Activity and inclusion - the need for enhancing the curriculum on universal design for landscape architecture

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ABSTRACT: Teaching universal design is a must in the contemporary education of engineers who will be designers of public and private spaces in various scales. This refers also to landscape architects. So far, this issue has been included in the landscape architecture curriculum at the level of Bachelor studies in the Faculty of Architecture at Cracow University of Technology (FA-CUT), Kraków, Poland, but to a small extent. The article presents the results of an on-line survey conducted on students of the 3rd semester of landscape architecture in order to check their knowledge on the principles of universal design before the planned introduction of separate theoretical and design modules devoted to this issue. The on-line questionnaire consisted of a mix of close and open questions. The results of the study indicate the necessity of enriching the curriculum with theoretical and practical modules allowing for a broader understanding of the universal design idea among students, taking into account the needs of the widest possible user groups, including those with various types of disabilities.

INTRODUCTION

Landscape architects in recent years have become a profession, which is supposed to play a vital role in addressing the challenges of sustainable development along with ongoing climate and demographic changes [1]. This means that over the course of academic education landscape architects, like other engineers and designers, should become equipped not only with all possible technical skills, but also with the deep understanding of environmental and social aspects of the design process [2].

The outline of the process of teaching landscape architecture in the Faculty of Architecture at Cracow University of Technology (FA-CUT), Kraków, Poland, constructed in the year 2000 supports a holistic approach to landscape architecture design, and takes into account engineering, environmental, socio-economic and cultural aspects, as described in detail by Porada and Zachariasz [3]. The integrated design studio (IDS) as a key concept allows students to successively apply knowledge from many fields in their course projects, which refer to various scales ranging from the private garden, through the public square, historic garden rehabilitation, public park design and projects for larger areas.

The social aspects of the profession are also linked with the principles of universal design (UD), which is a widely accepted approach towards design of *products, environments, programmes and services to be usable by all people, to the greatest extent possible, without the need for adaptation or specialised design* [4]. The wide context of the universal design implementation in teaching architectural design is stressed by Gronostajska and Berbesz with specific emphasis on the case study of housing aimed at the elderly [5]. The study presented in this article focuses, in turn, on the existing state of knowledge on universal design among students of landscape architecture. Currently, issues of universal design are included in the landscape architecture curriculum with reference to existing regulations on technical requirements concerning the accessibility of spaces. Information about universal design is provided during classes on landscape design principles, integrated design studio, landscape perception and building construction - mainly during the first two semesters. There are, however, no specific separate modules on this topic.

This article presents the results of a survey conducted to estimate how much information on universal design students of 3rd semester of landscape architecture already have acquired and what are the gaps to be filled by enriching the curriculum with planned theoretical and practical modules allowing for a broader understanding of the idea of universal design. The reason for this action is an emerging opportunity to improve the curriculum resulting from a special, national scheme. Following the Polish Act of Parliament on Ensuring Accessibility for People with Special Needs (from 2019) [6], the National Centre for Research and Development (NCRD) launched a competition on implementation of universal design principles at universities that teach architecture, urban planning and landscape architecture. The FA-CUT in one of the beneficiaries of this funding scheme, which offers an opportunity to introduce modules specifically devoted to universal design in frames of the first-cycle (Bachelor) studies.

A SURVEY ON UNIVERSAL DESIGN

A survey was conducted among the students of the 3rd semester of landscape architecture first-cycle studies. An on-line questionnaire was prepared using the MS forms, widely used in educational institutions, especially in remote teaching in the situation of COVID-19 pandemic. The questionnaire consisted of a mix of close and open questions divided into five sections (five questions each), which were designed to examine students' knowledge of issues concerning:

- Space organisation for people with physical disabilities;
- Activating solutions for inclusion in social life, and maintaining the physical condition of elderly and disabled people;
- Solutions facilitating special orientation;
- Solutions for sensory stimulation;
- Legal regulations.

