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ASSESSING STUDENTS' PERCEPTION OF MULTISENSORY LANDSCAPING

Melinescu Andreea[1]*

[1*]University of Craiova, Faculty of Horticulture, Department of Horticulture and Food Science, no. 13, A.I. Cuza Street, 200585, Craiova, Romania

* *Correspondence author. E-mail*: melinescu93@gmail.com

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ABSTRACT

The study examines the perceptions of students in the fields of architecture, landscape and engineering on multisensory landscape design and its impact on well-being. The results show that the sense of sight is considered the most important, followed by smell and hearing, while taste is perceived as the least relevant. The majority of respondents experienced positive sensory reactions, associated with relaxation, inner peace and connection with nature. The study highlights the potential of multisensory design to reduce stress and anxiety and contribute to improved well-being in urban environments.

INTRODUCTION

The integration of multisensory landscaping into the design of public and private green spaces is currently becoming an increasingly popular practice. Multisensory landscape focuses on integrating the five senses: sight, hearing, smell, touch and taste (Senetra, 2025). Sensory and therapeutic design combine in an approach that seeks to consciously harmonize the perceptual elements of space, creating environments that are physically, cognitively, emotionally, behaviorally and spiritually aligned with human needs, capable of stimulating the senses and supporting the body's regenerative and self-healing processes (Malhotra & Abrol, 2024). To increase the quality of environments and amplify both their attractiveness and therapeutic effects on residents, more and more contemporary urban planning and design concepts focus on developing complex multisensory experiences. By introducing natural elements, such as vegetation, trees or aquatic components, the urban environment can provide positive stimuli, such as the sounds of nature (birds singing, rustling leaves or flowing water), which contribute to reducing blood pressure, heart rate and levels of stress hormones (Hao et al., 2025). In contrast, traffic noise can generate psychological and emotional discomfort, triggering states of irritability and anxiety (Ren, 2023). Also, pleasant smells, coming from flowers and aromatic plants, can improve mood, concentration and cognitive performance (Kafaei et al., 2025), while unpleasant smells, such as those of exhaust gases or waste, can have the opposite effects, affecting the physical and mental health of individuals (Wojnarowska et al., 2020). Elements such as color, shape, material, light, acoustics, space circulation, air quality and the presence of plants combine to

create an integrated environment that supports well-being and healing processes (Malhotra & Abrol, 2024).

The aim of the study was to determine the perception of university students on multisensory landscaping, in the context of their participation in the GLOCAL Summer School, Bialystok University of Technology, Poland, an international summer school dedicated to modern technologies and eco-innovations in the field of construction and urban development, with a focus on solutions for sustainable cities.

MATERIAL AND METHODS

In order to achieve this goal, a questionnaire with 6 questions, 3 multiple-choice questions, a dichotomous question, a question on a scale from 1 (not at all important) to 5 (very important) and a semantic question was addressed to students during a multisensory landscaping workshop that took place as part of the GLOCAL Summer School, Bialystok University of Technology, Poland. In order to elaborate the student portrait, the questionnaire has also contained a series of information such as age, country, specialization of studies.

Before handing out this questionnaire, the concept of multisensory landscaping was explained to the students. Thus, 33 students answered the questions included in the questionnaire, and the statistical data were analysed in Microsoft Excel.

RESULTS AND DISCUSSIONS

The first data obtained is related to the profile of the responding student, 75.8 % students are between the ages of 20-25 and 24.2 % are between the age of 26-30. Regarding the field of study, 45.4 % are architecture students, 33.3 % are landscape/horticulture students and 21.2 % are engineering students, all professions that will contribute to the sustainable future of the urban and rural environment. Regarding the country in which they study (Figure 1), 39.4 % come from Romania, 21.2 % from Italy, followed by countries like Germany and Poland.

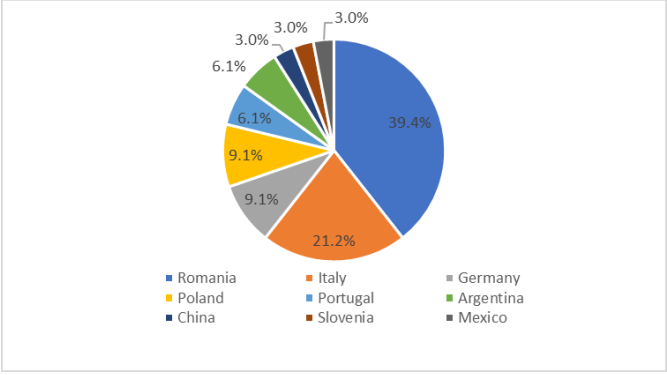

Figure 1. Country where respondents' study.

