AG Publishing House

Architectural Paradigms: Academic Research in Pedagogy, Heritage, and Sustainability

Year: 2026

The Role of Outdoor Landscape in Shaping Institutional Environments

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Abstract

The role of outdoor landscapes in institutional contexts has become a growing focus that is of importance for ecological sustainability, user well-being and the functionality of an institution. This review aims to analyse the impact of the landscape in the design of educational and institutional campuses, drawing on the latest research into landscape architecture, environmental psychology, and sustainable campus design. The review explores the ecological, functional and aesthetic functions of outdoor landscapes and their impact on mental health, physical activity, social interaction, creativity and institutional identity. It also delves into the principles of sustainable landscape design – such as conserving biodiversity, planning for climate change, water-sensitive design, sustainable materials and smart landscape management. There are also current challenges of funding, accessibility, climate change, and rapid campus development highlighted, followed by future directions on the use of digital technologies and evidence-based planning. Overall, the review findings revealed that an outdoor landscape can play a crucial role in making institutions resilient, inclusive, healthy and sustainable and can contribute to both educational quality and long-term environmental management.

Keywords: Outdoor landscape; Institutional environment; Sustainable campus; Landscape architecture; User well-being.

[*] ISBN No. 978-93-7640-203-8

1 INTRODUCTION

Outdoor landscapes have become an integral part of educational and institutional campuses and are playing an ever more important role than aesthetic. They offer spaces which serve a functional purpose to enhance the campus experience and support academic activities, social interaction, recreation and environmental quality [1]. In the modern landscape, landscapes are seen more and more as components of campus planning, linking buildings and natural environments, and creating a harmonious and people-oriented space. In the context of growing urbanisation and expansion at higher education institutions, outdoor space quality has become increasingly significant in the design of an attractive, resilient and sustainable campus [2].

The institutional environment is the physical, social and ecological context in which teaching, learning, research and institutional administration are conducted. In this context, landscape architecture is the design, planning and management of open spaces to enhance their functions, accessibility, environmental quality and beauty. Green spaces, walkways, courtyards, seating areas, indigenous plants, and other landscaping elements create a campus atmosphere that promotes movement, comfort, and ecology [3], [4].

The evidence indicates that good outdoor environments can have a positive impact on learning outcomes, physical health, mental wellbeing and social interaction. The green campus environment also facilitates informal learning, outdoor teaching, recreation and stress reduction, and enhances the sense of belonging and institutional identity for students. Additionally, sustainable landscape planning and design, such as biodiversity protection, climate adaptation, and water management, serve to mitigate and address environmental issues and increase long-term campus resilience [5], [6].

As the requirement for a sustainable and student-focused campus development grows, a comprehensive review of the design of the outdoor landscape is required. Combining the latest research can help to improve knowledge of the impact of landscape design on institutional environments and inform planning for future healthy, sustainable and engaging educational campuses.

2 FUNCTIONS OF OUTDOOR LANDSCAPES IN INSTITUTIONAL ENVIRONMENTS

Outdoor landscapes are essential to the functioning and character of institutional campuses, with environmental, social and functional values beyond their ornamental aspects. Good landscape design blends natural and constructed elements to provide places for learning, enhance

environmental quality and foster active use. Modern campus design acknowledges the outdoor spaces as complex systems that can play a role in ecological sustainability, user comfort and institutional identity, while meeting challenges from urbanisation and climate change [7].

1. **Ecological Functions:** Institutional landscapes play an important ecological role by adding green infrastructure (trees, lawns, rain gardens, bioswales, permeable surfaces, etc.). These features increase biodiversity, support bird and insect predation, and promote ecosystem health by providing habitat for birds, insects and native plants. Additionally, vegetation helps to control the microclimate on the campus by lowering surface temperature, shading, air quality, and reducing urban heat island effects, which is helpful for climate change adaptation and carbon sequestration [8].
2. **Functional Roles:** The outdoor landscape allows for safe circulation and access via pedestrian paths, bike paths, open plazas and universally accessible walking paths. Campuses become more accessible and welcoming for students, staff and visitors by providing areas for learning informally, sitting on the ground, working together and interacting with others.
3. **Aesthetic and Visual Quality:** Landscape design adds visual interest to the institutional campus by integrating the design of the landscape, water features, seasonal plantings and open green space. Attractive outdoor environments enhance user satisfaction, reinforce the campus identity and make places welcoming and supportive to the overall educational experience [9].
4. **Landscape as a Connector Between Academic Buildings and Social Spaces:** Academic buildings are physically and socially linked with recreational and communal areas through outdoor landscapes. The courtyards, green corridors and pedestrian networks facilitate movement, interaction and interdisciplinary connections, and provide seamless transitions between learning spaces and social areas. This holistic approach to landscape planning contributes to the strengthening of the institutional unity and the sustainability of institutional development through the promotion of active mobility and the reduction of reliance on motorized mobility [10].