The questionnaire was closed by a self-assessment component regarding students' competencies, and three open questions on the scale of difficulty of the above issues, suggestions on the arrangement and ways of teaching and conveying the knowledge. The questionnaire was constructed to reflect the seven principles of UD - equality, flexibility and simplicity in use, perceptibility of information, safety, comfort, appropriate dimensions when creating public spaces, buildings, services, products, information and communication systems [7].

RESULTS

There are currently (in the academic year 2020/2021) 31 students in the 3rd semester of the first-cycle studies in landscape architecture at the FA-CUT. The survey was completed by 28 of them, so the response rate was 90.3%. Because of the small size of the research sample, the results are given in numbers rather than only percentages.

The first section of the questionnaire focused on the issue of space organisation for people with physical disabilities.

Responding to the first question, only four students admitted that they did not know the required dimensions of manoeuvring space for the wheelchair user. However, 12 students gave the incorrect dimensions in centimetres, while the same number responded correctly. All students were aware that a non-stabilised gravel surface does not allow people with mobility impairments to comfortably use the paths, but three students did not justify their answers. The students' explanations referred mostly to the fact that gravel causes instability and wheels blocking or to general difficulties when moving in a wheelchair. Twelve students knew the right size of car parking space for the wheelchair user (3.6 x 5 m), while 13 gave the wrong answer and three did not answer at all. Exactly the same proportion referred to the minimum width of a sidewalk for two wheelchair users to pass each other. Meanwhile, only eight students knew the maximum inclination of a ramp of 1 m in length (in %), while 19 answered wrongly and one person did not know the dimensions.

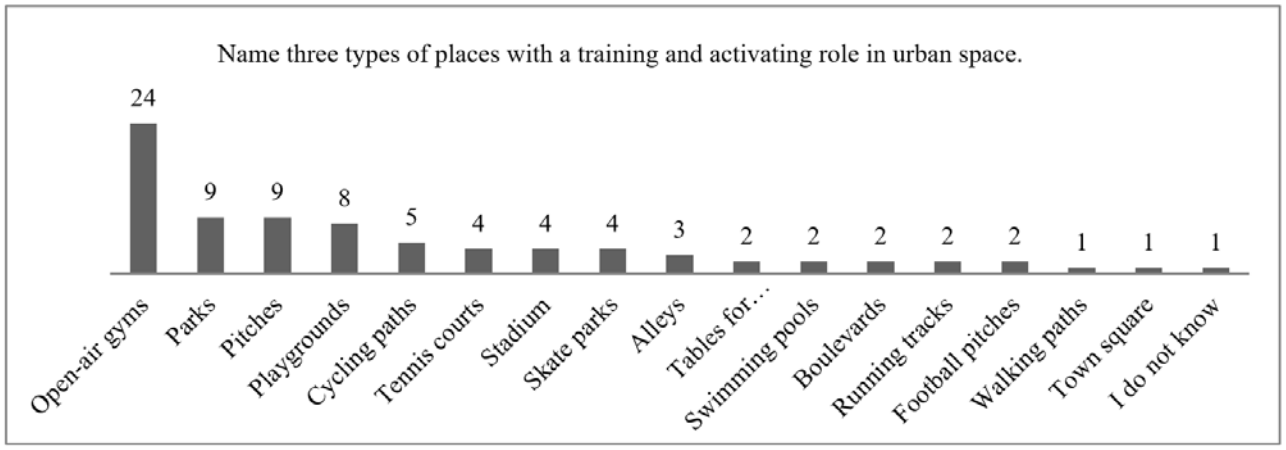

Figure 1: Types of places and landscape elements considered by students as activating in urban space.

