

Urban acupuncture: Strategic design for campus street furniture based on generation Z preferences

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ARTICLE INFO	ABSTRACT
<p><i>Article history:</i> Received August 25, 2023 Received in revised form March 09, 2024 Accepted May 02, 2024 Available online August 01, 2024</p> <p><i>Keywords:</i> Disaster Evacuation High-density Kampung</p> <p>*Corresponding author: Dominikus Aditya Fitriyanto Department of Architecture, Faculty of Architecture and Design, Universitas Pembangunan Nasional "Veteran", Indonesia Email: dominikus_aditya.ar@upnjatim.ac.id ORCID: https://orcid.org/0000-0002-4142-9511</p>	<p><i>The end of the COVID-19 pandemic marks the beginning of a new era in many disciplines, including education. Campus life is starting to flourish, and there has been a significant increase in the use of public spaces, but this has not been accompanied by the renewal and improvement of the campus public spaces that students frequently use for studying and other activities. Many of the street furniture was in poor condition, uncomfortable to use, or could not serve the users. This study aims to define the ideal public space from the perspective of Generation Z students as the users. To collect data, a closed questionnaire is distributed to students from various adjacent faculties. The information is then quantitatively processed to obtain the preferences of street furniture through several parameters, including shape, color, and material. According to the analysis, the best campus street furniture has a circular or face-to-face shape, is geometrically balanced, uses bright, natural colors, and has natural expression. Other improvements include adding more furniture, adding power or electricity, and adding shading. The conclusions of this conversation can act as an outline of guidelines for administrators and stakeholders on campus when planning public spaces and the elements that constitute them up to fulfill the needs of users.</i></p>

Introduction

The Indonesian government has officially ended the enforcement of PPKM (*Pemberlakuan Pembatasan Kegiatan Masyarakat*) at the end of 2022 (Rokom 2022).

Ever since, society has flourished and adjusted to the new period. Numerous fields and disciplines, including education and campus life, witnessed changes due to this transformation. As a result of being compelled to study online, the majority of pandemic-affected students had little opportunity to contact their peers (Sari 2020; Syamsuddin 2021). These students can also be classified as members of Generation Z. Nestled between Millennials and Generation Alpha is the age group designated as Generation Z, or simply

Gen-Z. Although the precise birth year range of Generation Z is occasionally contested or discussed, most sources agree that it began around the middle of the 1990s and ended in the early 2010s (Szymkowiak et al. 2021).

Another viewpoint encompasses the period from 1997 to 2012, although it is occasionally contested due to the difficulty in categorizing different generations and their characteristics (Schwieger and Ladwig 2018).

As a result of having lived entirely online, Generation Z is occasionally referred to as the "digital native" generation. Although there is not a single scientific definition of age Z, experts have discovered several traits that people of this age share in common. These qualities include putting teamwork, independence, and practicality first

(Seibert 2021). They value the individuality provided by variety and tend to construct their own identities. Being the first generation to grow up digitally native, Generation Z's relationships with urban surroundings are influenced by improvements in technology, sustainability issues, inclusion, and a strong sense of community.

As urban landscapes continue to change, the preferences and behaviors of Generation Z in public spaces are becoming more and more significant. To create inclusive and interesting public places, urban planners and designers must have a thorough understanding of their unique qualities (Husin and Komala 2024). The way that Generation Z utilizes public places is greatly influenced by their dependence on digital technology. Studies by Humphry (2022) propose that having access to Wi-Fi, charging stations, and interactive street furniture enhances their outdoor experience. Technology-integrated smart furniture would promote a seamless digital connection with the city (Zaffagnini et al. 2022).

The fervent dedication of Generation Z regarding environmental sustainability influences their inclinations toward street furniture. An article by Allameh and Heidari (2020) reveals that this generation is drawn to eco-friendly designs and materials that encourage energy efficiency. Street furniture that respects the environment, like solar-powered benches, conforms with their beliefs.

Campus as an academic ground to foster future generations should react to the changes of the generation who use the public space and their characteristic. Desirable changes were indeed required to fulfill the ideal functioning public space. The urban design strategy to achieve this was to revitalize the image of the public space (El-Ghonaimy 2020). One of the strategies for revitalizing public space is Urban Acupuncture. This strategy enables the least amount of intervention to have a "sting" effect that would encourage the surrounding community to react favorably (De Waal, De Lange, and Bouw 2020). A quick method to bring about the desired changes in the deteriorating area of an urban area is through Urban Acupuncture.

