



PLANNING MALAYSIA:

Journal of the Malaysian Institute of Planners

VOLUME 22 ISSUE 6 (2024), Page 578 – 588

THE IMPACT OF FUNDAMENTAL PLANTING DESIGN ON WELL-BEING

**Norizan Mt Akhir^{1*}, Nor Suzila Lop², Izatul Farrita Mohd Kamar³, Mohd
Nasiruddin Abdul Aziz⁴**

*^{1,2,3}Department of Built Environment Studies and Technology,
College of Built Environment,*

⁴College of Creative Arts,

**UNIVERSITI TEKNOLOGI MARA, PERAK BRANCH,
32610 SERI ISKANDAR MALAYSIA**

Abstract

The planting design plays a pivotal role in shaping the campus landscape, blending scientific planning with artistic expression. The fundamental aspects of planting design, such as plant density, configuration, and properties, have a substantial impact on the daily lives of students. However, unattractive landscape planting on campus can diminish students' connection to nature. This study aims to investigate the interaction between planting design and students' well-being, drawing from positive psychology principles. The objectives of the study involve identifying fundamental elements in planting scenes that impact students' perceptions and, subsequently, their well-being. Using a photo-based questionnaire, 319 students from diverse faculties rated 51 selected landscapes photographs. Data analysis revealed that arrangement emerged as the most crucial fundamental element influencing preferences of planting design. Interestingly, the naturalness of scenes uniquely correlated with engagement among respondents. These findings underscore the potential of visually appealing planting designs to boost students' happiness, satisfaction, and engagement in their educational environments. Future research should further explore how strategically planted greenery influences individuals' nature experiences and mental health, offering insights for nature-based interventions on campuses.

Keywords: Fundamental planting design, Well-being, Campus landscape

¹ Corresponding Author. *Email: noriz102@uitm.edu.my

INTRODUCTION

Studies on landscape and well-being have been common focus areas in research. However, these studies often provide a holistic view of landscapes deprived of delving into specific elements within them. This research aims to investigate the interaction between students and planting design, assessing it visually through students' perceptions to understand its impact on their well-being.

Recent research has revealed that looking at nature through windows is linked to various enhancements in mental well-being, encompassing heightened life satisfaction, improved attention restoration, and better stress recovery (Soga et al., 2020; Chang et al., 2020). Interestingly, it has been discovered that the impact of viewing a green scenery on individuals' mental health generally surpasses that of actively utilizing green spaces (Soga et al., 2020). This discovery carries significant implications as it suggests that smaller number of direct interactions with nature can yield comparable benefits for human health and well-being when compared to more immediate interactions. One plausible explanation for this outcome could be that these surveys were conducted during the pandemic, a period when people were advised to stay indoors in isolation. Consequently, experiences with nature that were less immediate, such as looking out of windows, might have been far more prevalent than immediate interactions with nature (Soga et al., 2020).

Instead, this study will explore students' preferences for planting design in the vicinity of their educational spaces through photographs. Furthermore, students will be asked to articulate their emotions and feelings regarding their most preferred planting scenes. The purpose of these inquiries is to anticipate the immediate impact of planting design principles on well-being.

STUDENTS' WELL-BEING

Positive psychology within an educational setting yields positive outcomes such as the improvement of well-being and decrease in levels of depression among students (Lai et al., 2018). Presently, numerous efforts have been undertaken to explore the connections between landscaping and well-being. One such study delves into the impact of planting design on visual landscape quality and its influence on overall well-being (Mt Akhir et al., 2021), plants impact on health and well-being of people (Parwiz et al., 2023) and the benefits of indoor and outdoor vertical greening system towards human health and well-being (Fonseca et al., 2023).

Well-being is a comprehensive concept frequently deliberated within the realm of psychology. In accordance with well-being theory, it can be divided into two primary categories: hedonic well-being and eudaimonic well-being (Deci & Ryan, 2008; Schueller & Seligman, 2010). In a more straightforward explanation, both forms of well-being involve the expression of emotions, with

hedonia being synonymous with experiencing positive emotions and eudaimonia entailing the aspect of functioning effectively.

