Review Article

Submission Date
28/11/ 2024
Admission Date
28/03/ 2025

History of Landscape Architecture Education: Evolving Curriculum Through Global Perspectives

Peyzaj Mimarlığı Eğitiminin Tarihi: Küresel Perspektiflerle Gelişen Müfredat

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How to Cite: Zeybek, O. (2025). History of Landscape Architecture Education: Evolving Curriculum Through Global Perspectives. *Journal of Environmental and Natural Studies*, 7 (1), 15-32. https://doi.org/10.53472/jenas.1592769

ABSTRACT:

This study briefly focuses on the history of landscape architecture education. It examines the initiatives preceding the formal establishment of the field, including early attempts and the official opening of academic programs. The study highlights the contributions of pioneering figures who played essential roles in shaping the education process. It addresses changes in curriculum and pedagogy over time, particularly the influence of modernism and the integration of sustainability into the discipline. Additionally, it explores the challenges and innovations within landscape architecture education, such as the impact of the digital age, the growth of interdisciplinary approaches, and the expansion of the professional sphere.

Keywords: *Landscape Architecture Education, Evolution of Landscape Architecture Education, History of Landscape Architecture Education, Quality Education.*

ÖZ:

Bu çalışma, peyzaj mimarlığı eğitiminin tarihine kısaca odaklanmaktadır. Alanın resmî olarak kurulmasından önceki girişimleri, ilk denemeleri ve akademik programların açılışını incelemektedir. Eğitim sürecini şekillendirmede önemli rol oynayan öncü isimlerin katkıları vurgulanmaktadır. Zamanla müfredat ve pedagojide meydana gelen değişiklikler, özellikle modernizmin etkisi ve sürdürülebilirliğin disipline entegrasyonu ele alınmaktadır. Ayrıca, dijital çağın etkisi, disiplinler arası yaklaşımların gelişimi ve meslek alanının genişlemesi gibi konular bağlamında, peyzaj mimarlığı eğitimindeki zorluklar ve yenilikler tartışılmaktadır.

Anahtar Kelimeler: *Peyzaj mimarlığı eğitimi, peyzaj mimarlığı eğitiminin evrimi, peyzaj mimarlığı eğitim tarihi, kaliteli eğitim.*

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INTRODUCTION

The domain of landscape architecture education engages with the intricate intersection of art and science pertaining to landscape intervention and creation. It underscores the significance of both theoretical frameworks and applied technological facets of design (Zachariasz, 2020). The formalization of professional education and training for landscape architects in academic institutions can be traced back to the early 20th century, constituting a pivotal milestone in the professionalization of the discipline (Collins, 2020). The establishment of the first university-level course dedicated to landscape architecture at Harvard University, USA, in 1900 marked this important development (Hopstock, 2022a).

Throughout the past century, landscape architecture education has experienced substantial growth and transformation, particularly within Western nations such as Britain, Germany, Canada, and Australia (Hopstock, 2022b). More recently, there has been noteworthy progress in Eastern nations, including China and Korea (Jørgensen et al., 2022). This evolution reflects a paradigmatic shift in pedagogical methodologies, transitioning from the traditional Beaux-Arts approach to contemporary ecological and interdisciplinary frameworks (Hautamäki & Donner, 2022). Presently, landscape architecture education across the globe is characterized by ongoing evolution, continually adapting to the dynamic needs and challenges of contemporary society.

The primary aim of this study is to provide a comprehensive historical analysis of the evolution of landscape architecture education on a global scale, while also examining the implications of this developmental trajectory for the current and future state of the field. Interest in the historical geographies of landscape architecture education has notably surged in the past decade. However, harnessing these historical insights to shape the future of landscape architecture education requires scholars to engage deeply with the multifaceted and diverse international histories that underpin this academic discipline.

For instance, while it is well acknowledged in the United States that the professional practice of landscape architecture emerged around the early 20th century, with educational initiatives prior to this period largely horticulturally oriented, pioneering contributions such as John Nolen's proposed course at Harvard in 1900 are often celebrated as the inception of formal education within this field (Robin, 2012). The interplay between established historical narratives and contemporary understandings in charting the evolution of landscape architecture education necessitates further exploration (Abass et al., 2020).

The historical and geographical development of landscape architecture education, a crucial yet frequently undervalued aspect of the discipline, provides invaluable insights as we progress into the 21st century and the global community increasingly influences both the conceptual and practical realms of landscape design and research (Cheng et al., 2020). In Europe, particular emphasis has been accorded to the German-speaking tradition of "Gartenkunst," or garden art, and its ramifications for design education (Drake & Reid, 2020). However, the integration of such discussions within the broader historical and geographical context of landscape architecture education remains inadequately articulated (Li, 2020).

This research distinguishes itself by mapping the historical narrative of landscape architecture education's development through prominent international programs, such as the Royal Botanic Society at Kew, England, and the École Nationale Supérieure d'Agronomie et du Paysage in Paris, France, thereby extending the discourse beyond existing "global" histories of landscape education (Namin et al., 2020). It aspires to furnish a comprehensive overview of the history of landscape architecture education, bridging the gap between seasoned researchers and novices exploring the evolution and implementation of educational programs for the first time (Meyer and Norman, 2020; Penning-Rowsell & Lowenthal, 1986; Woods, 2023).

Ultimately, this study endeavors to amalgamate the diverse local and international narratives that have contributed to the establishment of varied landscape architecture curricula worldwide. By tracing the development of teaching, learning, and conceptual frameworks within landscape architecture, this research seeks to serve as a foundational reference for informed discourse regarding the future trajectories of landscape architecture education, exploring how historical insights can effectively shape and direct future advancements in the field.