This research is in an open space in the Faculty of Architecture and Design (FAD) of the Universitas Pembangunan Nasional Jawa Timur, called DPR (*Di bawah Pohon Rindang*) or Under the Shady Trees. Previously, there was a research student behavior investigation conducted in this

area, concluding that several adjustments and improvements were required (Fitriyanto, Mutia, and Krisnawatie 2023). According to previous research, users tended to use the side of the site with seating areas the most, leaving the other half of the space empty as there were no benches or resting areas there. Additionally, users are more likely to congregate near an electrical outlet. The area devoid of power outlets and seating turned into a dead zone that students seldom ever used. This dead space needs to be revitalized using the urban acupuncture method to become livelier and more dynamic.

Previous research about Gen-Z preferences toward public space has been carried out as Susanti (2018) finds that Generation Z prefers flexible public spaces, unique, provide enough privacy, and are contemplative.

Students prefer campus landscapes with vegetation, seating areas, water features, natural bases, landscape elements, seating areas, curved paths, and colorful plants (Hami and Abdi 2021), and to reflect cultural aspects, street furniture design must be optimized based on user characteristics, including material, color, and shape (He 2021). Previous research did not specifically address Gen-Z as a user in campus public space design, nor did it focus on street furniture. Consequently, this research aims to discover Gen-Z's preferences for street furniture and explores their attitudes, expectations, and behaviors towards street furniture in campus public spaces. Previous research supports the need to determine the ideal criteria of public space based on user preferences, which can be classified as Gen-Z.

Methods

This research is presented in four stages. Identifying the research question was the first step. The prior behavior study conducted in the area informed the research questions at this stage, necessitating the development of design standards for street furniture that take user preferences into account. The second method was gathering data on-site through direct observation and an online questionnaire. The analysis and discussion of the data collected came in third, and the conclusion was stated in the final one. As a result, this study belongs within the category of explanatory research (Poltak and Widjaja 2024).

Data collection

Respondents may only be student organizations that utilized the DPR-FAD public space; they are users who have been monitored. People who are not students, students who have never used DPR-FAD, or those who have only ever visited the area were omitted from the sample because this study focused on Generation Z users. A non-random sampling strategy combined with a purposive sampling technique was employed for selecting the sample. A random selection of sample units from the population segment having the most information on the feature of interest is regarded as purposive sampling (Guarte and Barrios 2006).

A Google form was used to administer an online survey and gather data. The survey will be

available from June 6, 2023, to July 25, 2023. There are 61 closed-ended questions and ten variables in the online survey. Activities, the amount of time and frequency that furniture is employed, comfort during activities, the physical quality of the furniture, comfort, shape and pattern, color, material and texture, and intended improvements in DPR-FAD have been considered by the questionnaire questions. The variables of time, frequency, and activities related to furniture utilization were identified to understand the typology that the user required and desired. The best material and form for the furniture were determined based on factors such as comfort while activity, the furniture's physical quality, comfort, shape and pattern, color, and texture.