Seligman (2011, 2018) has delineated well-being into five pillars: Positive emotion, Engagement, Relationships, Meaning, and Accomplishment, collectively referred to as PERMA. These dimensions can be associated with highly preferred planting design scenes to evaluate the quality of the planting design settings. This evaluation can provide valuable insights for enhancing students' happiness and satisfaction within their educational environment. Therefore, this study used these five pillars as measurement indicators to assess students' views towards planting design scenes and relate to their emotional perceptions.

FUNDAMENTAL OF PLANTING DESIGN ON CAMPUS

The assessment of how planting design scenes dimensionally impact students' well-being can be gauged by examining various properties of plants. Distinct physical characteristics of plants, such as colour, shape, texture, size, density, arrangement, natural appearance, and vividness, have been demonstrated as fundamentals to influencing people's preferences (Jiang et al., 2014; Polat & Akay, 2015; Yilmaz et al., 2018; Wang et al., 2019; Sanders, 2020; Ma et al., 2020). These fundamental elements of planting design can then be linked to dimensions of well-being.

Research by Jiang et al., (2014) found that trees' density positively predicted mental restoration and aesthetic satisfaction. Kaplan, Kaplan and Brown (1989) noted that people experience a sense of calmness around plants. Areas without trees experienced a notable increase in stress and low preferences (Jiang et al., 2014). However, excessively dense planting can hinder regeneration and increase feelings of uncertainty (Van den Berg, Jorgensen & Wilson, 2014). Generally, areas with a mixture of trees and shrubs are more preferable. Additionally, flowers, especially vibrantly coloured ones, receive higher preference ratings (Hoyle et al., 2017), with their presence contributing positively to psychological well-being.

On the other hand, changes in plant selections have subsequently changed the plant profiles and criteria of the landscape design in particular place (Mohd Hussain et. al, 2022). However, by considering the fundamentals of design such as principle of balance, order, sequence, rhythm and others, it allows various categories of plant selections to be able included in the fundamental design and setting of a landscape.

These examples of studies demonstrate that the fundamentals of planting design characteristics such as density, colours, and the form of planting composition have the ability to impact one's mental or psychological well-being. Hence, this study intent to explore the preferences of students on campus

regarding fundamental planting design and how these preferences influence their perceptions and emotions when observing these scenes.

METHODOLOGY

Landscape photographs are frequently employed in landscape perception research (Mirza, 2015; Sevenant & Antrop, 2011). Traditionally, Kaplan, Kaplan, & Brown (1989) used photographs as visual stimuli, considering them to be a suitable substitute for direct visual assessment in this field. These photographs serve as potent tools for studying how people perceive landscapes when presented in visual form (Dupont, Antrop, & Van Eetvelde, 2014). This study used photo-based questionnaire as a tool to measure students' well-being in preferred planting design sceneries.

A total of ninety-four (94) landscape planting scenes were photographed in the study area. However, only 51 photographs were selected with the aid of subject experts who are academicians from the landscape architecture field. The selection was executed based on whether the main planting design elements of each image accurately reflected the fundamentals of planting design scenes.

The research site was selected to represent the settings where students interact with the campus environment. Universiti Putra Malaysia's (UPM) campus in Serdang (Figure 1) was chosen for the study, covering a land area of 1245.056 hectares. This campus, comprising 15 faculties, accommodates approximately 25,000 students. The exploration areas included only green spaces with passable landscape planting scenes in each of the faculties, and can be physically and visually assessed by the students. This study involved 319 students from different faculties.