When it comes to the importance of each stimulus in landscaping (Figure 2), very important for 72.7 % of respondents is the sight (colours, shapes), followed by the smell (floral perfumes, plant scents) very important to 48.5 % respondents. Negative results are encounter when it comes to taste (fruits, edible plants, herbs), so for 18.2 % it is not important at all and slightly important for 27.3 % of the

respondents, while touch (texture of leaves, bark, soil) is moderately important for 45.5 % of the students. The sense of hearing (noise of leaves, birds, insects) is both very important (39.4 %) and important (39.4 %) in the natural or urban green space.

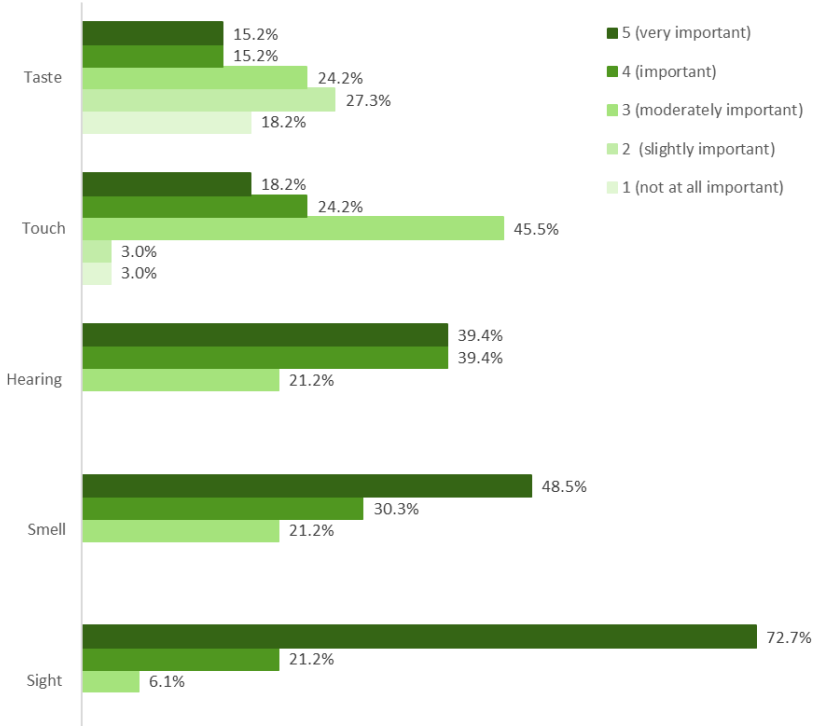

Figure 2. Respondents' perception of sensory importance in green environments

While sight is the first to help perceive the space, contributing to the aesthetics evaluation of the landscape perceived by each individual, taste stimulation in the landscape should not be neglect. The high percentage in terms of vision may be caused by the urbanization process and people's need to see as much of the nature around them as possible. We live in a century of speed, where technology takes precedence, thus the need to smell, touch, and hear elements as natural as possible arises.

In the context of urban green spaces, young students expressed a desire for greater stimulation of the following senses: smell (48.5 %), sight (33.3 %), hearing (27.3 %), touch (15.2 %), while just 3 % choose taste. Taste is considered the most intimate of the senses, as it involves a direct and ephemeral relationship between the body and the perceived object, and this deeply sensory and corporeal nature has traditionally placed it, along with touch and smell, on a lower level than the senses of sight and hearing (Ferguson, 2011). To stimulate taste in the landscape, there are a multitude of fruit trees or vegetables, which also have aesthetic value, and can contribute to all 5 senses.

Asked if they had ever observed plants that caused them a strong sensory reaction, 63.6 % of respondents answered affirmatively, while 24.2 % answered

negatively. To further understand how plants influence sensory perception, respondents were asked to describe the reactions they experienced, thus, 45.5 % of them experience relaxation and well-being / inner peace, while 30.3 % felt a connection with nature. Only 18.2 % of them experience childhood memories and 15.2 % a feeling of energy / revitalization. Respondents also had the opportunity to mention the most recent plant that caused them a sensory reaction, and the most frequently mentioned was lavender, associated with feelings of relaxation, well-being, connection with nature, and spontaneous joy.

Other plants were named, such as: *Convallaria majalis* brought a revitalization reaction, but also nostalgia and childhood memories, *Tilia tomentosa* also brought childhood memories alongside with inner peace and relaxation. *Rosmarinus officinalis* and *Rhododendron canescens* generated a reaction of wellbeing and relaxation, but also a state of craving, feeling hungry. *Mimosa pudica* was mentioned, a plant that, through its reaction of tightening to touch, evoked childhood memories. Participants also mentioned *Celtis australis* as a plant that fostered a sense of connection with nature while also stimulating creativity and inspiration. Similarly, *Platanus occidentalis* was reported to evoke relaxation, connection with nature, nostalgia, and curiosity, whereas *Jasminum officinale* elicited spontaneous joy and feelings of amazement. On the other hand, mulberry and onion were mentioned as examples of plants that caused reactions of unpleasantness and rejection.

