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Evidence-Based Landscape Architecture for Human Health and Well-Being

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Abstract: More than 80% of the people in the USA and Canada live in cities. Urban development replaces natural environments with built environments resulting in limited access to outdoor environments which are critical to human health and well-being. In addition, many urban open spaces are unused because of poor design. This paper describes case studies where traditional landscape architectural design approaches would have compromised design success, while evidence-based landscape architecture (EBLA) resulted in a successful product. Examples range from school-yard design that provides safe levels of solar radiation for children, to neighborhood parks and sidewalks that encourage people to walk and enjoy nearby nature. Common characteristics for integrating EBLA into private, public, and academic landscape architecture practice are outlined along with a discussion of some of the opportunities and barriers to implementation.

Keywords: design; physical; biological; social; cultural

1. Introduction

Landscape architecture's historical roots run deep and wide, generally considered to reach back to the late 1800s in North America, and to older garden design throughout every continent but Antarctica. How the discipline prepares for the next hundred years of professional practice in an era of global changes is worth prospecting. Amid rapid increases in urbanization, species extinctions, a hotter globe, climate and economic refugees, ubiquitous social-environmental data, machine-learning, autonomous vehicles, drone delivery, and artificial intelligence, landscape architecture will be challenged to address new practice priorities and processes. An emerging approach common to many arenas—including medicine [1], correctional institutes [2], environmental management [3], and health-care architecture [4]—is to use evidence to inform practice. The field of evidence-based landscape architecture (EBLA) was recently introduced [5] and this paper continues the development of EBLA in two distinct ways: First, we look backwards to identify lessons from past uses of evidence in landscape architecture; second, we describe some recent and current cases of how evidence changes a landscape architecture project. The cases show how landscape architects sought, interpreted, judged, and applied evidence and in some cases changed their approach in light of evidence. A process for integrating EBLA into private, public, and academic landscape architecture practice is outlined along with a discussion of some of the opportunities and barriers to implementation.

More than half of the people in the world live in cities and their suburbs, and in the USA and Canada this proportion is greater than 80% [6]. Humans are quickly becoming an urban population, yet people retain the need for access to nature and outdoor environments [7]. Urban development replaces natural environments and land covers with hard, dry surfaces. The few natural elements that remain must be well-designed so that they can provide attractive opportunities for people to spend time outdoors and be self-sustaining. From a health point of view, the US Surgeon General has identified walking as an important activity and has called on Americans to provide outdoor places that are "designed and enhanced to improve their *walkability*" [8] (p. 1). When people are asked why they do not walk more, they provide many reasons, but the most common reason almost always relates to the thermal comfort conditions [9], and with climate change this might be expected to be even more salient. There are many guidelines for designing thermally comfortable urban environments yet places are often designed without the benefit of evidence. Rather, they are based on traditional approaches and personal opinions that might not be correct. Landscape architects need to use evidence as a foundation to their designs [5] so that the resulting landscapes function as intended.

This paper describes case studies where traditional approaches to design would have compromised successful outdoor spaces, while EBLA led to successful places. Most examples of EBLA are based on an understanding of the biological and physical landscape, and several such examples are included. However, we have also identified EBLA examples in the social and cultural realms, directly and indirectly leading to improved health and well-being of humans.

Evidence-based landscape architecture was defined by Brown and Corry [5] (p. 328) as "the deliberate and explicit use of scholarly evidence in making decisions about the use and shaping of land". The search for, and application of evidence in landscape architecture has long been part of the scholarship of the discipline, yet the execution of EBLA still needs to be explained and illustrated to enhance the status and relevance of the profession. EBLA, for example, is different from confirmation bias, where a landscape architect has a pre-conceived position that will be embodied in a landscape project and then seeks only the evidence that supports their decision. Rather, evidence should be sought and evaluated prior to and during design conception so that the knowledge forms the basis of design evolution [10]. This iterative cycle of knowledge and creativity in identifying and applying evidence through landscape architecture is consistent with the *alternating currents* of rational and creative thought described by Lyle [11] where designers propose and dispose (in the sense of testing and executing) their conceptual solutions.

Practicing landscape architects need to access and weigh evidence before acting on it. As knowledge emerges, practice should respond, meaning that existing knowledge is subject to being discarded if subsequent research changes our understanding of a situation or phenomenon. This requires that landscape architects are current in the state of applicable knowledge and prepared to update their evidence base or calibrate knowledge for a location [12]. For example, landscape architects have been taught surface grading for effective drainage since the profession's beginning, yet evidence derived from stream hydrographs and soil drainage have demonstrated undesirable effects of rapid surface drainage. Landscape architecture has responded by emphasizing rainwater infiltration and surface hydrology design to selectively slow surface drainage and encourage short-term detention and infiltration [13].

In this paper, we present examples that illustrate how evidence was sought by landscape architects as part of inventory, analysis, problem identification, goal-setting, design conceptualization and testing, design execution, and/or monitoring. Our intent with these purposively selected cases is to show that conventional approaches using questionable or non-existent evidence would compromise success, and how EBLA changes landscape architecture for more successful outcomes. These examples draw on the physical, biological, social, and cultural realms of the landscape, resulting in better human health and well-being.