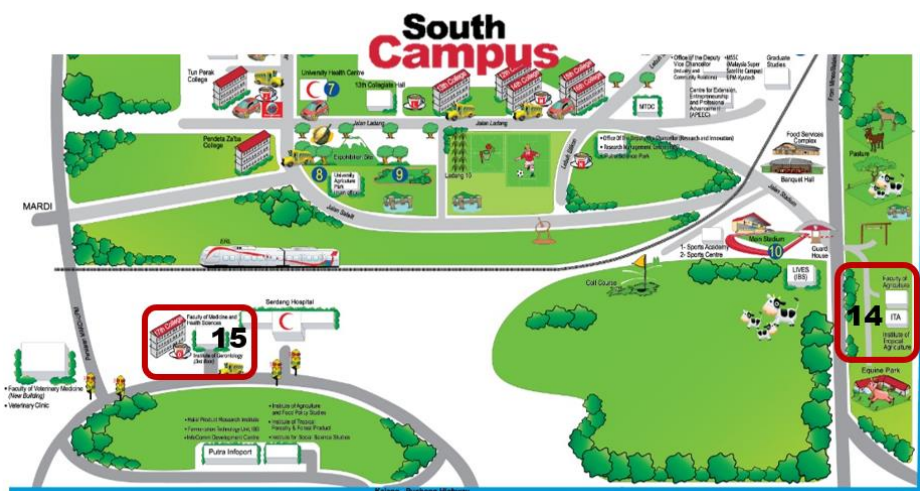


Figure 1: 15 Faculties at Universiti Putra Malaysia, Serdang
 Source: UPM web page (2024)

The first section of the photo-questionnaire comprised inquiries related to the demographic profile., followed by section two which was the evaluation of planting photographs, and section three consisted of a well-being survey. The items for sections two and three were formulated by drawing upon established, academically developed, and validated multi-item scales for assessing well-being in individuals or populations, such as PERMA. The questions were crafted using a multi-item scale approach, as suggested by Singh, Todd Donovan, Mishra, and Little (2008), who emphasized that employing multi-item scale measures for various constructs can help mitigate measurement errors. The items were assessed utilizing a five-point Likert scale, with response options spanning from 1 (strongly disagree), 2 (disagree), 3 (neutral), 4 (agree) to 5 (strongly agree).

Since the photo-questionnaire sought to evaluate the respondents' opinion immediately, their responses would depend on their emotion at that particular time. The collected data were analysed using SPSS software version 23.0. The average of the planting photograph scores and the dimension of planting properties were then calculated. Relative Importance Index (RII) were used to rank the most preferred planting scenes and well-being scores.

RESULT AND DISCUSSION

The result of study is shown in Table 1 which display the ranking of planting design dimensions or attributes in the evaluated planting sceneries, as rated by the respondents. Among the eight essential planting design dimensions, the arrangement attribute garnered the highest preference rating (Mean=4.339; RII=0.868). Following closely were density, naturalness, colour, shape, size, and

vividness of planting scenes, ranked in descending order. The plant texture element was the least prioritized factor as respondents assessed the landscape planting images (Mean=3.712; RII=0.742).

Table 1: Mean and RII score for landscape planting scene dimension

Planting design dimension	Mean value	Tendency level	RII	Rank	Importance level
C6_arrangement	4.339	High	0.868	1	High
C5_density	4.188	High	0.838	2	High
C8_naturalness	4.185	High	0.837	3	High
C2_colour	4.154	High	0.831	4	High
C4_shape	4.097	High	0.819	5	High
C1_size	4.022	High	0.804	6	High
C7_vividness	4.006	High	0.801	7	High
C3_texture	3.712	High	0.742	8	High-Medium

Figure 2 also illustrates the ranking of the most prominently regarded fundamental element in planting design, which is arrangement. This discovery emphasizes the importance of organizing planting elements in a coherent and orderly manner.