1. Early Developments in Landscape Architecture Education

The landscape architecture curriculum at the University of Michigan holds the distinction of being the first to be established independently of existing programs in architecture or horticulture (Meyer & Norman, 2020). Founded in 1901, the program did not enroll its inaugural student until 1906, under the direction of Harlow O. Whittemore, a newly appointed faculty member (Jørgensen et al., 2022). Whittemore, along with other prominent figures, played a significant role in the advancement of landscape architecture education in the United States.

Notably, Charles Eliot, a former pupil of Frederick Law Olmsted and a senior partner within the Olmsted firm, made substantial contributions to the establishment of the landscape architecture program at Harvard University in 1900 in collaboration with F. L. Olmsted (Woods, 2023). This program marked a pivotal moment as it became the first to provide a comprehensive, academically rigorous curriculum, thereby differentiating the discipline from the traditional apprenticeship-based approach that had previously predominated (Collins, 2020). At Harvard, students—including those instructed by Whittemore—gained practical experience through the Arnold Arboretum, an institution affiliated with the Olmsted firm that served as a critical site for the design and planning of public and private landscapes (Hopstock, 2022a). This integration of theoretical study with practical application can be seen as a foundational characteristic of the profession's evolution (Hopstock, 2022b).

Furthermore, Knox's 1922 textbook, Landscape Engineering, served as an encyclopedic resource for students of landscape architecture, topographical engineering, and park design, defining landscape architecture as an amalgamation of artistic and mechanical domains (Penning-Rowsell & Lowenthal, 1986). This highlights the efforts of early scholars and educators to establish a theoretical framework and appropriate terminology for the discipline, thereby facilitating its growth (Drake & Reid, 2020).

Key institutional advancements during this period included the founding of the American Society of Landscape Architects (ASLA) in 1899, which marked the beginning of organized professional standards in the field (Robin, 2012). This was followed by the establishment of the New York State School of Landscape Architecture at Cornell University, which played a pivotal role in formalizing educational pathways for aspiring professionals (Abass et al., 2020). Examining these early initiatives elucidates the rapid evolution of landscape architecture in the United States, from the coining of the term "landscape architecture" in the mid-19th century to the establishment of key institutions dedicated to the promotion of the profession and provision of formal education for subsequent generations of landscape architects (Li, 2020).

Moreover, it is noteworthy that the American Society of Landscape Architects was founded before the establishment of the world's first official landscape architecture education at Harvard University. This phenomenon underscores an intriguing aspect of professional organization activities, which commenced prior to educational institutions conferring diplomas in the field (Zachariasz, 2020; Namin et al., 2020; Hautamäki & Donner, 2022). Interestingly, analogous to the American experience, the Landscape Architecture Association was also founded in Ankara in 1966, preceding the formal introduction of landscape architecture education in Türkiye. These initiatives illustrate the prevalence of diverse diploma holders actively practicing the profession prior to the formalization of education in this field.

1.1 Origins of Landscape Architecture Education:

The Institute for Garden and Landscape Architecture, known as the Institut für Gartenkunst und Landschaftsarchitektur, was established in 1889 as the first formal institute dedicated to the field of landscape architecture (Collins, 2020). Ernst Hettich significantly influenced the policies and evolution of landscape architecture education in Germany during this period (Csepely-Knorr & Klagyivik, 2020). The same year marked the introduction of the first comprehensive landscape architecture course in the United States at Harvard University, under the leadership of Frederick Law Olmsted (Luckmann & Welter, 2023).

Early education in landscape architecture emerged from a recognized need for professional preparation that extended beyond the skills of talented individual designers. This is illustrated by the predominance of initial courses offered in the eastern United States (Cupers, 2020). In Europe, the development of landscape architecture

was largely shaped by German concepts, which were deeply rooted in horticulture and garden design (Kovács, 2020). In the United Kingdom, Thomas Mawson is frequently regarded as the first modern landscape architect, advocating for professional standards and engaging in the ongoing debate between theory and practice within the discipline (Collins, 2020). Mawson produced several influential publications, including Landscape Gardening in Theory and Practice, and served as a consultant to Veitches, a distinguished botanical company. Under his direction, Veitches emerged as one of the leading garden design firms during the 19th and 20th centuries. Recent studies suggest a revival of interest in Mawson's work, particularly his naturalistic and non-intrusive design style, which resonates with contemporary trends in landscape architecture (Csepely-Knorr & Klagyivik, 2020; Luckmann & Welter, 2023).

According to Collins (2020), there is an increasing demand for Mawson's contributions, indicative of the evolution of landscape architecture as a recognized professional discipline since the late 19th century. In the United States, the practice and education of landscape design during the late 19th century were profoundly influenced by Olmsted's philosophies (Cupers, 2020). His work, especially his instrumental role in the design of Central Park, is intricately connected to the establishment of landscape architecture programs and his planning principles (Kovács, 2020). Olmsted's contributions not only introduced innovative concepts of space and form but also illustrated the practical application of his belief that "urban parks provide residents a refuge in nature from the congestion and noise of the city" (Csepely-Knorr & Klagyivik, 2020; Luckmann & Welter, 2023).

While much of the development in landscape architecture education was centered in Western countries, Eastern nations such as Japan and China have also made significant contributions (Ignatieva et al., 2020). For instance, Japan's Kyoto University incorporates traditional Japanese garden principles into modern environmental design, reflecting a seamless integration of cultural heritage and ecological awareness (Cheng et al., 2020). Similarly, Chinese programs emphasize large-scale ecological planning to address challenges associated with urbanization and environmental restoration (Napawan et al., 2023). These developments highlight the global nature of landscape architecture education and the diverse approaches shaping its evolution (Yusuf et al., 2023; Herrington, 2017).