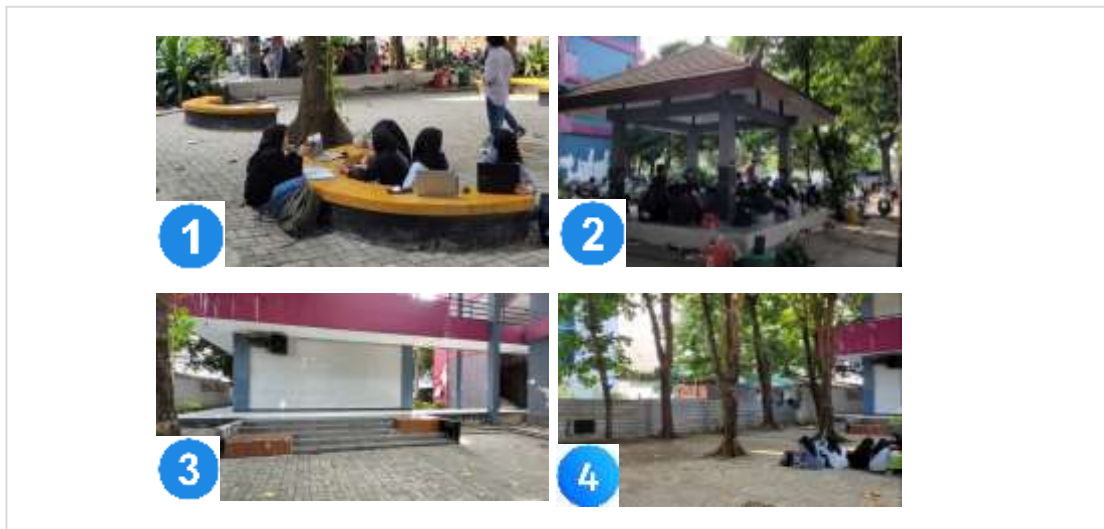


Figure 1. Observation spots

There were four spots, as demonstrated in [image 1](#), that were asked in the questionnaire, consisting of the bench (1), gazebo (2), mini amphitheater (3), and paved open space (4). 184 people completed the survey. This study used 180 respondents; however, four respondents were excluded as samples since they were not students and had never participated in DPR-FAD events. There were 180 responders in the final data, with 62 (34.3%) men and 119 (65.7%) women. Of the respondents, seven faculties were represented. Of them, the Faculty of Architecture and Design (FAD) accounted for 58.2% of the total. There were students from 2017 to 2023 enrolled, with students from 2022 constituting the majority. Every responder was a member of Generation Z

considering their ages ranged from 18 to 24 when they completed the questionnaire.

The 61-item online questionnaire is divided into nine questions about the activities, six questions regarding the time, four questions concerning the frequency of use, five questions about the comfort of the furniture during an activity, five questions regarding the physical quality of the furniture, nine questions concerning comfort, four questions concerning shape and pattern, four questions regarding color, four questions regarding material and texture, and eleven questions concerning the changes that are desired in DPR-FAD. The questionnaire is a closed-ended question prepared by employing the semantic differential method (SD method)

proposed by Maguire (2023) and the Likert scale (Bertram, n.d.). Every response is given on a scale of 1 to 5, where 5 is the highest score and 1 is the lowest. To determine out what each student's

preferences are, Sunarya (2023) also employed surveys and closed-ended questions. Table 1 is an example of close-ended questions from the online questionnaire.

Table 1. The sample of close-ended questions

Variable	Example Questions					
Activity	I use the DPR-FAD area for gathering					
	Strongly disagree	1	2	3	4	5
Time	I often use the DPR-FAD area for activities on Weekdays					
	Strongly disagree	1	2	3	4	5
Furniture: frequency of use	I often use the DPR-FAD Garden Chair					
	Strongly disagree	1	2	3	4	5
Furniture: comfort in activity	The DPR-FAD gazebo is comfortable to use for activities					
	Strongly disagree	1	2	3	4	5
Furniture: physical quality	The DPR-FAD Mini amphitheater/ladder has good physical quality					
	Strongly disagree	1	2	3	4	5
Comfort	In the morning, the thermal comfort of the DPR-FAD area is good					
	Strongly disagree	1	2	3	4	5
Aesthetics: Shape/Pattern	The paving area under the DPR-FAD tree has an attractive/aesthetic shape/pattern					
	Strongly disagree	1	2	3	4	5
Aesthetics: Color	Bright color is suitable to be applied in DPR-FAD					
	Strongly disagree	1	2	3	4	5
Aesthetics: Material and texture	Materials with natural elements (wood/stone/water) are suitable when applied to the DPR-FAD					
	Strongly disagree	1	2	3	4	5
Desired Changes in DPR-FAD	I like the addition of power outlet points in the seating area					
	Strongly disagree	1	2	3	4	5

Analysis

Every variable in the questionnaire had a numerical value between 1 and 5. Factor analysis (FA) was implemented for a quantitative study of the outcome. Principal component analysis (PCA) and varimax rotation were employed to perform factor analysis (FA) to determine latent variables that represented measured variables (Hapsari et al. 2023). Statistical methods named JMP were employed to characterize multi-dimensional data, and a multivariate regression analysis was also implemented to investigate the relationship between latent causal variables and latent causal factors.

Results and discussion

Several categories were then created using the questionnaire responses. The study aimed to identify what kind of activities occurred, the frequency that they were utilized, where they were most frequently used, user comfort in terms of heat, vision, and sound, ideal color, substance,

and texture of the street furniture, and anticipated improvements. Activities including assembling, conversing, resting, and having a conversation had a stronger association than other responses (figure 2). This suggests that rather than being done individually, these tasks might be completed concurrently by a group of people.