3 INFLUENCE OF OUTDOOR LANDSCAPES ON USERS' WELL-BEING AND INSTITUTIONAL EXPERIENCE

The outdoor environment is a key component in defining the experiences of students, faculty, staff and visitors through institutional campuses. In addition to their environmental and functional roles, these areas impact psychological health, physical health, social relationships, and academic engagement. Environmental psychology and campus planning studies show that

connectivity to well-designed greenspace can improve users' quality of life by providing restorative, inclusive and stimulating environments. This has led to an increasing focus on the role of the outdoor landscape in institutional planning that will enhance campus health and learning [11].

Table 5: Influence of Outdoor Landscape Components on Users' Well-being and Institutional Experience

Outdoor Landscape Aspect	Key Landscape Elements	Influence on Users	Institutional Benefits
Mental Health and Psychological Restoration	Green spaces, gardens, shaded seating areas, water features, trees	Reduces stress, anxiety, and mental fatigue; improves mood, attention, and cognitive restoration	Enhances student well-being, reduces psychological stress, and supports a healthier campus environment
Physical Activity and Healthy Lifestyles	Walking trails, cycling paths, sports fields, open lawns, fitness zones	Encourages walking, cycling, exercise, and outdoor recreation; promotes physical fitness	Supports healthier lifestyles, improves productivity, and reduces sedentary behaviour
Social Interaction and Community Engagement	Courtyards, plazas, amphitheatres, gathering spaces, community gardens	Facilitates communication, collaboration, cultural events, and social inclusion	Strengthens campus community, teamwork, and institutional culture
Learning, Creativity, and Outdoor Educational Spaces	Outdoor classrooms, botanical gardens, ecological parks, learning courts	Enhances experiential learning, creativity, concentration, and problem-solving skills	Supports innovative teaching methods and interdisciplinary learning opportunities
User Satisfaction and Sense of Belonging	Attractive landscapes, comfortable seating, accessible pathways, iconic green spaces	Improves comfort, campus satisfaction, emotional attachment, and place identity	Increases campus attractiveness, institutional reputation, student retention, and overall user satisfaction

- **Mental Health and Psychological Restoration:** Incorporating natural landscapes can alleviate stress, mental fatigue and anxiety through the provision of a restorative space where the user can relax and recover from academic or occupational stressors. Psychological restoration, enhanced moods and cognitive functions through trees, gardens, shaded seating, and water features enhance overall mental health [12].
- **Physical Activity and Healthy Lifestyles:** Campus facilities promote regular exercise through walking and cycling trails, sports fields, fitness areas, and open recreational areas. The facilities encourage active living, decrease sedentary behaviour, and benefit the users' physical health as well as their preventive health practices on campus.
- **Social Interaction and Community Engagement:** Informal meeting areas, courtyards, plazas and open green spaces are used for cultural events and collaborative activities. In these spaces, interpersonal relationships are reinforced, community engagement is promoted, and an inclusive campus culture is created that promotes communication and collaboration [10].
- **Learning, Creativity, and Outdoor Educational Spaces:** Green outdoor spaces are seen as extensions of the classroom, offering flexible learning environments for experience-based learning, field learning, co-creative discussion and thinking. Nature-based environments have been linked to enhanced attention, problem-solving and academic engagement, and this proves that outdoor spaces are valuable learning environments [13].
- **User Satisfaction and Sense of Belonging:** The campus environment is improved and users' satisfaction is increased when the landscapes are well-maintained and attractive, and their identity is strengthened. Positive experiences are built in comfortable, safe and accessible outdoor spaces, leading to greater emotional attachment, campus pride and belonging among students and staff [14].

4 SUSTAINABLE LANDSCAPE DESIGN STRATEGIES FOR INSTITUTIONAL CAMPUSES

As universities and educational institutions strive to balance the needs of their users with the preservation of the environment, sustainable landscape design has become a key part of their campus planning process. The current campus environment is expected to achieve more ecological performance, be more climate resilient, conserve natural resources and provide healthy outdoor environments. Incorporating sustainable landscape practices in campus development serves to minimize impacts to the environment while also aligning with institutional sustainability and climate action goals, and with long-term operating efficiency.

Recent studies underscore the importance of green infrastructure and climate-smart landscape design to create resilient and environmentally responsible campuses [15], [16].