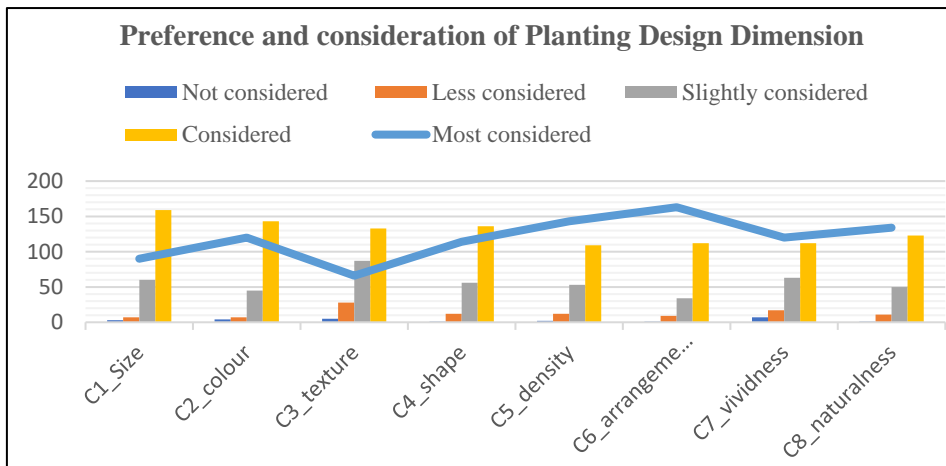


Figure 2: Ranking of planting design dimension preference and consideration

According to Sanders (2020) who studied planting design in urban vacant lots, participants consistently highlighted planting, arrangement, emotional responses, and environmental factors as key factors influencing their ratings of planting images. Similarly, in alignment with the current study, respondents assigned the highest mean value and importance index to planting

arrangement, underscoring the significance of prioritizing this variable as it forms the initial impression during review. This observation may be influenced by the high ratings given to photographs that were visibly well-organized and well-arranged, as depicted in Figure 3.



Figure 3: Images with highly rated by respondents

Texture emerged as the last dimension prioritized in the assessment of planting design scenes, likely because it is perceived as less visually striking compared to other elements (Ma et al., 2020). Serpa & Muhar (1996) note that texture significantly influences size and distance perception. In this context, respondents might not be as attentive to the spacing between planting scenes, resulting in lesser consideration. Ma et al. (2020) study found that the texture of foreground plant design did not significantly impact landscape visual quality, suggesting that while texture is an important dimension, its level of consideration is comparatively less significant. This outcome may also be influenced by the diverse background knowledge of respondents regarding planting design dimensions.

Moreover, the study compared considerations for planting design dimensions with students' well-being outcomes. Positive emotion, such as feeling at ease or maintaining a positive mindset, was closely associated with almost all factors related to well-being. Only the naturalness dimension showed a connection to high levels of engagement among those who independently decide on matters involving a natural setting. The correlation between planting dimension consideration criteria and strongly agreed-upon statements of well-being indicators is detailed in Table 2.

Table 2: The most considered planting design dimension relation to well-being

Mostly Considered Planting Dimension	Well-Being Items with Strongly Agree Statement	Total responses
C6_arrangement	Positive emotion_feel at ease	163 (51.1%)
C5_density	Positive emotion_feel positive	143 (44.8%)
C8_naturalness	Engagement_makeup my mind	134 (42%)
C2_colour	Positive emotion_feel positive	120 (37.6%)
C7_vividness	Positive emotion_feel at ease	120 (37.6%)
C4_shape	Positive emotion_feel positive	114 (35.7%)
C1_size	Positive emotion_feel at ease	90 (28.2%)
C3_texture	Positive emotion_feel positive	66 (20.6%)

With the exception of naturalness consideration, the findings indicate that nearly all factors strongly influence respondents' positive emotions. Naturalness is closely linked to the impact of engagement on well-being, attributed to natural features such as the diversity, variety, or richness of plants that connect with cultural values (Bulut & Yilmaz, 2008; Gungor & Polat, 2018) and the constructs of complexity (Abkar et al., 2011; Sanders, 2020). As classified by Kaplan, Kaplan & Brown (1989), the complexity construct falls under "involvement," requiring exploratory information. Consequently, factors related to naturalness contribute to well-being engagement, allowing respondents to feel empowered in decision-making when observing natural scenes. Additionally, numerous researchers hypothesize that engagement with natural scenes can enhance performance, alleviate stress, and improve overall well-being (Li & Sullivan, 2016; Scholl & Gulwadi, 2018).

Furthermore, the natural settings in this study contained the natural form of plant attributes rather than manicured plants. As a result, students are more likely to notice the uniqueness of plant forms that are freely planted in the courtyard spaces, exposing the natural scenery and generating engagement vibes when seeing this planting design. In fact, as Browning and Rigolon (2019) empirically tested and discovered that there was substantial evidence to suggest the relationship between natural green space views from classroom windows and increased classroom engagement. On that basis, the natural planting design is critical to ensuring improved student engagement with their campuses, particularly with their faculties.