2. Methods

A targeted project review was conducted to identify appropriate projects. We searched for projects in the academic, public, and private realms that documented explicit use of evidence as part of the design process. It was not an exhaustive search or a representative sample, but rather an attempt to find at least one illustrative example in each of biological, physical, social, and cultural projects that showed how evidence improved the outcome. These four categories are often used to describe the range of projects undertaken by landscape architects [5] but they are not often mutually exclusive. We attempted to find projects that fit entirely into each one of the categories, but there was often some inevitable overlap.

A short description of the EBLA process is identified and described for each project, and an overview of the processes is synthesized.

3. Results: Case Studies

3.1. Physical Design

3.1.1. Schoolyard Design and Shade Guidelines

Schoolyards have several designed functions and intentional form and character. Along with providing for creative play and socialization, visibility, vehicular and pedestrian circulation, and community open space, keeping students healthy and safe in schoolyards is a key consideration. With increasing awareness of the dangers of skin cancer, especially as associated with sunburn experienced in childhood, schoolyard design in southern Ontario now incorporates shade guidelines. These guidelines follow approaches used in other countries, including Australia and the United States, and are being adapted and applied across southern Ontario school boards. Schoolyards in Ontario, though, are mostly used by students during the autumn, winter, and spring seasons when clothing coverage is extensive, cloud cover increases, sun elevations are lower, and day length is shortened.

Following shade guidelines for schoolyards would consider sun elevation and azimuth angles and typical recess times to estimate exposure and risk of sunburn. What might be overlooked, though, is how sun assimilates vitamin D on exposed skin. Vitamin D deficiency is a documented problem for people of mid- to high-latitudes (such as Canada) and particularly for people with darker skin tones [14]. Ultraviolet radiation on bare skin is a natural way for people to assimilate vitamin D. Shade guidelines for reduced sun exposure, and vitamin D deficiency and assimilation seem to call for opposing landscape design goals.

Cox et al. [15] executed a research project that could inform schoolyard shading in southern Ontario. Their project measured how much ultraviolet radiation students would experience in their schoolyards in a typical academic year. Students' UVB exposure at recess was measured using dosimeters. Dosimeter data were used to model UVB experienced throughout the school year. A second model used the dosimeter data to estimate vitamin D assimilation. Results showed that UVB exposure was low and vitamin D assimilation was lower than daily recommended levels throughout almost all of the school year, while threats of sunburn during school recess periods were most often low.

Using this evidence, Cox et al. [15] suggest that landscape designs for schoolyards would apply shading judiciously to avoid early autumn and late spring sun exposure but provide for increased UVB exposure at all other times. Movable canopies or shade structures could provide for flexible shading, or trees with late leaf emergence and early senescence can allow UVB to pass through in spring and autumn, but shade students in summer. A tree species like *Gymnocladus dioicus* (Kentucky coffee-tree) has these characteristics but more common schoolyard tree species leaf-out earlier and hold their leaves later in the fall (e.g., *Acer platanoides*). With this evidence, vegetation, built structure, and landform would be re-designed for better outcomes.

Prioritizing school ground shading without considering UVB and vitamin D assimilation would miss important opportunities for promoting health with informed and carefully designed solar access. By seeking and applying evidence of UVB exposure throughout recess periods and the school year, Cox et al. [15] identified landscape goals that can increase health both by avoiding excessive sun exposure in summer when it is more likely, and providing for UVB vitamin D assimilation throughout the rest of the school year

3.1.2. Tokyo Olympic Marathon Route

The 2020 Olympic Summer Games will be held in Tokyo, Japan during July and August, the hottest time of the year. Many of the events are held indoors under controlled climate conditions, but one of the most physically demanding events, the marathon, is run through the streets of Tokyo. The route for the marathon was chosen based on many criteria including length, footing, room for spectators, and interesting camera angles for television audiences. Following these criteria led to a course that meets all the criteria established for the design of marathon courses.

Kosaka et al. [16] measured the microclimatic conditions along the proposed route. They equipped vehicles with sensors that recorded, every second, the solar and terrestrial radiation, air temperature, humidity, and wind speed. They drove the vehicles along the marathon route, at the rate of a typical Olympic marathon runner, on the pre-anniversary of the scheduled event (four years to the day before the marathon race). They analyzed the results through the use of the human energy budget model COMFA [17]. This analysis revealed that the conventional approach to route design could result in some dangerously hot conditions for runners.

The use of the energy budget model allowed them to analyze the streams of energy in these over-heated locations and identify the components of the energy budget that could be adjusted, through landscape design, to make the microclimate conditions less extreme. In some cases, high intensity of solar radiation was the problem, and in other locations, terrestrial radiation was the problem. They were also able to assess the effectiveness of temporary and permanent design interventions. A fine mist of water augmented by a fan-driven wind could substantially cool runners at key locations. In other locations, the shade of trees or simply running on the other (shady) side of the road was very effective. These evidence-based design modifications show how a course that met design criteria for a marathon course could be enhanced to avoid extremes of human thermal comfort for competitors and spectators.