The second section referred to activating solutions for inclusion in social life and maintaining the physical form of the elderly and the disabled. Firstly, students were asked to name three types of places with a training and activating role in urban space. The most frequent answer was an outdoor gym (24 answers) - probably since over the last years many such facilities were built in green areas in the course of EU funded projects. The next in row were parks - as green spaces for walking - and pitches (nine answers each) along with playgrounds mentioned in eight cases. Particular sports influenced the choice of further spaces considered as activating: cycling paths (5), tennis courts, stadium and skate parks (four answers each). Far less frequently were mentioned alleys (3), tables for playing chess, swimming pools, boulevards, running tracks, football pitches (2), walking paths (1), town square (1). Only one person admitted to not know any examples.

According to 21 students (75%) institutions that take part in the activation of people with disabilities and the elderly are mainly state agencies and various types of NGOs. Six students could not name any examples and one did not answer this question. Among most often mentioned were local senior clubs (5), and state funds and agencies helping the disabled, such as: State Fund for the Rehabilitation of Disabled People (SFRDP), Office of the Government Plenipotentiary for People with Disabilities (OGPPD) and Polish Sports Association for the Disabled (PSAD) (four answers each) along with community centres and social welfare institutions (3 each). Other examples were mentioned incidentally and included: associations for helping people with disabilities, unions of the disabled - in general, rehabilitation centres, sanatoria, spas and universities of the third age (U3A).

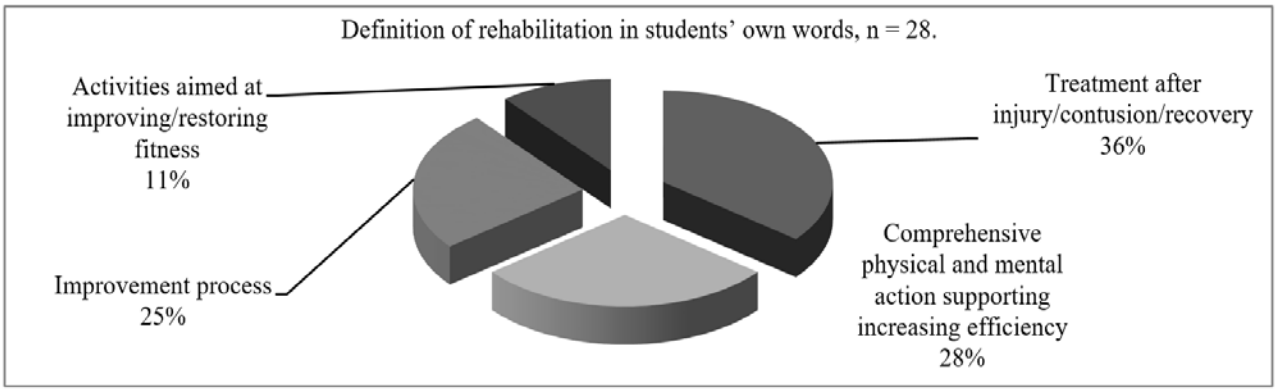

Figure 2: Students' understanding of the definition of *rehabilitation*.

When defining rehabilitation in their own words, students mainly focused on the physical and medical aspect rather than referring to the social process of inclusion. The most common answer was that rehabilitation *is a treatment after an injury or contusion, or medical recovery* (11). Many described rehabilitation generally as *an improvement process* (7), while some defined it as *…activities aimed at improving or restoring fitness and improvement processes* (3). At the same time, eight students claimed that it is *…comprehensive physical and mental action supporting increasing efficiency*. One person claimed rehabilitation in public space impossible, while 16 respondents provided one or more examples on how this process can be conducted. The examples included outdoor gyms and exercise equipment (10), activities, such as walks, exercise, exercise in the open air (5) and horticultural therapy (2) or playing chess (1).

In the next question, students were asked to list three architectural and urban barriers. One person did not name anything and others provided at least two examples each. The most frequently named barriers were (in order of frequency) stairs (19), lack of an elevator (18), too high curbs (11), uneven, unstable surfaces (7), lack of handrail or its wrong height (6), no ramp (5), narrow paths/sidewalks/passages (5), uneven and too narrow paths (2). Narrow corridors, underground passages, a bridge, no clear signs, traffic lights without sound and fountains were mentioned only once each.

