Lojová and Kristína Lipiaková).

## RESULTS OF QUESTIONNAIRES FROM RESIDENTS OF SLNEČNICE

The questionnaire prepared in the framework of the UD course demonstrated the importance of participation with the users and inhabitants of the building under study. The questionnaire was distributed via social networks, a total of 28 people participated and answered 11 questions. This provided the necessary data for analysis, which was then processed and evaluated in tables and graphs (Figure 4 and Figure 5).

A short introduction was included at the beginning of the questionnaire for respondents and users of the apartment building to understand its intent and purpose:

*The topic of our seminar paper is the research of a housing unit and apartment building in the southern part of Slněčnice and its assessment in terms of complying with the seven principles of universal design. Our work is also about collecting the identified shortcomings from the perspective of the residents themselves, in order to provide possible interventions to address them [9].*

The first question in the survey aimed to find out whether the users of the apartment building were aware of, or had encountered, the term universal design. Rollová et al state that universal design is a term defined as a method of designing environments taking into account the requirements of a broad range of people, with different abilities and limitations. The universal design method is embodied in the UN Convention on the Rights of Persons with Disabilities [10]. Of the 28 people who answered the first question, 23 answered *no* and five answered *yes*. Regardless of whether respondents answered *yes* or *no*, the second question tested whether they could describe in a few sentences what they thought the term universal design mean. Answers to this question were varied, with some differing from the definition of universal design, for example:

- *General ideas.*

- All the ordinary things needed to live in the district so we do not have to commute to access them - shops, services, education, etc.
- Some kind of automated process.
- Designing residential and non-residential spaces in the same layout without major changes in order to save time for the architect, builders, etc.
- General basics for the design of a house/apartment so that its quality is the best and most appropriate within the conditions of the surroundings and the standard of living.

Some answers were quite accurate in describing the universal design method, for example:

- Designing space to suit everyone (young, old, healthy, sick people...).
- Designing optimal space for most people.
- Usage suitable for all, equally comfortable for elderly, people with disabilities, children...
- Universal design for all is accessible design. That is, designing buildings, environments for all or for as many people as possible, regardless of their physical abilities, health or age...
- Universal, that is, suitable for different people's needs with the possibility of modification according to time or requirements.

Do you know what the term *universal design* means?

Do you know at least one of the seven UD principles?

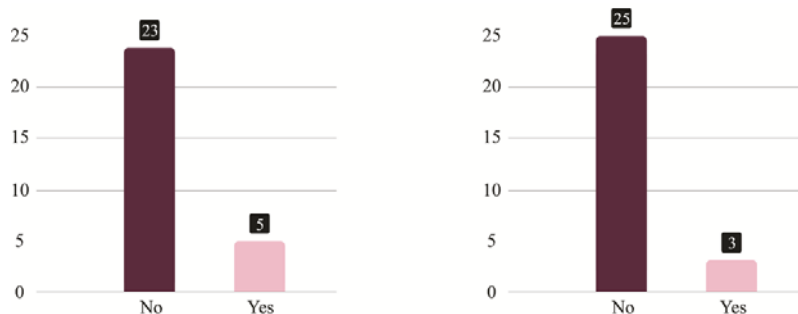


Figure 4: Questionnaire responses to the universal design question and the question on the seven principles of universal design (2023-24, students: Katarína Lojová and Kristína Lipiaková).

The third question was focused on the seven principles of universal design. In 1997, Ronald Mace and his team at the Centre for Universal Design (Collage of Design, North Carolina State University, USA) formulated the seven principles of universal design: 1) equitable use; 2) flexibility in use; 3) simple and intuitive use; 4) perceptible information; 5) tolerance for error; 6) low physical effort; and 7) appropriate size and space for approach and use [11]. Nowadays, these principles in design practice are used, as well as included in academic curricula in courses focused on universal design. Through the questionnaire, the students surveyed the knowledge of the seven UD principles among the users of the apartment building. Of the 28 people who answered the third question, 25 answered *no* and three answered *yes*. Respondents were given the option in the next question to elaborate on their answer if they answered *yes*, *no* and *I do not know* (the most common answer), or they expressed their answer in some other way, for example:

- No, I am from a different profession.
- Fire safety, statics, hygiene.

Some answers indicated knowledge of at least some of the principles of UD:

- Equality in use, flexibility in use, intuitive use, error tolerance, low physical effort.
- Equality of use or flexibility.
- Flexibility.

In the following questions, the questionnaire focused on specific UD principles in relation to the apartment building where the users live. Each principle was explained next to the question, so that the users could answer the questions. The answers were closed: *yes*, *partly*, *no*.

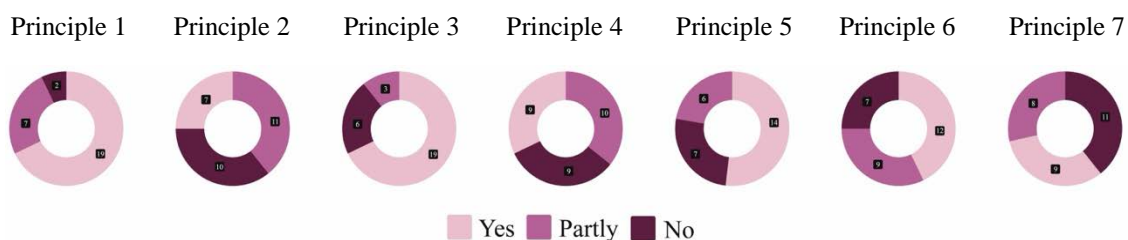


Figure 5: Questionnaire responses on the seven principles of the universal design question (2023-24, students: Katarína Lojová and Kristína Lipiaková).