- **Native Vegetation and Biodiversity Conservation:** Native trees, shrubs and grasses support biodiversity, create habitats for native wildlife and pollinators, and need little or no irrigation or maintenance compared to other non-native species. A diverse landscape enhances the resilience of the ecosystem, enhances soil quality and helps to maintain region-specific landscape attributes, thus making campuses more environmentally sustainable.
- **Stormwater Management and Water-Sensitive Landscape Design:** Water sensitive landscape design (WSLD) uses features such as rain gardens, bioswales, permeable pavement and constructed wetlands to capture, filter, and use stormwater. These practices help to reduce surface runoff, prevent flooding, increase groundwater recharge and water quality, and promote sustainable water resource management.
- **Climate-Responsive Design:** Shade trees, green corridors, vegetated roofs and open green spaces enhance thermal comfort in the outdoor environment through their ability to reduce solar radiation and to moderate the urban heat island effect. Climate responsive design also maximizes natural ventilation and supports adaptation to climate change by sequestering carbon and providing better microclimate.
- **Sustainable Materials and Low-Maintenance Landscapes:** The use of recycled, locally sourced and durable materials in the construction process minimizes environmental impacts and reductions in lifecycle cost. Low maintenance landscapes, when paired with drought-tolerant plantings and efficient irrigation, reduce the number of resources needed while delivering effective and appealing campus spaces.
- **Smart Landscape Management and Green Campus Initiatives:** Digital technologies such as smart irrigation systems, sensor technology, Geographic Information Systems (GIS) and remote monitoring can provide efficient management of the landscape by optimising resources in real time. These technologies can be incorporated into green campus projects along with campus sustainability policies to enhance environmental performance, cut down on costs and help advance institutional goals related to carbon reductions and sustainable campus development.

5 CHALLENGES AND FUTURE DIRECTIONS IN INSTITUTIONAL OUTDOOR LANDSCAPE PLANNING

Outdoor landscape planning is increasingly having to deal with environmental, financial and technological challenges as institutional campuses continue to grow. Sustainable landscapes

offer many ecological and social advantages, but they require both planning and long-term management to be effective, as well as an institutional commitment. Meanwhile, innovations and new evidence-based design methods are opening the door to new opportunities for resilience, function and sustainability of campus landscapes. A mix of innovative planning strategies and tackling current challenges will be necessary to create future-ready institutional environments.

6 CHALLENGES IN INSTITUTIONAL OUTDOOR LANDSCAPE PLANNING

Limited financial resources for installation, maintenance, and periodic upgrades of the landscape are one of the main issues. Funding limitations can lead to sub-optimal investment in green infrastructure, poor maintenance, and poor landscape quality. The quick growth of campus is also putting pressure on opening new green spaces, often leading to the destruction or disintegration of green spaces. In addition, too many campuses continue to have obstacles that prevent them from creating universally accessible outdoor spaces suitable for all physical capacities. Climate change brings new challenges in the form of extreme weather events, more water scarcity, changing vegetation patterns, and increased temperatures, and landscapes must be resilient and adaptable [17].

7 FUTURE DIRECTIONS IN INSTITUTIONAL OUTDOOR LANDSCAPE PLANNING

Plans for the future of the campus landscape will focus on technology-based and evidence-based strategies to enhance environmental performance and user experience. The use of Geographic Information Systems (GIS), smart irrigation networks, environmental sensors, drones and remote monitoring systems can help to optimise water use, monitor plant health and facilitate the management of water resources. Furthermore, the use of evidence-based landscape planning, taking into account the ecological data, user behaviour, thermal comfort analysis, as well as the involvement of stakeholders can provide the basis for informed design decisions. The combination of these innovations, along with biodiversity protection, climate planning and inclusive design, will help institutions design resilient, sustainable and user-friendly outdoor spaces to change with future environmental and learning needs.

8 LITERATURE REVIEW

(M. Liu & Feng, 2026) [18] enlarged the Stimulus–Organism–Response (SOR) framework by include felt emotional healing and perceived personal progress, and proposed a dual-pathway model in which creative creativity mediates the relationships between environmental emotions

and reported psychological advantages. A cross-sectional survey was administered to 350 undergraduate art and design students who had taken outdoor landscape sketching classes at three Chinese universities. The results indicate that during outdoor landscape sketching classes, students reported emotional healing and personal development are linked to environmental experiences through creative expression. This study provides practical implications for incorporating experiential landscape sketching into higher art education to support students' emotional well-being and personal development by expanding the SOR framework with a dual-pathway mediation model.