Similarly, other factors under consideration, including arrangement, density, colour, shape, size, vividness, and texture, also exhibited positive influence on respondents' emotions, contributing to feelings of ease and positivity. This positive emotional response is closely associated with happiness and satisfaction. Consequently, images that are highly preferred may possess qualities that enhance respondents' happiness and satisfaction, considering these specific aspects. Furthermore, the positive emotion experienced also correlates

with feelings of security and excitement, aligning with previous research findings that suggest the density and arrangement of vegetation can positively or negatively influence people's preferences.

CONCLUSION

Individual preferences for the design of planted landscapes and their effects on people's well-being can vary. The view of planting design through windows is notably linked to experiences with nature, contributing to human health and overall well-being. This visual exploration of the fundamentals of planting design is strongly recommended for further exploration, particularly among university students facing challenges.

To cultivate a positive association with their learning environment and enhance their well-being, including positive emotions and engagement, it is advisable to incorporate visually pleasing planting design scenes into the areas of study. Students in this study expressed that a well-arranged placement of plants provides a sense of ease, while optimal level of plant density is crucial for fostering positivity, and finally the natural form of plants facilitates engagement with the surroundings, contributing to a composed state of mind. All these fundamental elements should be taken into account to reduce stress and improve the well-being of students on campus.

Moving forward, future research should focus on comprehending how the positioning of green spaces and trees influences individuals' experiences with nature, along with the associated benefits for mental health. This knowledge is essential for designing effective nature-based interventions aimed at improving the health and well-being of campus populations.

ACKNOWLEDGEMENTS

We are grateful to all of the participants whose time and insights were crucial in making this research article possible. We would like to thank UiTM Cawangan Perak and Research Management Centre (RMC) UiTM for the support and the incentive. Furthermore, we would like to express our heartfelt gratitude to the Landscape Architecture Programme for their generous support, which substantially aided in the completion of this work.

REFERENCES

- Abkar, M., Mustafa Kamal, M. S., Maulan, S., & Davoodi, S. R. (2011). Determining the Visual Preference of Urban Landscapes. *Scientific Research and Essays*, 6(9), 1991–1997.
- Browning, M. H. E. M., & Rigolon, A. (2019). School green space and its impact on academic performance: A systematic literature review. *International Journal of Environmental Research and Public Health*, 16(3), 1-22.

- Bulut, Z., & Yilmaz, H. (2008). Determination of landscape beauties through visual quality assessment method: A case study for Kemaliye (Erzincan/Turkey). *Environmental Monitoring and Assessment*, 141, 121–129.
- Chang, C. C., Oh R. R. Y., Le Nghiem T. P., Zhang Y., Tan C. L., Lin B. B., Gaston K. J., Fuller R. A., and Carrasco L. R. (2020). Life satisfaction linked to the diversity of nature experiences and nature views from the window. *Landscape and Urban Planning* 202:103874.
- Deci, E. L., & Ryan, R. M. (2008). Hedonia, Eudaimonia, and Well-Being: An Introduction. *Journal of Happiness Studies*, 9(1), 1–11.
- Dupont, L., Antrop, M., & Van Eetvelde, V. (2014). Eye-tracking analysis in landscape perception research: Influence of photograph properties and landscape characteristics. *Landscape Research*, 39(4), 417–432.
- Fonseca, F., Paschoalino, M. & Silva, L. (2023). Health and Well-Being Benefits of Outdoor and Indoor Vertical Greening Systems: A Review. *Sustainability*, 15, 4107, 1-18.
- Gungor, S., & Polat, A. T. (2018). Relationship between visual quality and landscape characteristics in urban parks. *Journal of Environmental Protection and Ecology*, 19(2), 939–948.
- Hoyle, H., Hitchmough, J., & Jorgensen, A. (2017). All about the ‘wow factor’? The relationships between aesthetics, restorative effect and perceived biodiversity in designed urban planting. *Landscape and Urban Planning*, 164, 109–123.
- Jiang, B., Chang, C. Y., & Sullivan, W. C. (2014). A dose of nature: Tree cover, stress reduction, and gender differences. *Landscape and Urban Planning*, 132, 26–36.
- Kaplan, R, Kaplan, S., & Brown, T. (1989). Environmental Preference: A Comparison of Four Domains of Predictors. *Environment and Behavior*, 21(5), 509–530.
- Lai, M. K., Leung, C., Kwok, S. Y. C., Hui, A. N. N., Lo, H. H. M., Leung, J. T. Y., & Tam, C. H. L. (2018). A multidimensional PERMA-H positive education model, general satisfaction of school life, and character strengths use in Hong Kong Senior Primary School students: Confirmatory Factor Analysis and Path Analysis using the APASO-II. *Frontiers in Psychology*, 9, 1–11.
- Li, D., & Sullivan, W. C. (2016). Impact of views to school landscapes on recovery from stress and mental fatigue. *Landscape and Urban Planning*, 148, 149–158.
- Ma, Bingqian, Hauer, R. J., & Xu, C. (2020). Effects of design proportion and distribution of color in urban and suburban green space planning to visual aesthetics quality. *Forests*, 11, 1–18.
- Mt Akhir, N., Md Sakip, S. R., Abbas, M. Y., & Othman, N. (2021). Analyzing The Criteria of Planting Design for Visual Landscape Quality in Campus. *Planning Malaysia*, 19(2), 39-47.
- Mirza, L. (2015). Windowscape: A Study of Landscape Preferences in an Urban Situation. PhD Thesis. University of Auckland.
- Mohd Hussain, N.H., Mat Nayan, N., Ahmad, S. & Salleh, I.H. (2022). Landscape and Plants Profile Analysis in Rural Perak. *Planning Malaysia*, 20(3), 136-147.
- Parwiz, N., Obaidullah, A., Azizaqa, A., Abdul Wahid, M. & Hamidullah, O. (2023). People-plant Interaction: Plant Impact on Humans and Environment. *Journal of Environmental and Agricultural Studies*, 4(2), 01-07.