The last question asked what the residents of the apartment building lack with regard to universal design in their apartment building and the surrounding area. The responses presented varied but also similar views on the neighbourhood's shortcomings, such as:

- *The audible alarm in the elevator.*
- *Handrail on the staircase on each side, difficult to open the front door, narrow space in front of the elevator.*
- *Not enough benches outside, ramps not wide enough, bells are high, hard to open doors.*
- *Community lounge.*
- *Solutions for people with physical disabilities.*
- *The possibility of using the inner blocks for individuals, not just families with children (overall there are an excessive number of children's playgrounds).*
- *Lack of facilities for people in wheelchairs - opening main entrance doors can be more difficult for them. Lack of acoustic information systems for persons with visual impairment.*
- *Barrier-free access to the balcony, fire extinguishers are not in niches and they can be obstacles for people with visual impairment. Some mailboxes are up high.*
- *Addressing sanitary areas with accessible potential for people in wheelchairs.*
- *Easier access to the apartment building, easier handling of the front door, orientation plans, benches...*

Architect Juraj Benetin commented for this article on the topic of participatory design and his experience with it:

*Slněčnice currently has 5,500 inhabitants. Of these, almost 12% are preschool and school-age children and 70% of the population is made up of people of working age 25-45. This makes Slněčnice the largest residential district built in the former Czechoslovakia after 1990. In designing the later stages of the project, we were guided by feedback from the residents, which I think without exaggeration can be called participatory planning. 1) Personal contacts: our family members, close friends and more distant acquaintances live in the residential project. Some members of the studio have lived here for some period of their lives. I consider my conversations with them as my main inspiration. 2) Surveys and polls: the developer Cresco in co-operation with a survey agency conducted several surveys focused on the demographic composition of residents and their quality of life in Slněčnice, satisfaction, initiatives, etc. 3) Outputs from the commercial and administration departments: The developer has been involved in the project for almost 20 years and during this time has continuously collected feedback from clients of apartments, commercial premises, administration and all potential users.*

## CONCLUSIONS

Within the seven principles of universal design in the residential environment, in addition to the case study Slněčnice, several apartment buildings were analysed and investigated through questionnaires. The questionnaires brought a variety of opinions on the issue under study from the users of the analysed residential buildings. The most frequent question was directed to general knowledge of universal design. Of the 38 respondents interviewed, 16 answered *yes* and 22 answered *no* to this question. Some respondents who were familiar with the concept of UD had encountered the term primarily through a person with disability in their surroundings.

Significantly, respondents' answers showed that they were largely unaware of whether the environment in which they live is equally designed for all people. It has also been shown in the research that when the question is closed, the result is more positive than when respondents are asked directly for an answer with an explanation and follow-up questions about the environment in which they live.

The research findings highlight the fact that the concept of universal design can often be misinterpreted by building users. This is due to their inability to identify barriers and obstacles in the built environment. When asked if they thought it was important to design in accordance with universal design, all responses were 100% *yes*. The positive response to this question reflects people's moral convictions in relation to the issue, but the true weight of the issue is only understood when they or a close relative finds themselves in the situation of a person with a disability.

From the overall responses obtained from all questionnaires, the requirements and needs of users of various surveyed residential environments can be assessed, with some missing elements or existing difficulties recurring among the residents' responses, such as: entrance doors with difficult handling, mailboxes at high height, not enough outdoor recreational furniture. Other barriers that respondents mentioned in their answers were specific to the analysed residential buildings and their immediate environment. The most common responses included barriers, such as the absence of an elevator, the difficulty of stairs and lack of handrails, high door thresholds, lack of sensor lights, slippery surfaces or narrow exterior walkways.

In regard to the collected data, including the questionnaire responses from the illustrative Slněčnice case study (the full questionnaire in Slovak is also available via the link provided in the references), students provided the following evaluation:

*From the general information and the responses received, we can draw the following conclusions. The general public is not sufficiently familiar with the concept of universal design and thus cannot be more fully involved in*

*participating in the design of individual projects. This fact does not only apply to the object under analysis and its surroundings. After familiarising themselves with the concepts and their meaning, the residents were able to give examples that they considered negative in terms of universal design in their neighbourhood. Therefore, it is important to expand public awareness of universal design and its principles [9].*

Research shows that the needs of different resident groups must be taken into account when planning residential buildings or complexes and the semi-public space that surrounds them. The case study of Slnecnice found a higher demand for quieter zones, corners for individual relaxation, although it can be noted that there is a lot of good quality outdoor space in the area, including benches and other elements for a variety of relaxation. While it is true that it is appropriate for recreation areas to promote community interaction, more private recreation areas should also be designed. The issue of designing the environment to accommodate both children and people with pets is also important.

In future research, in addition to people's conscious replies from questionnaires, it would be interesting to investigate people's subconscious responses to the built environment in terms of feelings of inclusion and well-being, also using instruments, and to correlate such findings. It would be possible to apply neuroscientific research directly in the environment using biometric devices (EEG, mobile eye-tracker, etc), such as in the research conducted by Kotradyová et al in the waiting room of a healthcare facility [12].

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