The following question was about examples of solutions to eliminate spatial barriers. Here, three students gave no answer, while the most common remedy for spatial barriers was the construction of a ramp (15) and the use of elevators (11), as well as suitable surfaces: even, but not slippery (6) and lowered curbs (5). Far less frequently was mentioned the construction of driveways (3), providing handrails and handles (3), differentiation of the surface to signal the change (2), use of colour, texture, Braille as markings (2), construction of a platform/lift (2), widening paths (2), avoiding underpasses (2), small differences in altitude to overcome (2), sound signalling (1) or larger changing rooms in stores (1). Just one person mentioned a solution, which was not purely technical, but referred to social interaction described as building integration sites.

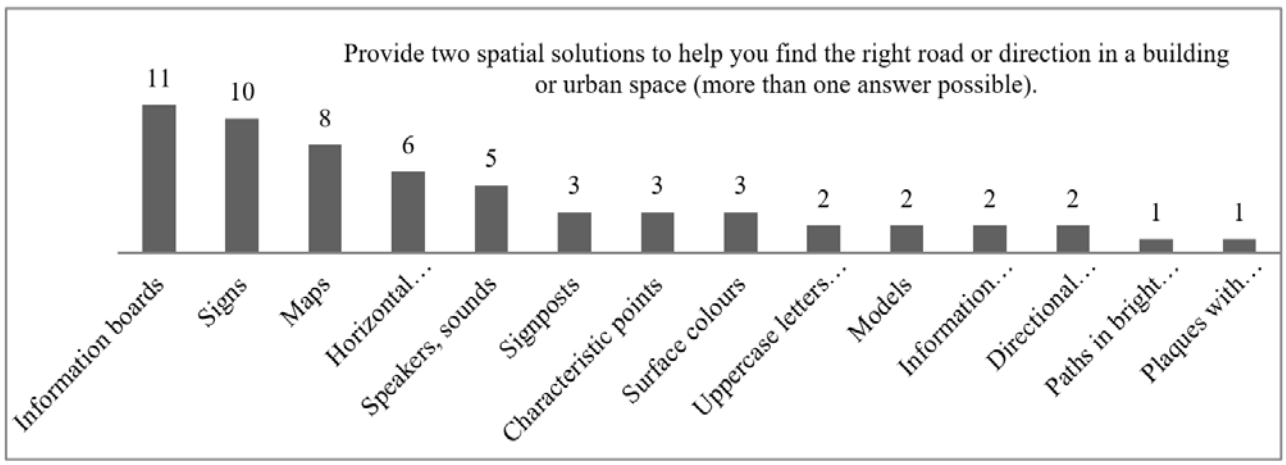

Figure 3: Most frequently mentioned solutions helping to find the right way or direction in a building or urban space.

The third section was about solutions that may facilitate special orientation. Firstly, students were asked to provide two spatial solutions to help them find the right road or direction in a building or urban space (e.g. to a public transport stop, institution). The most frequent answers referred to various types of clear graphic elements, among which the most popular were information boards (11), signs (10), maps (8) and horizontal markings in the pavement (6) along with similar solutions (signposts, surface colours, uppercase letters on the boards, information boards at intersections or directional markings, like arrows). Some students mentioned also sound information, indicating speakers (5) or tactile elements like models (2) or Braille signage. Only a small group of students could explain what the colour code is (5), while as many as 13 described its technical parameters related to computer or screen settings and graphic colour profiles - red, green and blue (RGB).

When describing how should the pavement be shaped for the blind and visually impaired, students indicated a possible use of tactile paving and different textures in the first place (15). They did not forget about the appropriate width (13) and special detectable warning surfaces (9). On the other hand, they also mentioned the need of even surfaces with no obstacles (5) and a curb as a helpful element.