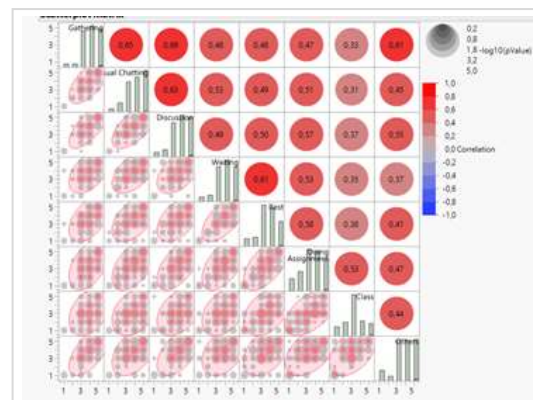


Figure 2. Analysis of the correlation between activities on the site

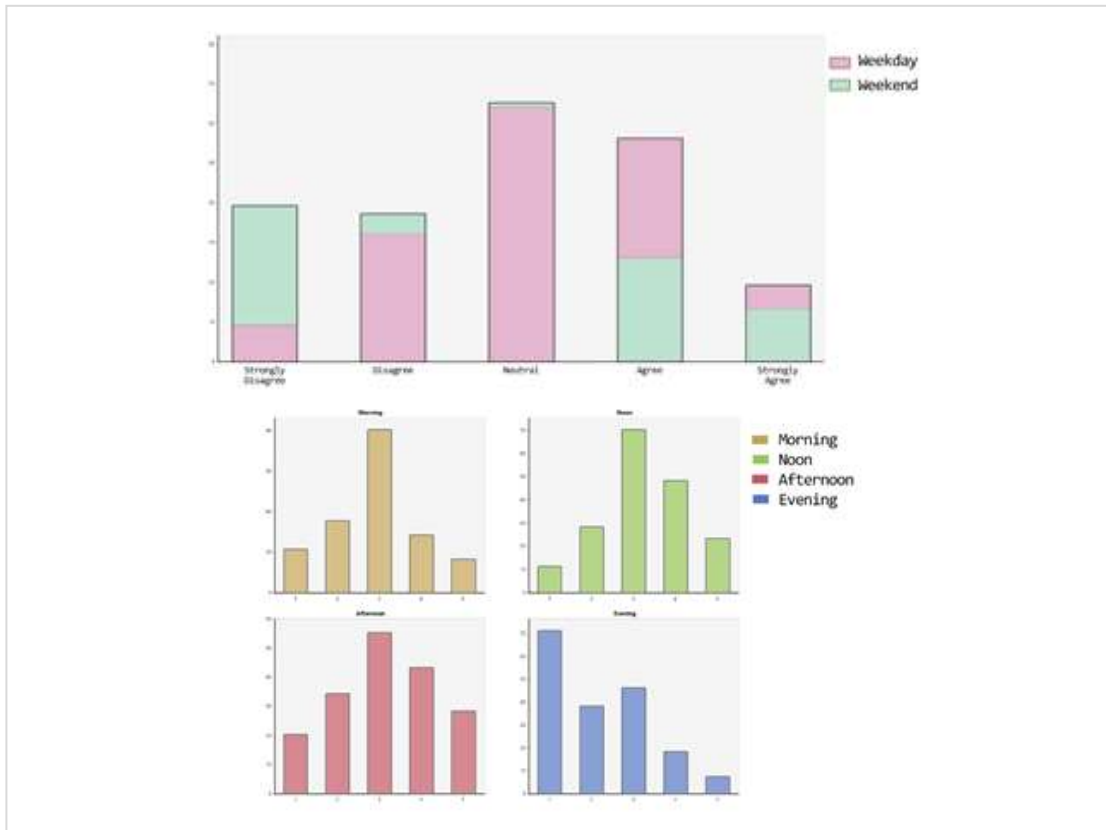


Figure 3. Time of usage and occupancy

On weekdays, students primarily use the DPR-FAD from Monday through Friday (figure 3). In contrast to Morning (5 a.m. to 11 a.m.) and Evening (more than 6 p.m.), they mostly employ the DPR-FAD during the day from Noon (11 a.m. to 3 p.m.) till Afternoon (3 p.m. to 6 p.m.).