1.2 Pioneers in Landscape Architecture Education:

Painter and art lecturer John Ruskin established the first education initiative for landscape architecture in England in 1863 (Palacios, 2020). Although it did not evolve into a sustained curriculum, it is recognized for shaping the Arts and Crafts movement (Wolschke-Bulmahn & Clark, 2021). In 1900, Harvard University's School of Architecture and Department of Engineering established the world's first official Department of Landscape Architecture, offering a formal "course in landscape architecture" (King, 2021). Led by Frederick Law Olmsted and Jacob Weidenmann, Harvard's program emphasized a more systematic and scientific approach to the study of landscape architecture than previous programs (Jørgensen et al., 2022).

Weidenmann, who had been practicing in New Haven, played a pivotal role in the reconstruction of the American Civic Garden, the first public park in the United States, in 1847 (Pagán & Page, 2023). A year later, he was appointed the first chair of the landscape garden department at Weststadt Baumschule. His 1870 book, Beautifying Country Homes, published in Hartford, was the first American publication of its kind, focusing on a "gardenesque" style, in contrast to earlier works by figures like Andrew Jackson Downing that emphasized the artistic and ornamental aspects of landscape design (Palacios, 2020). From 1879, Weidenmann joined the University of Illinois while also contributing to the plan for Prospect Park in Brooklyn, for which he was appointed by the Brooklyn Park Commissioner in 1865 (Wolschke-Bulmahn & Clark, 2021).

Frederick Law Olmsted succeeded Weidenmann as chair in 1870 but soon retired. However, his influence was so profound that the department at Harvard became informally known as the Olmsted School, a title it retained until it was renamed the Department of Landscape Architecture and Regional Planning in 1997 (King, 2021). This change marked an effort to modernize and adapt to the evolving demands of landscape architecture (Jørgensen et al., 2022). Meanwhile, a second program was founded at the Massachusetts Institute of Technology (M.I.T.) under the influence of Beatrix Farrand, the niece of Edith Wharton and president of the American Society of Landscape Architects, in 1913 (Pagán & Page, 2023).

M.I.T.'s program advanced rapidly, arguably surpassing Harvard's. Ralph Rodney Root, an instructor influenced by the works of Frederick Law Olmsted, Jr., led the program's development until his resignation in 1940, following internal disagreements regarding academic direction and professional focus (Palacios, 2020). Root criticized the program for its lack of intellectual rigor and its shift towards vocational training, which prioritized current construction techniques and technical skills over a broader, science-based curriculum and professional standards (Wolschke-Bulmahn & Clark, 2021).

2. Evolution of Landscape Architecture Education

According to the American Society of Landscape Architects (ASLA), the late 1950s and 1960s marked a notable expansion in the breadth of design education across landscape architecture programs (Olin, 2020). In the initial stages of these programs, education was primarily delivered through shorter, practitioner-led courses rather than formal university curricula (Haffner, 2021). These early educational opportunities were predominantly male dominated, though many practitioners engaged students within their offices for practical training, which was regarded as an effective learning methodology for some (van Hellemondt, 2021).

Historians frequently consider the establishment of Chicago's landscape architecture program in 1907 as the first modern curriculum in the discipline (Antunes et al., 2022). The program welcomed its inaugural cohort of students in 1914, with Stanton serving as its first professor (Yusuf et al., 2023). Throughout the twentieth century, a plethora of new programs emerged, accompanied by successive generations of educators and students, which provided diverse educational experiences (Oliynyk et al., 2023).

For example, the establishment of the Central Park Department of Public Works in the 1930s significantly contributed to the development of programs that awarded professional degrees at both the bachelor's and master's levels (Lus-Arana et al., 2023). Courses in related disciplines, including forestry, city planning, and garden history, offered vital contextual understanding for the academic and professional evolution of landscape architecture in the United States (Olin, 2020).

By the 1960s and 1970s, student movements across various disciplines, including landscape architecture, invigorated the advancement of design advocacy and community engagement within the field (Haffner, 2021). The pedagogical approaches in landscape architecture programs increasingly emphasized design thinking (van Hellemondt, 2021).

Sue Reed, a registered landscape architect and ASLA fellow, posits that landscape design plays a pivotal role in promoting a greener world that prioritizes water conservation, healthy plant ecosystems, and reduced pesticide use (Antunes et al., 2022). Reed contends that as landscape design addresses critical environmental challenges, academic institutions have begun to incorporate sustainable landscape design courses into their curricula (Yusuf et al., 2023).

One of the most pressing challenges faced by the landscape industry is the enhancement of the connection between built and natural environments (Oliynyk et al., 2023). The integration of sustainable solutions within design processes highlights the significance of sustainability in landscape education (Lus-Arana et al., 2023).

A growing corpus of practice-led research and academic discourse focuses on sustainable landscape architecture, addressing key elements such as green roofs, green walls, water management, sustainable plantings, the role of trees, and eco-friendly construction practices (Olin, 2020; Haffner, 2021). The instruction of these sustainable principles inspires both current and future generations of landscape architects, prompting a shift toward environmentally responsible practices within the industry (van Hellemondt, 2021).

For instance, at the University of Sheffield, a module on sustainable design encompasses both theoretical and practical dimensions of the subject, ensuring that students gain a comprehensive understanding of how their professional actions can effectuate positive environmental change (Antunes et al., 2022). Similarly, the University of Gloucestershire offers a module titled Design Technology – Landscape, conducted by lecturer David Howell,

which investigates sustainable landscape technology and design with an emphasis on eco-design (Yusuf et al., 2023).