Naming two solutions to facilitate spatial orientation for the deaf and hearing impaired in a building and urban space was a much more difficult task for the students. The most frequently provided answers were maps, orientation plans (7) along with signs (6) and oddly enough - sound signals as for a blind person (6). Five students did not answer or admitted they did not know. Only one person suggested an induction loop graphic; among other answers graphic solutions prevailed, like: changes in the road surface (4), colour codes (3), information boards (3), signposts (2), text information (2), model (1) or designation of characteristic points (1).

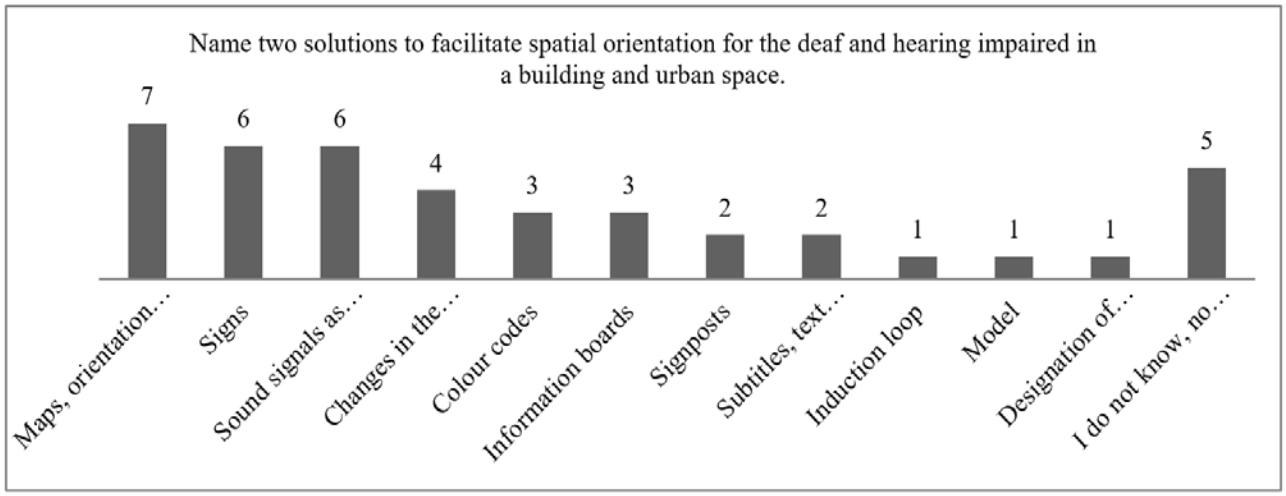

Figure 4: Wide choice of methods facilitating spatial orientation for the deaf and hearing-impaired users of urban space.

When asked to list two ways in which information can be provided to the blind and visually impaired people in public spaces and buildings, students focused on messages and sound signals, also at traffic lights, automatically read (16), and boards with information in Braille (9) along with tactile paving, guide lanes, attention fields (5), while four did not provide any answer.

A section on solutions for sensory stimulation gave interesting and promising results. When listing the senses used by the user of architectural and urban space, students focused dominantly on sight (28), hearing (25), touch (24) and smell (21), while they almost omitted spatial sense and coordination (1), and taste (1). On the other hand, they showed a deep understanding of the impact that urban space or architectural or landscape interiors can have on the feelings and behaviour of a person. Students' answers can be grouped into categories of positive and negative feelings induced by spaces described roughly as *beautiful, harmonious* vs. those seen as *ugly, chaotic, etc.* The aesthetic and compositional features and the relations concerning the scale are presented in Table 1.