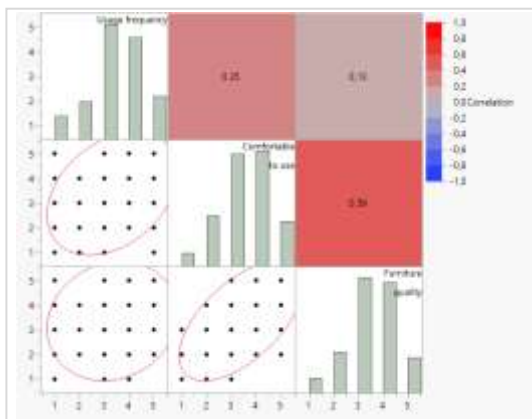


Figure 4. Analysis of furniture usage (bench) and its correlation with usage frequency, comfortability, and physical condition

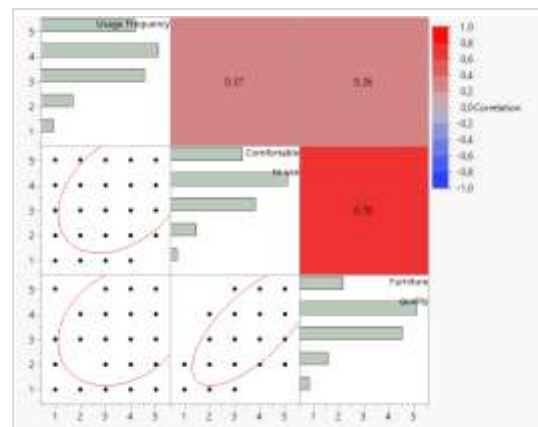


Figure 5. Analysis of furniture usage (gazebo) and its correlation with usage frequency, comfortability, and physical condition

Figures 4 and 5 demonstrate a strong relationship between the respondents' emotions of comfort and the furniture's construction quality (bench and gazebo). The quality and comfort of the bench did not, however, appear to be correlated with how frequently it was employed. This indicates that although the respondents use

the bench regardless of its quality, they are more comfortable when it is constructed well.

The large number also suggests that, in contrast to other locations, the respondents use these locations to organize a variety of activities. Because of the layout and orientation, which encourage group seating, they might feel more comfortable here. As a result, when they use these two areas, they typically feel more concentrated and private.

The three variables usage frequency, build quality, and user comfort have a poor association, as demonstrated by figure 6. These low numbers could have something to do with the position or setting of the amphitheater, which served as a pedestrian circulation area. Therefore, only a few activities could take place here, which would be uncomfortable for the user.

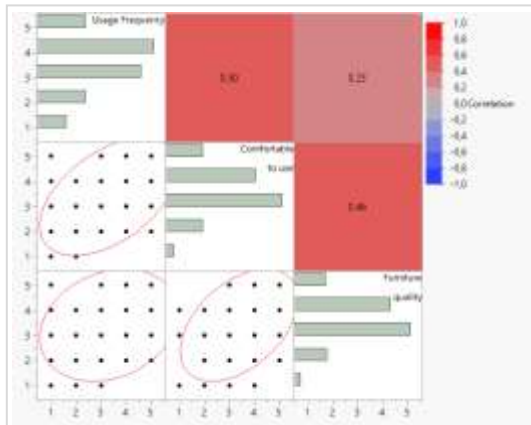


Figure 6. Analysis of amphitheater usage and its correlation with usage frequency, comfortability, and physical condition

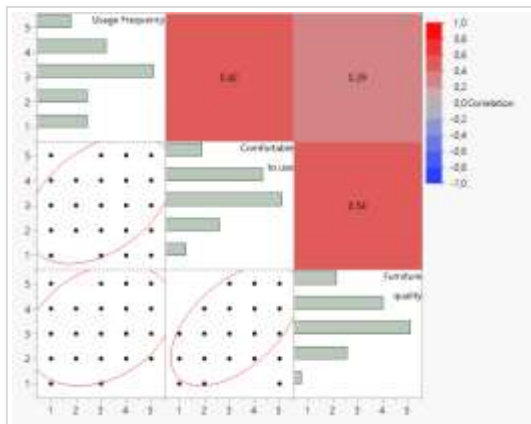


Figure 7. Analysis of paved open space usage and its correlation with usage frequency, comfortability, and physical condition

The three variables usage frequency, build quality, and user comfort have a poor association, as observed in figure 7. These are low numbers because the respondents considered it uncomfortable to conduct their activities such as waiting, studying, or conversing in a space devoid of places for sitting.