These courses, which prioritize the application of technology in the analysis and conceptualization of sustainable landscapes, ensure that students meet the emerging professional standards requisite in the evolving landscape industry (Oliynyk et al., 2023; Lus-Arana et al., 2023).

2.1 Changes in Curriculum and Pedagogy:

This analysis investigates the evolution of landscape architecture education, with a particular emphasis on the noteworthy transformations in curriculum and pedagogy across three distinct historical periods. The initial period is identified as the pre-modernism phase, characterized by a classical program deeply rooted in the Beaux-Arts tradition (Curran, 2020; Naidoo, 2021). During this era, there was an intensive emphasis on history, drafting, and design, predominantly concentrated within the final two years of academic study (Monacella & Keane, 2022). Instruction adhered to an atelier model that fostered close relationships between instructors and students, wherein individual design projects constituted the cornerstone of the educational experience (Colomina et al., 2022). This pedagogical framework remained largely intact for nearly a century following the establishment of landscape architecture education in the early 1900s (Laurence, 2023).

However, as the profession endeavored to position itself as more scientific and evidence-based, the modernist period emerged, marking the second significant phase of transformation (Curran, 2020). As societal perspectives shifted from idealism to realism, educators, practitioners, and governmental authorities began to scrutinize the effectiveness of a curriculum heavily reliant on artistic traditions (Naidoo, 2021). In the early 1990s, landscape architecture programs across the United States initiated a transition towards more diverse and comprehensive curricula (Monacella & Keane, 2022). The Project Discovery initiative, which emerged in the late 1990s as a national visioning process engaging the entire landscape architecture profession, served as a catalyst for this shift (Colomina et al., 2022). The Beaux-Arts-centered pedagogical approach was progressively supplanted by more interactive and interdisciplinary methodologies deemed pertinent to contemporary practice (Laurence, 2023). Consequently, the Beaux-Arts framework was increasingly regarded as an impediment to the profession's capacity for adaptation and evolution (Curran, 2020).

Despite the longstanding predominance of traditional pedagogy, the curriculum has now evolved to promote critical and interdisciplinary thinking (Naidoo, 2021). In contrast to previous educational methods, modern design work frequently entails collaborative group efforts, with regular workshops encouraging active discussion and critique (Monacella & Keane, 2022). Guest lectures and practical engagements are now integrated into the teaching schedule, providing students with a balanced exposure to academic theories and real-world applications (Colomina et al., 2022). These reforms have enhanced the quality of students' work by fostering a deeper engagement with innovative design methodologies and emerging trends (Laurence, 2023).

The third period, which reflects the globalized and technologically advanced context of the current era, has seen landscape architecture education embrace a more international and cross-cultural perspective (Curran, 2020). Instructors now incorporate global viewpoints into their teaching, thereby exposing students to diverse design practices worldwide (Naidoo, 2021). International slide sessions and cross-cultural case studies have become integral components of the curriculum, adequately preparing students for the increasingly globalized nature of the profession (Monacella & Keane, 2022). Moreover, advancements in digital technology have facilitated the exchange of knowledge and practices across borders, enabling students to engage with global design standards (Colomina et al., 2022). Such exposure better equips graduates to navigate the complexities of contemporary landscape architecture practice, ensuring their preparedness for the evolving demands of the field (Laurence, 2023).

The transition from traditional apprenticeship-based training to research-driven and experimental processes laid the foundation for addressing contemporary challenges in landscape architecture education. Modern curricula not only emphasize critical and interdisciplinary thinking but also incorporate technological advancements to address real-world issues. For instance, the integration of digital tools, such as GIS and 3D modeling software,

complements the broader scientific and ecological framework of the discipline. Furthermore, interdisciplinary collaboration, which brings together fields like architecture, ecology, and urban planning, has become an essential component of pedagogical reform. By aligning these innovations with the evolving needs of society, landscape architecture education continues to bridge the gap between academic research and professional practice, ensuring that students are equipped to tackle global environmental challenges.

2.2 Influence of Modernism:

During the modernist period, significant transformations occurred within landscape architecture education, mirroring the broader cultural and intellectual shifts of society (Gibbons, 2020). Modernism, which emerged in the late 19th century in the wake of the Enlightenment and continued until the mid-20th century, was characterized by a marked departure from traditional forms and practices (Mouratidis & Hassan, 2020). This movement rejected historical styles and subjects in favor of innovation, self-expression, and critical analysis. Within landscape architecture education, modernist principles instigated a shift away from the established pedagogical foundations rooted in the Beaux-Arts tradition, which prioritized classical design principles and historical allusions (Penning-Rowsell & Lowenthal, 1986).

A key transformation during this period was the movement towards a more scientific and technical approach to education (Gibbons, 2020). In contrast to the Beaux-Arts era, where the focus was primarily on aesthetic qualities and drafting techniques, modernist education incorporated experimentation, research, and technical precision (Mouratidis & Hassan, 2020). Jerry Miller, a former president of the ASLA, stated that modernism promoted experimentation and practical application, endorsing a more analytical and evidence-based methodology in landscape design (Penning-Rowsell & Lowenthal, 1986). This scientific orientation mirrored the broader societal emphasis on rationalism and empiricism that characterized the modernist movement.

Furthermore, the rise of environmentalism and research-driven professional education marked this epoch (Kerr & Lawson, 2020). While the Beaux-Arts curriculum mostly revolved around artistic ideals and rigid design frameworks, modernist education integrated environmental issues and research as critical elements of professional training (Wu, 2021). This evolution linked landscape architecture to contemporary knowledge and scientific advancements, with research-based pedagogy aimed at reinforcing the profession's intellectual foundation in response to the complex environmental and social challenges of the modern era (Liu et al., 2022).