Students were unexpectedly assertive about the elements of the composition that can be used for the sensory interaction, and in the first place named vegetation, taking into account its colours, smell, noise of leaves, grasses (22). Far behind were other features, such as light, shadow, contrasts, colour, texture (8), surfaces with different textures (7), sensory and educational paths (5) and water elements, like fountains (3). Only a few mentioned various elements of small architecture, play equipment, elements that make sounds and nature sounds, birdhouses, models, tables, mazes, mirrors. In three cases, there was no answer.

Ideas on the use of sense of touch in landscape design on an urban scale focused mainly on using various textures (22) and Braille boards or models (1 of each). When describing it in detail, students stressed the importance of different textures of planting (7), paths (7) and small architecture (4) emphasising that elements are supposed to be pleasant in touch (3).

Regarding the use of water elements, students described their sensory interactions with hearing (13) and called it often murmur and relaxation (5), with touch (9), including feeling moisture (3), cooling the hot air (2), fog (1), with smell (4), with eyesight including mirror image, colour (3) and movement (1). Typical sensory water elements were listed by 25 students, the majority of whom named fountains, also those with musical features or with coloured light effects (11), along with cascades and waterfalls (6) or flat water surfaces (3).

Table 1: Categories of emotional reactions and feelings that may be evoked by the overall impression made by a landscape interior and setting.

Aesthetic and compositional features		
Types of space	Spaces described as beautiful, good, cosy, cheerful, friendly	Spaces described as ugly, neglected, chaotic, disordered
Feelings and emotional response	Calming, improving concentration, enabling focus of attention, relaxation, delight, positive associations, sense of freedom, good emotions, willingness to come back, share with others, willingness to reflect, escape from the hustle and bustle, encouragement to walk, rest, brings joy, enables relaxation, delight, relaxation, provides sense of security, provides silence, gives stimulation to action, comfort, good mood, cosines, convenience	Depressed mood, potentially higher crime, higher levels of stress, anxiety, discomfort, overwhelming, foreignness, aggression, chaos, sadness, deterrence, anxiety, anger, weariness
Relations of scale and dimensions		
	Small spaces	Vast spaces
Feelings and emotional response	Narrowness, overwhelming, claustrophobia, settling in	Feeling of alienation, loneliness, uncertainty, being small or unimportant, freedom

The next section of the survey explored issues of regulations. More than three quarters of students (22) were convinced that there is a separate section on design for people with disabilities in Polish basic legal regulations on the conditions and requirements for buildings. A considerable number of students could not state the minimum dimensions of the door opening and the maximum height of the threshold - usually remembering just the width. Furthermore, when listing known information sources on universal design, a large group pointed out legal regulations (15) called: norms (6), technical conditions (4), building law (4) and convention (1). Others mentioned the Internet (7), manuals (5), guidelines and strategies (3) or lectures (1). Also, a wrong assumption - although very rational - that in light of the applicable regulations recreational areas within public parks have to be accessible to people with disabilities prevailed, while it is not a matter of any regulation, but actually an application of universal design principles.

In the penultimate part, students performed self-assessment of their competencies in each of above measured sections.