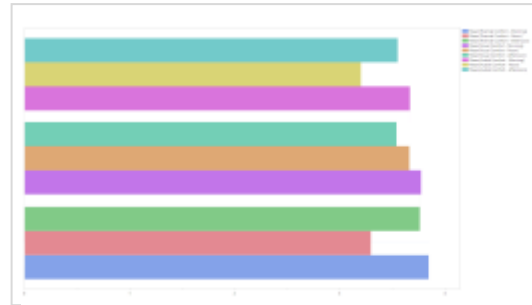


Figure 8. Preference for thermal comfort, visual, and audio

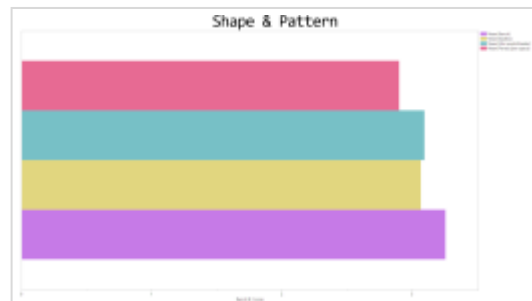


Figure 9. Preference for geometry and pattern of furniture

Figure 9 demonstrates that the preference for geometry and pattern were all neutral.

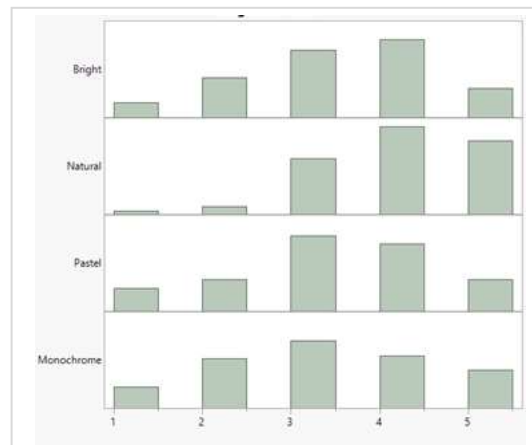


Figure 10. Preference for color

Figure 10 demonstrates that respondents' top choices for colors are bright and natural. The selection is consistent with research that indicates young people are inclined to select environmental preservation when it comes to color adjective preference. Young people's preference for green, yellow-red, and red-blue families lends more credence to this.

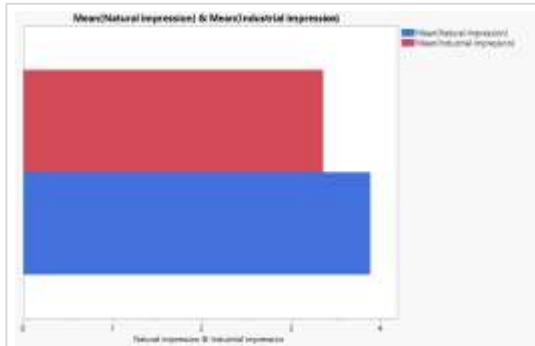


Figure 11. Preference for color natural and industrial impression

Figure 11 demonstrates respondents prefer natural materials to industrial.

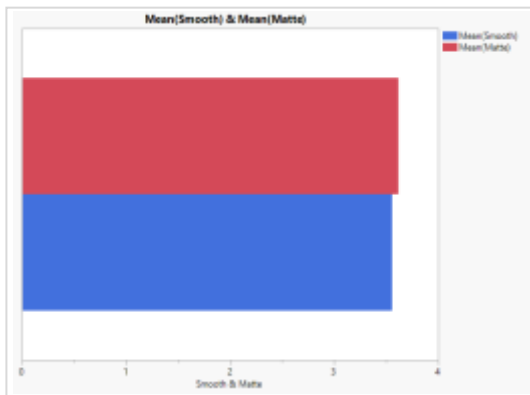


Figure 12. Preference for texture

Figure 12 indicates no difference preference between two options.