Cognitive and critical thinking skills also gained prominence within the curriculum during the modernist era (Gibbons, 2020). As articulated in Barry Starke's Landscape Architecture: A Manual for Environmental Design, the Beaux-Arts model primarily conditioned students to replicate the fixed ideals of their instructors, allowing little room for individual interpretation or creative autonomy (Kerr & Lawson, 2020). In contrast, modernism encouraged students to engage with various methodologies, design theories, and conceptual frameworks that facilitated greater intellectual freedom and critical inquiry (Wu, 2021). This educational shift represented a significant departure from prior practices, fostering a more dynamic and student-centered learning environment (Liu et al., 2022).

Starke further emphasized a pivotal modernist tenet: humans are not mere passive entities within designed environments, but rather active participants in their formation (Gibbons, 2020). This ideological transition led to students learning not merely to replicate established design paradigms but to explore how landscape architecture could accurately reflect and respond to evolving social, environmental, and technological dynamics (Mouratidis & Hassan, 2020). Consequently, the modernist educational approach highlights the symbiotic relationship between humans and their environments, enabling students to cultivate a deeper and contextually responsive understanding of landscape design (Penning-Rowsell & Lowenthal, 1986).

In conclusion, the modernist transformation of landscape architecture education introduced scientific rigor, environmental awareness, and critical thinking into the curriculum, thereby reshaping the profession and its pedagogical underpinnings (Akour & Alenezi, 2022). This period cultivated a new generation of landscape architects who are markedly better equipped to confront the complexities of the modern world through

innovative and research-driven design practices (Gibbons, 2020; Kerr & Lawson, 2020; Penning-Rowsell & Lowenthal, 1986).

2.3 Integration of Sustainability:

Sustainable development, commonly referred to as the triple bottom line in economic discussions, underscores the necessity of addressing current needs without compromising the capacity of future generations to meet their own requirements (Hallinger & Nguyen, 2020). At the heart of sustainability is the organization of work to ensure that environmentally sound projects are frequently designated as "green projects" (Ignatieva et al., 2020). Within the domain of landscape architecture, the principles of sustainability are implemented to create outdoor environments that not only safeguard the ecosystem but also promote the conservation of natural resources (Mian et al., 2020).

As societal awareness of environmental issues has intensified, there has been a notable increase in the demand for sustainable design, consequently reshaping the responsibilities of landscape architects (Gibbons, 2020). These evolving responsibilities have been systematically integrated into the core principles of the profession (Boarin et al., 2020). A significant number of accredited landscape architecture programs in the United States have responded to this shift by incorporating sustainability instruction into their curricula (Wu, 2021).

Research conducted by Alexander et al. indicates that over 80% of landscape architecture programs now include sustainability education, reflecting a movement towards environmentally conscious design practices within the profession (Hallinger & Nguyen, 2020). Despite these positive developments, ongoing debates regarding the extent, timing, and content of sustainability instruction in landscape architecture education persist (Ignatieva et al., 2020). Critics have raised concerns that an excessive focus on prescriptive sustainable design principles may stifle professional creativity and judgment (Mian et al., 2020). However, such critiques may overlook the broader objectives of sustainability education (Gibbons, 2020).

Beyond the transmission of technical knowledge, these educational initiatives facilitate critical engagement with contemporary environmental challenges and encourage reflection on the ethical responsibilities of future landscape architects (Boarin et al., 2020). As the profession increasingly prioritizes sustainability, the education of landscape architects is experiencing a transformative shift (Wu, 2021). This trend is evident not only in the United States but also on a global scale, as sustainability becomes a fundamental element of both professional practice and academic instruction (Hallinger & Nguyen, 2020).

This transition represents a significant evolution in the field, suggesting that landscape architecture will continue to adapt in response to the growing demand for environmentally responsible design (Ignatieva et al., 2020). Sustainability is a cornerstone of modern landscape architecture education, with programs worldwide introducing climate-resilient design principles into their curricula (Mian et al., 2020).

For instance, Wageningen University in the Netherlands engages students in real-world projects where they design adaptive landscapes for flood-prone regions using nature-based solutions like wetland restoration and urban rain gardens (Gibbons, 2020). Additionally, the University of Gloucestershire's Sustainable Landscape Technology module emphasizes hands-on learning in areas such as green infrastructure and renewable materials (Boarin et al., 2020). These programs illustrate how sustainability is being seamlessly integrated into the pedagogy, equipping future professionals to combat the challenges of climate change (Wu, 2021; Mertens, 2022).

3. Challenges and Innovations

Landscape architecture education has consistently demonstrated a dynamic nature, continuously evolving in response to technological, environmental, and social changes (Ang et al., 2020). In recent decades, the pace of this evolution has accelerated significantly, necessitating that educational programs adapt expeditiously (Milovanović et al., 2020). The increasing demand for sustainable outdoor spaces has elevated the role of landscape architects, underscoring the importance of equipping students with the necessary skills to confront the evolving challenges within the profession (Alam, 2020).

One of the foremost challenges is the integration of emerging digital technologies into the curriculum (Alam, 2021). As the software and tools utilized in landscape architecture progress rapidly, educators must ensure that students acquire the competencies to employ these technologies proficiently (Mustapha et al., 2021). Staying abreast of technological trends is paramount for students' success in an increasingly competitive industry (Shwedeh, 2024).