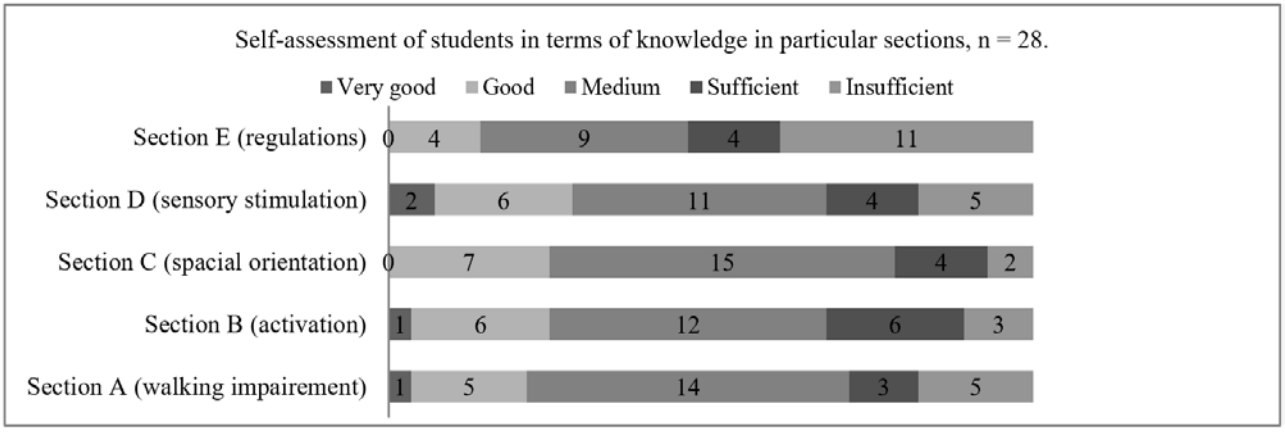

Figure 5: Self-assessment of competencies in particular problem areas concerning universal design.

Students felt least competent in the areas of regulations and spatial orientation (no one claimed that they were very good at it). Their opinion on skills in application of various solutions in sensory stimulation and activation was considerably higher, what was reflected also by their previous answers. This shows that the current methods of teaching regulations seems to be not effective enough to give students confidence of applying them practically.

The last section consisted of open questions and suggestions on the implementation of universal design modules in the future. Students considered as most difficult designing for people from vulnerable social groups, like people with disabilities, seniors, parents with young children, along with memorising all legal regulations. In students' opinion, the issue of regulations and dimensions to ensure that space meets the requirements for people with disabilities should be introduced as first in the cycle/module (12 suggestions). Students indicated that they would like to learn about

universal design in an active way and indicated workshops as their preferred type of classes (12), if possible, in direct contact with a person with a disability (11), apart from lectures, e-learning, books, case studies and meeting with experts.

The most challenging tasks according to students of the 3rd semester of landscape architecture were described as:

- *adapting a particular space for all users while maintaining the appropriate aesthetic values;*
- *designing places where children with disabilities can fully play with other children;*
- *creating a coherent space accessible, suitable and attractive for all groups of users.*

CONCLUSIONS

All in all, the results of this study indicate the necessity of enriching the curriculum with theoretical and practical modules allowing for a broader understanding of the universal design idea among students, taking into account the needs of the widest possible user groups, including those with various types of disabilities. While feeling not confident enough in regard to regulations, students demonstrate significant potential ability to use their design skills to create inclusive spaces that could enable multisensory experiences. It is worth noticing that they declare, and are likely to use, a wide range of landscape and garden features, such as various planting and material properties to improve access to public spaces, like public parks and their rehabilitating and inclusive functions.

Many public and professional bodies formulate guidelines to improve the implementation of universal design. In 2019, also the American Association of Landscape Architects (ASLA) issued their guide [8]. This document puts emphasis on using design solutions to ensure access comfort and inclusiveness of created spaces. The survey results show that students seem to be likely to follow this approach.

A module on the regulations should be introduced along with other normative principles of accessibility and safety rules. Perhaps apart from lectures, an on-line tool for repetition and self-check could improve the effectiveness of learning the regulations. Nonetheless, special emphasis should be put on practical tasks and experiencing the condition of disability or limitation in form of a workshop during which students could meet someone with disability and experience the outdoor space using wheelchairs, a white cane, a walker or roller, crutches, an induction loop, the age simulation suit GERT, and a number of particular disability simulators along with limb orthoses and augmented reality applications.

As experience shows, the human-centred approach and introduction of empathetic simulation exercises contribute to educating designers of truly inclusive spaces, apart from merely reducing physical barriers, as stated by Ceresnova and Rollova [9]. This should help to move from the medical approach, still partly demonstrated by students, to wide social inclusion in landscape design and reaching further than just providing the accessibility of spaces [10].

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