- Polat, Ahmet Tuğrul, & Akay, A. (2015). Relationships between the visual preferences of urban recreation area users and various landscape design elements. *Urban Forestry and Urban Greening*, 14, 573–582.
- Sanders, S. (2020). Plantings with people in mind: Increasing use in urban vacant lots through planting design. Kansas State University.
- Scholl, K. G., & Gulwadi, G. B. (2018). College Campus Landscapes within a Learning Ecosystem. *Planning for Higher Education Journal*, 46(2), 50–64.
- Schueller, S. M., & Seligman, M. E. P. (2010). Pursuit of pleasure, engagement, and meaning: Relationships to subjective and objective measures of well-being. *Journal of Positive Psychology*, 5(4), 253–263.
- Seligman, M. (2018). PERMA and the Building Blocks of Well-Being. *Journal of Positive Psychology*, 13(4), 333–335.
- Seligman, M. E. P. (2011). *Flourish: A visionary new understanding of happiness and well-being*. Free Press.
- Serpa, A., & Muhar, A. (1996). Effects of plant size, texture and colour on spatial perception in public green areas—a cross-cultural study. *Landscape and Urban Planning*, 36(1), 19–25.
- Sevenant, M., & Antrop, M. (2011). Landscape Representation Validity: A Comparison between On-site Observations and Photographs with Different Angles of View. *Landscape Research*, 36(3), 363–385.
- Singh, S. N., Todd Donovan, D., Mishra, S., & Little, T. D. (2008). The latent structure of landscape perception: A mean and covariance structure modeling approach. *Journal of Environmental Psychology*, 28(4), 339–352.
- Soga, M., Evans, M. J., Tsuchiya, K., & Fukano, Y. (2020). A room with a green view: The importance of nearby nature for mental health during the COVID-19 pandemic. *Ecological Applications*, 0(0), 1–10.
- Van den Berg, A.E., Jorgensen, A., Wilson, E.R. (2014). Evaluating restoration in urban green spaces: does setting type make a difference? *Landscape Urban Planning*. 127, 173–181.
- Wang, R., Zhao, J., Meitner, M. J., Hu, Y., & Xu, X. (2019). Characteristics of urban green spaces in relation to aesthetic preference and stress recovery. *Urban Forestry & Urban Greening*.
- Yılmaz, S., Özgüner, H., & Mumcu, S. (2018). An aesthetic approach to planting design in urban parks and greenspaces. *Landscape Research Group*, 1–19.

Received: 17th April 2024. Accepted: 2nd September 2024