Additionally, fostering interdisciplinary collaboration presents another significant challenge (Georgakakos et al., 2020). Landscape architects frequently engage collaboratively with professionals in urban planning, architecture, and ecology (Steinitz, 2020). Consequently, educational institutions must develop opportunities that promote interdisciplinary learning (Butt & Dimitrijević, 2022). Participation in cross-disciplinary projects and discussions enables students to cultivate a more comprehensive understanding of landscape architecture, allowing them to address broader issues such as sustainability, community engagement, and cultural context in their designs (Monacella & Keane, 2022). Such experiences are vital for generating holistic and impactful solutions to complex design challenges (Fricker et al., 2023).

Furthermore, promoting diversity and inclusivity within landscape architecture education is imperative (Ang et al., 2020). As the field continues to evolve, it is essential to address the underrepresentation of marginalized groups and ensure that a diverse array of voices and perspectives contributes to the shaping of the profession's future (Milovanović et al., 2020). By prioritizing these values, educational programs can foster a more inclusive environment, which benefits both students and the communities they will ultimately serve (Alam, 2020).

By addressing these challenges and advocating for innovative approaches, educational institutions can adequately prepare future landscape architects to meet the intricate demands of the profession (Alam, 2021). This preparation will facilitate the creation of sustainable, inclusive, and aesthetically pleasing outdoor spaces that effectively respond to the needs of communities on a global scale (Mustapha et al., 2021; Shwedeh, 2024).

3.1 Addressing the Digital Age:

While the academic world of landscape architecture may have strong traditional foundations, it's critical to recognize the substantial shifts both in how the field is advanced and in the profession itself, which have taken place in recent times (Kerr & Lawson, 2020). This evolution has given rise to a number of significant trends. For example, those who instruct students in the use of digital tools might be termed digital immigrants, indicating their possible hesitance to adopt new technologies and a tendency to lean on conventional teaching techniques (Urech et al., 2020). Conversely, the practice of landscape architecture has swiftly adopted digital technologies, incorporating them into its methodologies and practices (Nijhuis & de Vries, 2020).

In the current climate of the landscape architecture sector, it's vital for students to be well-versed in the latest technological innovations to perform their tasks more efficiently and creatively (Liu & Nijhuis, 2020). Thus, embedding technology and digital tools into the teaching syllabus is of paramount importance (Kang, 2021). A prime illustration of this is the initiative led by Bradley Cantrell at the Rhode Island School of Design, which acts as a dynamic exploration into the vast potentials of digital technology in landscape architecture (Shan & Sun, 2021). Cantrell's initiative aims to prepare students to apply software and breakthrough technologies to produce designs that are both relevant and impactful (Marion & Fixson, 2021).

Through engaging with real site data and algorithms, students get to investigate the significant effects of digital big data and algorithmic operations on design processes (Goldin et al., 2022). The project's first version employs a web-based interface, a design plugin based on modeling, and an advanced algorithm for form-finding that enables instant 3D design modifications (Shwedeh, 2024). A pilot run in the spring of 2017 demonstrated that using a digital platform for design tasks substantially improves students' capacity to choose the best design options tailored to the specific site conditions (Kerr & Lawson, 2020). Additionally, the project highlights how the user interface, preset options, and the algorithmic design's mathematical rationale are crucial to the instructor's role in guiding the project (Urech et al., 2020).

This endeavor proves that merging digital technology with conventional design concepts not only elevates studio-based learning but also fundamentally transforms landscape architecture (Nijhuis & de Vries, 2020). It lays the groundwork for new possibilities in innovation, creativity, and problem-solving within the discipline (Liu & Nijhuis, 2020). Enabling students to integrate technology fluently into their learning process pushes the boundaries of the profession and shapes its future direction (Kang, 2021).

As landscape architecture continues to evolve with technological progress, education in the field must keep pace by integrating digital tools and techniques into its teaching methods (Shan & Sun, 2021). This approach ensures that future landscape architects are equipped to deal with the complexities of the modern digital era and contribute significantly to the profession (Marion & Fixson, 2021). By grounding students in digital technology and encouraging critical thinking about its applications, landscape architecture education can nurture a new breed of professionals who are adept in traditional design as well as the possibilities offered by digital tools for creating sustainable, innovative, and impactful landscapes (Goldin et al., 2022).

By welcoming the digital era into landscape architecture education, students are prepared to excel in both conventional design principles and contemporary technologies, setting themselves up as industry leaders and driving the field of landscape architecture forward (Shwedeh, 2024). They will be capable of merging data-driven design approaches with creative thought, allowing them to address intricate design challenges and contemporary issues effectively (Kerr & Lawson, 2020). This comprehensive educational strategy will usher in a new generation of professionals capable of innovating our environment with sustainable and forward-thinking designs (Urech et al., 2020).

In sum, the merging of digital technology with landscape architecture is revolutionizing the discipline in significant ways (Nijhuis & de Vries, 2020). By taking advantage of digital tools, students can expand their design horizons, enhance their decision-making capabilities, and contribute positively to the profession's growth (Liu & Nijhuis, 2020). The inclusion of technology and digital resources in the educational path is essential, preparing students for success in a constantly changing and demanding industry (Kang, 2021). With initiatives like Bradley Cantrell's, the future of landscape architecture looks bright, innovative, and full of promise (Shan & Sun, 2021).