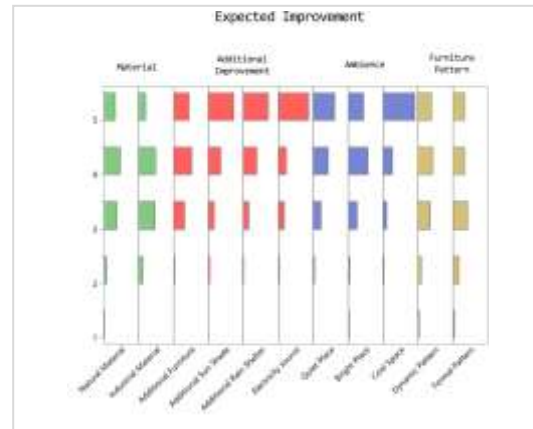


Figure 13. Expected improvement

Several improvements in materials, whether natural or manufactured, were anticipated by the respondents. Another feature that was preferred was the number of furnishings and the shade. A power/electricity source that would substantially support student activity is the most desired addition. In addition, they prefer a calm and serene atmosphere with excellent lighting. Regarding the furniture, the participants anticipated modifications in shape and design, whether formal or dynamic, with a preference for the former.

Conclusions

The study revealed that group discussions, resting, and chatting were the most common activities on the website. There was a neutral and uniform preference for geometry, pattern, texture, and comfort from thermal, visual, and audio comfort. In contrast to other selections, bright and natural shades were the colors that the respondents favored. Thus, it may be assumed that the following design specifications should apply to campus street furniture: (1) The geometry and style of street furniture on campus should enable users to converse about a circular or face-to-face posture; respondents favored dynamic forms more; (2) The street furniture on campus should be painted in vibrant, natural colors; (3) Whether the content is artificial or natural, it should have a natural expression; (4) The facilities in public areas, such as the amount of furniture, power supply, and shading, should be enhanced further.