(Segun et al., 2026) [19] uses "Lagos State University of Science and Technology (LASUSTECH)", Ikorodu as a case study to investigate how landscape design might support health and wellness in postsecondary institutions. In addition to serving as hubs for academic pursuits, university campuses have a big impact on people's social, emotional, and physical health. This study assesses the manner in which natural features, green spaces, recreational areas, shaded walks, and other landscape characteristics support social interaction, physical exercise, stress reduction, and general wellness. The results show that well-designed landscape areas promote social interaction, improve environmental quality, and promote mental calm. The research suggests more funding for green infrastructure in postsecondary institutions and indicates that incorporating efficient landscape design techniques into campus planning will greatly enhance user wellbeing.

(Beery, 2025) [20] The engagement of students with nonhuman nature, which is becoming increasingly limited, is a critical challenge for environmental and outdoor educators today. This has resulted in a diminished understanding of and connection to the natural world. We need to come up with fresh, productive, and flexible approaches to organise and structure outdoor and environmental education in light of the growing global concerns. The landscape of Laponia is a live illustration of this intertwined interaction, and the metaphor of fabric emphasises the profound interconnectedness between human and nonhuman nature. In the end, we require strategies that are both relational—promoting human relationships and a feeling of belonging in the natural world—and responsive—recognizing the obligations that result from this belonging.

(Hussain et al., 2024) [21] conducted a study at "the National Child Development Research Centre (NCDRC) Kindergarten at Universiti Pendidikan Sultan Idris (UPSI)" in order to determine how the outdoor landscape shapes children's sense of place and supports their T&L process. Interviews with 15 informants from "UPSI's Department of Development and Asset Management (DDAM)" and kindergarten teachers using a qualitative study design revealed trends in the influence of outdoor landscapes on children's educational physical, cognitive, emotional, and social development. The Ministry of Education and kindergarten administrators

are urged to give landscape designs in kindergartens top priority since the study highlights the significance of landscape design for complete child development.

(Caprari et al., 2024) [22] focuses on SAAD/UNICAM contributions and summarises the key findings, techniques, and outcomes of the European project EDUSCAPE (Erasmus+), created by a group of international academics from four countries, little over a year and a half after its debut. As the project's culmination, EDUSCAPE is creating Didactic Units (DUs) to refresh and include landscape into school curriculum. These units will be evaluated in the partnership network's schools and will give theoretical underpinnings and practical teaching solutions. In general, this paper investigates the potential for spreading the pedagogical and social role of the landscape through a new method of instruction based on a deeper examination of the theme that can encourage critical thinking in present and future generations regarding the local and global challenges of the twenty-first century.

(Hammadi, 2017) [23] emphasise the value of using landscape design concepts to improve people's outdoor areas, as a way to improve the general environment of urban open spaces in communities. Modern planning and design of these urban locations and spaces ignores elements like culture and climate that affect people's behaviour and how they use the environment and these amenities. Pedestrian movements within the entire urban fabric of the city's morphology were not given enough consideration in alien planning and design conceptions, which prioritised automobile systems. Neighbourhood gardens, parks, mini-vest pocket parks, university open spaces, and streetscape are examples of community open spaces that are said to be the main source of reformation for family members. The fact that children, women, the elderly, and people with disabilities do not have easy or even adequate direct access to outdoor urban areas makes this even more crucial. The ultimate objective is to raise decision-makers' understanding of the significance of incorporating landscape design ideas into all phases of city planning and design. To put it another way, this study will look at how some urban outdoor open spaces are now planned and designed in Makkah, Saudi Arabia, and how landscape design approaches could be used in the early stages of the emergence of new urban services and sites.

9 CONCLUSION

Outdoor landscapes are no longer just decorations on the campuses but become an integral part that has an impact on the environmental, social and educational function of the institutional environment. This review has demonstrated that well planned landscapes offer a variety of benefits from biodiversity conservation, climate control, accessibility, aesthetics, to supporting learning, physical health, psychological health, and social interaction. Institutional resilience and resources efficiency are further enhanced through sustainable landscape strategies like

native vegetation, water sensitive design, climate responsive planning and smart management technologies. Although all these benefits exist, maintaining these landscapes, funding them, expanding the urban landscape, making them accessible and considering climate change are still obstacles for effective landscape implementation. Future institutional landscape planning therefore needs to adopt evidence-based design approaches by incorporating ecological principles, user needs and digital technologies in order to optimise environmental performance and user experience. A multi-sector approach that includes landscape architects, educators, administrators and stakeholders will be critical to create inclusive and sustainable campuses. Finaly, outdoor landscapes are significant to institutional identity and are essential to providing healthier, more resilient and more environmentally responsible learning environments for current and future generations.

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