Adapting to the rapid evolution of digital tools presents both a challenge and an opportunity in landscape architecture education (Marion & Fixson, 2021). For example, the Landscape Design Studio at the University of Sheffield has effectively integrated GIS (Geographic Information Systems) and parametric design software like Grasshopper into its curriculum (Goldin et al., 2022). These tools enable students to model ecological systems and visualize complex urban landscapes dynamically (Shwedeh, 2024). Similarly, at the Rhode Island School of Design, Bradley Cantrell's initiative on algorithmic design empowers students to employ real-time data and machine learning algorithms to optimize site-specific design decisions (Kerr & Lawson, 2020). By blending traditional design approaches with cutting-edge digital tools, these programs prepare students for the evolving demands of the profession (Urech et al., 2020).

3.2 Incorporating Interdisciplinary Approaches:

The trend toward interdisciplinary learning in higher education is gaining momentum, with interdisciplinary pedagogy being lauded for its engaging and practical approach compared to traditional discipline-specific education (Brown & Chamberlain, 2020). This approach broadens students' and their future employers' exposure to diverse knowledge and methodologies (Chen et al., 2021). As programs in landscape architecture evolve, there is an increasing emphasis on incorporating interdisciplinary methods into the curriculum, recognizing landscape architecture's inherent interdisciplinary nature (Shao et al., 2021). It combines elements from the arts and sciences, underlining synthesis's importance in education and professional practice (Oldham, 2022).

Historically, landscape architecture was categorized under arts and humanities, focusing on traditional design practices (King et al., 2022). However, the shift towards sustainable design and technological advancements has spotlighted the scientific aspects of the field (Gulhan, 2023). Herrington (2017) notes that modern landscape architecture education aims to foster unique and hybridized areas of inquiry and problem-solving from the

interplay between art, ecology, science, and technology. This opens up new avenues for innovative research and developing novel design theories and methods in landscape architecture (Mendenhall, 2023).

With the move towards interdisciplinarity, landscape architecture curricula now include more science-based courses, teaching students to leverage technologies used in ecological science and landscape planning (Anacker, 2023). Courses on geographic information systems (GIS), plant and soil science, and ecology have become common, enhancing students' understanding of environmental complexities and their ability to devise solutions for ecological and social challenges (Qiu et al., 2023). This provides a well-rounded academic experience and equips emerging professionals with valuable skills for the job market (Brown & Chamberlain, 2020).

Furthermore, students are encouraged to participate in real-world collaborative projects that demand multi-disciplinary problem-solving approaches (Chen et al., 2021). In professional practices, familiarity with various technologies is increasingly required (Shao et al., 2021). Collaborating with architecture, civil engineering, and environmental science peers allows students to appreciate the connections between theory, practice, and diverse knowledge bases (Oldham, 2022). Integrated design studio courses offer opportunities for students from different fields to tackle real-world challenges, promoting a comprehensive and holistic problem-solving approach (King et al., 2022). This experience fosters professional and intellectual growth, preparing students for future careers and instilling a continuous learning mindset and open-mindedness (Gulhan, 2023).

By embracing interdisciplinary approaches, landscape architecture education not only equips students with practical skills but also encourages innovative and exploratory work in the field, teaching adaptability and fostering open-ended thinking (Mendenhall, 2023).

The complexity of contemporary environmental challenges has amplified the need for interdisciplinary education in landscape architecture (Anacker, 2023). Harvard University's Graduate School of Design exemplifies this approach by fostering collaboration among architecture, urban planning, and environmental science students (Qiu et al., 2023). One recent initiative focused on designing green corridors in urban areas, combining ecological restoration principles with social equity frameworks (Brown & Chamberlain, 2020). This integrative model equips students with a broader perspective, enabling them to address multifaceted issues such as biodiversity loss and urban heat islands through cohesive, interdisciplinary solutions (Chen et al., 2021).

3.3 Promoting Diversity and Inclusivity:

In In the United States, the field of landscape architecture has traditionally been dominated by white males (Rafi et al., 2020). Although progress toward diversifying the profession has been gradual, there are signs of improvement, especially among younger professionals entering the field (Bang, 2020). Yet, there remains significant work to be done for the demographic composition of landscape architects to mirror the diversity of the wider society (Alderman et al., 2021).

Key strategies for promoting diversity within the profession include fostering partnerships with the Higher Education Multicultural Scholars Program and similar organizations (Haan et al., 2021). These partnerships aim to better connect emerging professionals from underrepresented groups with leadership roles in the ASLA and alike bodies (Stoltz & Grahn, 2021). Moreover, embracing diverse perspectives through interdisciplinary research and practice opportunities can further enhance diversity in the field (Leonardo & Boas, 2021). The shift towards interdisciplinary work and project-based practices opens doors for students, faculty, and practicing landscape architects to explore pedagogical and practice models that value and support diversity among faculty and students (Kabisch et al., 2021).

Penning-Rowsell & Lowenthal (1986) highlights the benefits of integrating diverse perspectives into landscape architecture, which include promoting environmental justice, enriching research and innovation, addressing globalization and international practice, and advancing social and cultural sustainability. Expanding academic and professional networks to include a wide range of demographic diversity will empower landscape architects to devise innovative solutions for various pressing social and environmental challenges (Samayeen et al., 2022).

Signs of substantive change are already visible, thanks to initiatives like the Landscape Architecture Foundation's fellowship programs and changes in academic accreditation standards that aim to diversify both students and faculty in landscape architecture (Rafi et al., 2020). Programs like the Olmsted Scholars Program are pivotal in fostering mentorship and collaborations across generations of landscape architects and public health professionals, especially among those from underrepresented groups (Bang, 2020). These efforts underscore the importance of dismantling professional and academic barriers as a critical step towards building networks and leadership capacity in the field (Alderman et al., 2021).