References

- Allameh, Erfaneh, and Mohammadali Heidari. 2020. "Sustainable Street Furniture." *Periodica Polytechnica Architecture* 51 (1): 65–74. <https://doi.org/10.3311/PPar.12674>.
- Bertram, Dane. n.d. "Likert Scale \lick-urt\", n."
- De Waal, Martijn, Michiel De Lange, and Matthijs Bouw. 2020. "The Hackable City." In *The Routledge Companion to Smart Cities*, edited by Katharine S. Willis and Alessandro Aurigi, 1st ed., 351–66. New York: Routledge, 2020.: Routledge. <https://doi.org/10.4324/9781315178387-24>.
- El-Ghonaimy, Islam Hamdi. 2020. "Street Furniture Influence in Revitalizing the Bahraini Identity." *Journal of Contemporary Urban Affairs* 4 (1): 11–20. <https://doi.org/10.25034/ijcu.2020.v4n1-2>.
- Fitriyanto, Dominikus Aditya, Fairuz Mutia, and Aloysia Krisnawatie. 2023. "URBAN ACUPUNCTURE: INVESTIGASI POLA PERILAKU TERHADAP STREET FURNITURE DI RUANG PUBLIK KAMPUS." *Jurnal Arsitektur ARCADE* 7 (1): 56. <https://doi.org/10.31848/arcade.v7i1.1239>.
- Guarte, Jacqueline M., and Erniel B. Barrios. 2006. "Estimation Under Purposive Sampling." *Communications in Statistics - Simulation and Computation* 35 (2): 277–84. <https://doi.org/10.1080/03610910600591610>.
- Hami, Ahmad, and Babak Abdi. 2021. "Students' Landscaping Preferences for Open Spaces for Their Campus Environment." *Indoor and Built Environment* 30 (1): 87–98. <https://doi.org/10.1177/1420326X19887207>.
- Hapsari, Danti Arinta, Hanson Endra Kusuma, Rizki Dwika Aprilian, and Allis Nurdini. 2023. "The Meaning of Comfort and Security from Occupant's Perspective." *ARTEKS: Jurnal Teknik Arsitektur* 8 (1): 31–44. <https://doi.org/10.30822/arteks.v8i1.1599>.
- He, Fei. 2021. "The Planning and Design of Outdoor Furniture Based on the Characteristics of School Culture." *Tobacco Regulatory Science* 7 (5): 1889–94. <https://doi.org/10.18001/TRS.7.5.110>.
- Humphry, Justine, Sophia Maalsen, Justine Gangneux, Chris Chesher, Matt Hanchard, Simon Joss, Peter Merrington, and Bridgette Wessels. 2022. "The Design and Public Imaginaries of Smart Street Furniture." In *Equality in the City: Imaginaries of the Smart Future*, edited by Susan Flynn, 127–48. Intellect Books. https://doi.org/10.1386/9781789384642_6.
- Husin, Denny, and Olga Nauli Komala. 2024. "The Genomic Tabulation of Kampung Tambora's Massing Series". *ARTEKS: Jurnal Teknik Arsitektur* 9 (1): 69–78. <https://doi.org/10.30822/arteks.v9i1.2778>.
- Maguire, Thomas O. 2023. "Semantic Differential Methodology for the Structuring of Attitudes."
- Poltak, Hendrik, and Robert Rianto Widjaja. 2024. "Pendekatan Metode Studi Kasus Dalam Riset Kualitatif". *Local Engineering* 2 (1): 31–34. <https://doi.org/10.59810/lejlace.v2i1.89>.
- Rokom, Rokom. 2022. "PPKM di Indonesia Resmi Dicabut." Government official website. sehatnegeriku.kemkes.go.id (blog). December 30, 2022. <https://sehatnegeriku.kemkes.go.id/baca/rilis-media/20221230/0042128/ppkm-di-indonesia-resmi-dicabut/>.
- Sari, Gurita Arum. 2020. "DAMPAK SISTEM KEGIATAN BELAJAR MENGAJAR (KBM) DARING AKIBAT COVID-19 TERHADAP SISWA". *Jurnal IKA PGSD (Ikatan Alumni PGSD) UNARS* 8 (2): 462. <https://doi.org/10.36841/pgsdunars.v8i2.848>.
- Schwieger, Dana, and Christine Ladwig. 2018. "Reaching and Retaining the Next Generation: Adapting to the Expectations of Gen Z in the Classroom." *Information Systems Education Journal* 16 (3): 45–54. <http://isedj.org/2018-16/>.
- Seibert, Susan A. 2021. "Problem-Based Learning: A Strategy to Foster Generation Z's Critical Thinking and Perseverance." *Teaching and Learning in Nursing* 16 (1): 85–88. <https://doi.org/10.1016/j.teln.2020.09.002>.
- Sunarya, Wendy, Jackobus Ade Prasetya Seputra, and Afif Fajar Zakariya. 2023. "Parametric Modeling Practice for the First-Year Architecture Students Learning." *ARTEKS: Jurnal Teknik Arsitektur* 8 (2): 293–304. <https://doi.org/10.30822/arteks.v8i2.2189>.
- Susanti, A, and T W Natalia. 2018. "Public Space Strategic Planning Based on Z Generation Preferences." *IOP Conference Series: Materials Science and Engineering* 407 (September): 012076.

- <https://doi.org/10.1088/1757-899X/407/1/012076>.
- Syamsuddin, Syamsuddin. 2021. 'Dampak Pembelajaran Daring Di Masa Pandemic Covid-19 Terhadap Motivasi Belajar Siswa Sd Inpres 1 Tatura Kota Palu'. *Guru Tua : Jurnal Pendidikan Dan Pembelajaran* 4 (1): 45–50.
<https://doi.org/10.31970/gurutua.v4i1.65>.
- Szymkowiak, Andrzej, Boban Melović, Marina Dabić, Kishokanth Jeganathan, and Gagandeep Singh Kundi. 2021. "Information Technology and Gen Z: The Role of Teachers, the Internet, and Technology in the Education of Young People." *Technology in Society* 65 (May): 101565.
<https://doi.org/10.1016/j.techsoc.2021.101565>.
- Zaffagnini, Theo, Gabriele Lelli, Ilaria Fabbri, and Marco Negri. 2022. "Innovative Street Furniture Supporting Electric Micro-Mobility for Active Aging." In *Internet of Things for Human-Centered Design: Application to Elderly Healthcare*, edited by Sofia Scataglini, Silvia Imbesi, and Gonçalo Marques, 313–27. Singapore: Springer Nature Singapore. https://doi.org/10.1007/978-981-16-8488-3_15.

Author(s) contribution

Dominikus Aditya Fitriyanto contributed to the research concepts preparation, methodologies, investigations, data analysis, visualization, articles drafting and revisions.

Afif Fajar Zakariya contribute to the research concepts preparation and literature reviews, data analysis, of article drafts preparation and validation.

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