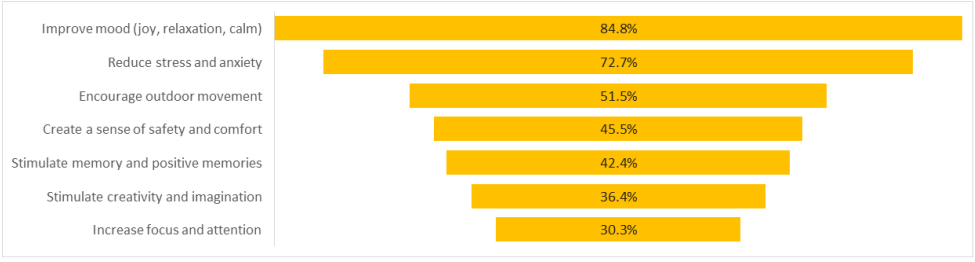

Figure 3. Effects that respondents believe multisensory landscaping can have on people

Regarding the effects that respondents believe multisensory landscaping can have on people (Figure 3) it is noticeable that they are aware of the benefits, more than 80 % believe multisensory landscape can improve people's mood and reduce stress and anxiety (72.7 %). A lower percentage can be notice regarding increase focus and attention, just 30.3 %, while studies highlight that, in the case of children with autism spectrum disorders, spending time in a sensory garden helps improve concentration and increase attention levels (Yusop et al., 2020). By integrating multisensory design, the educational environment becomes a living space, capable of fostering creativity, supporting attention, and facilitating learning through a continuous flow of positive stimuli (Cuentas & Moreira, 2024).

Last question in the survey was related to the negative effects respondents have experienced in contact with plants (Figure 4), noticing most of them had encourage skin irritations and they fear insects and bees, followed by respiratory allergies. They seem bothered by fallen fruits or flowers littering the alleys, but just 15.2 % of them think about the possibility to slipping on wet leaves / fallen flowers.

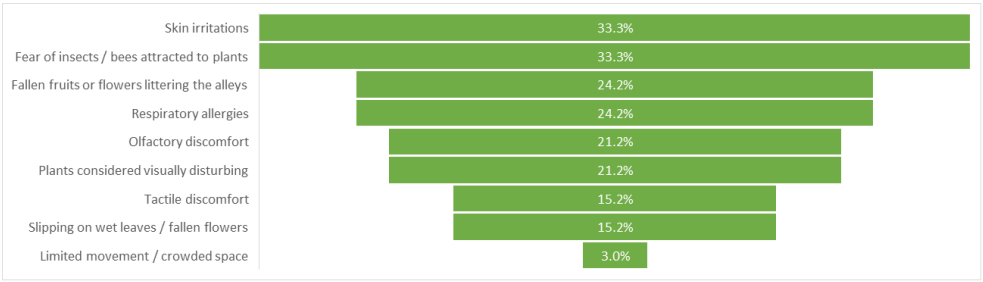

Figure 4. Negative effects respondents have experienced in contact with plants (in gardens, parks, green spaces)

CONCLUSIONS

The data analysis highlights that young students are aware of the importance of multisensory approaches in the design of green spaces. The results show a predominance of visual perception in the evaluation of environments, which can be explained by the influence of modern visual culture and the highly technological urban environment. However, respondents show a clear desire to activate their other senses, especially smell, hearing and touch, as ways to reconnect with nature.

The majority of participants (63.6 %) reported experiencing strong sensory reactions to certain plants, associating these experiences with states of relaxation, well-being, inner peace and connection with the natural environment. Plants such as *Lavandula angustifolia*, *Convallaria majalis*, *Tilia tomentosa* and *Rosmarinus officinalis* were most frequently mentioned, highlighting their ability to generate positive emotional responses.

Overall, the results highlight the potential of multisensory landscaping to influence the psychological state of humans, reduce stress and anxiety, and contribute to overall well-being. Therefore, the integration of sensory elements - sight (visual), hearing (auditory), smell (olfactory), touch (tactile) and taste (gustatory) - becomes essential in the design of urban green spaces aimed at health, relaxation, and reconnecting with nature.

For a complex view of multisensory landscaping and its perception, it is necessary to extend the study to a larger and more diverse sample, as well as to conduct field experiments: for example, setting up multisensory pilot areas and measuring the effect on stress (through physiological measurements) and user perception before and after the intervention.

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