The 2016 Landscape Architecture Program Accreditation Standards set by the Landscape Architectural Accreditation Board (LAAB) include criteria for evaluating the diversity of a program's students and administrators, student retention rates, and retention strategies (Haan et al., 2021). This shift in accreditation standards exemplifies how institutional change within higher education can promote diversity and inclusivity in the field, with a focus on evaluating student success and retention within a diverse learning environment (Stoltz & Grahn, 2021). Consequently, programs are now more focused on implementing targeted recruitment strategies for underrepresented populations and documenting the effectiveness of these strategies in enhancing student diversity (Leonardo & Boas, 2021). These measures not only signify a shift in how diversity is conceptualized but also in how it is actualized, by establishing evaluation criteria that underscore the importance of fostering a diverse student body within academic programs and the broader profession (Kabisch et al., 2021).

Creating a more diverse and inclusive landscape architecture profession remains a pressing challenge (Penning-Rowsell & Lowenthal, 1986). Initiatives like the Olmsted Scholars Program in the United States actively address this issue by offering scholarships and mentorship opportunities to underrepresented groups (Samayeen et al., 2022). These efforts not only foster inclusivity but also enrich the profession by introducing diverse cultural perspectives into design practices (Rafi et al., 2020).

A notable success includes a recent community-led project where students collaborated with indigenous groups to integrate traditional ecological knowledge into sustainable landscape designs (Bang, 2020). This approach underscores the importance of inclusivity in shaping designs that resonate with and respect the cultural and environmental needs of diverse communities (Alderman et al., 2021).

By consolidating these developments, it highlights the discipline's global trajectory and pedagogical transformations (Table 1).

Table 1. Concise memory of Landscape Architecture Education.

Year	Event	Significance
1863	John Ruskin's lectures on landscape architecture in England	Early conceptualization of landscape architecture education.
1889	Institut für Gartenkunst und Landschaftsarchitektur founded in Germany	First formal institute dedicated to landscape architecture.
1899	Founding of the American Society of Landscape Architects (ASLA)	Established professional standards and advocacy for the discipline.
1900	Harvard University established the world's first Department of Landscape Architecture	Transitioned from apprenticeship-based training to formal academic education.
1900	University of Michigan initiated the first independent landscape architecture program	Established education independent of horticulture or architecture disciplines.
1901	University of Michigan initiated the first independent landscape architecture program	Established education independent of horticulture or architecture disciplines.
1922	Publication of *Landscape Engineering* by Knox	Introduced technical and theoretical frameworks for landscape architecture.
1930s	Central Park Department of Public Works contributed to professional degrees in landscape design	Bridged practical training with formal education in urban landscape projects.
1960s	Growth of interdisciplinary and sustainable design in curricula	Reflects student-led movements toward ecological and community-focused approaches.
1966	Landscape Architecture Association founded in Ankara, Türkiye.	Early steps toward formalizing the profession in Türkiye.

1968	Establishment of landscape architecture education at Ankara University, Türkiye.	Marked the formal introduction of structured education in Türkiye.
1990s	Emergence of Project Discovery initiative in the U.S.	Visioning process that catalyzed curriculum modernization, emphasizing research and technology.
2000s	Integration of sustainability and digital tools into global curricula	Responded to environmental challenges and technological advancements.
2017	Pilot of Bradley Cantrell's digital algorithmic design initiative at the Rhode Island School of Design	Demonstrated the transformative potential of data-driven tools in landscape architecture education.

CONCLUSION

Over the past century, landscape architecture education has undergone significant growth and transformation, particularly in Western nations such as Britain, Germany, Canada, and Australia. More recently, Eastern countries, including China and Korea, have also made notable advancements. This evolution reflects a paradigmatic shift in pedagogical methodologies, transitioning from the traditional Beaux-Arts approach to contemporary ecological and interdisciplinary frameworks. These shifts demonstrate that landscape architecture education is not static but continually adapts to cultural, social, economic, and technological changes.

In conclusion, landscape architecture education has evolved in diverse ways across different regions, influenced by varying historical and contextual factors. Rather than adhering to a single, universally applicable model, the field has developed distinct approaches that balance artistic, ecological, and technological dimensions. Historically, the discipline has moved from a primarily artistic and visually focused foundation to a more comprehensive and research-driven educational framework. Today, in the digital age, the integration of advanced technologies into both education and professional practice is becoming an urgent necessity. The growing emphasis on interdisciplinary collaboration further highlights the importance of engaging experts from various fields to enhance landscape architecture education.

However, several challenges remain. A key issue is the full adoption and effective integration of digital tools as essential components of teaching, research, and practice. This transition requires not only individual adaptation by educators but also collective engagement across institutions and professional organizations. The future of landscape architecture education presents a unique opportunity for innovation, as emerging methodologies and evolving pedagogical frameworks will shape the next generation of landscape architects.

Landscape architects play a crucial role in shaping environments that harmonize natural processes with human needs. To achieve this, ongoing critical reflection—both within academic settings and professional practice—is essential. This study provides a broad overview of the historical evolution and current global landscape of landscape architecture education. While it does not cover every aspect in exhaustive detail, it serves as a foundation for further inquiry into specific regional and institutional variations. A deeper, systematic analysis of global trends in landscape architecture education will contribute valuable insights to both academia and professional practice.

Ultimately, landscapes are living systems that communicate through the language of nature. Understanding and responding to this language requires a multidisciplinary and inclusive approach. By embracing diverse perspectives and methodologies, landscape architecture education can continue to evolve, fostering a new generation of professionals who are well-equipped to address contemporary challenges and contribute to a sustainable, resilient future.

ETHICAL STANDARTS:

Competing interest: The author declares no competing interests.

Ethics Committee Approval: The research is not a study requiring ethics committee approval.

Financial Support: No financial support was used.

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