A similar study investigated the conditions that spectators at the Olympic marathon races would experience [18]. The study evaluated the locations that people were expected to congregate to watch the marathon races. These locations would meet the criteria of good viewing locations with visual access to the race route. However, at many of these sites, spectator health would be in jeopardy due to extreme surplus of energy and the potential for hyperthermia. The study suggested landscape interventions and re-designed spaces to make spectators safer during the hot weather expected during the Olympic Games.

3.1.3. Reducing Heat-related Illnesses During Heat Waves

It is well-established that extreme heat events (commonly known as heat waves) increase human morbidity and mortality. For example, a heat wave in Europe in 2003 caused 70,000 deaths [19]. A study of the 2002 Chicago heat wave that killed more than 700 people was investigated to identify social factors that exacerbated the conditions [20]. What is less well-known is the variation in distribution of heat-related illnesses across a city and whether the characteristics of a neighborhood has an effect. Graham et al. [21] investigated the relationship between physical characteristics of urban areas and the number of emergency medical services (EMS) calls during heat waves in Toronto, Canada. Their results showed that areas with lower tree canopy cover proportions and a higher percentage of hard surfaces corresponded to higher numbers of EMS calls—up to five times higher for areas with very low amount (under 5%) of canopy cover. In a follow-up paper, Graham et al. [22] used this evidence to re-design an area of Toronto that had high numbers of EMS calls during heat waves. The evidence-based design interventions they tested included adding more deciduous trees particularly on the west and south of walkways, replacing dark colored pavement with high albedo concrete, and replacing dark, dry roofs with green roofs. Through modeling, they demonstrated that the re-design could be expected to reduce EMS calls for heat-related illnesses by 50%.

3.2. Biological Design

3.2.1. Montreal Biodiversity Corridor

The City of Montreal engages designers through annual competitions and in 2017 a borough of the City had a competition for a biodiversity corridor. Master of Landscape Architecture students at the University of Guelph learn evidence-based landscape architecture [5] to seek, understand, evaluate, and apply evidence to all aspects of their design projects, and they engaged with Montreal's competition. The borough of Saint Laurent had many small open spaces that ranged from mown turf, spontaneous vegetation of herbs, shrubs, and canopy trees to a large woodland park along a branch of the St. Lawrence River. Saint Laurent is a mix of large commercial and industrial buildings with accompanying parking, small single-family dwellings, and mid-density residential development, adjacent to the City's busy international airport.

A key interest in the design competition was to support Monarch butterfly (*Danaus plexippus*) habitat throughout the borough. Saint Laurent had already prioritized habitat elements such as flowering meadow vegetation and water, and had established butterfly way stations so citizens would engage with the species and order (all *Lepidoptera*). Students developed a common understanding of the life-cycle of the Monarch butterfly for the project: its reliance on milkweed species (*Asclepias* spp.) as the larval host plant, nectar plants for adult Monarchs, the annual migration route from Canada to Mexico, overwintering habitat in Mexico, and threats to survival, particularly in summer habitats [23]—all things that are relatively well-known among urban ecology enthusiasts.

As students explored how to support the Monarch even more than the borough already has, a new paper [24] was published based on recent, nearby (Ontario) milkweed habitats. The paper featured a graphical abstract and listed key findings, helping to screen it as relevant to the students' projects. Two of the compelling findings from the paper were that small patches of milkweed had higher Monarch egg concentrations than larger patches, and that patches of milkweed alongside roads were of lower-quality than patches at greater distances from roads. The reasoning for these findings were suggested but remain to be tested in future research projects.

Though the students typically followed the landscape ecology principle to establish and connect large habitat patches wherever an opportunity presented itself, for the Monarchs they began to look for opportunities for small habitat patches farther from roads and streets. The students' approach differed from many of the borough's current habitat initiatives that focused on boulevards or powerline corridors that were often adjacent to streets or parking lots.

The evidence led to a dispersed ("land-sharing") strategy across the borough that could extend into small, privately-owned properties as part of the design approach. Students were able to use evidence to show why they designed smaller milkweed patches in locations farther from streets, roads, and parking lots. Without the Pitman et al. [24] findings, the students might have followed two common approaches: to consolidate milkweed habitats into larger, contiguous patches; and to use public rights-of-way associated with roads and streets to connect and extend milkweed habitat. Evidence led the students to different design tactics and gave them an evidence basis to not only defend their choices but that might also identify weaknesses in other competition entries.

3.2.2. Urban Agricultural Hot Spots

It has become generally accepted that urban heat islands (UHI) are negative consequences of the way cities have developed. The replacement of natural environments and land covers by hard, dry urban surfaces has led to urban areas experiencing hotter daytime air temperatures, less cooling at night, and generally drier conditions, all of which have negative consequences for urban residents. While these consequences are measured and substantiated by evidence, new questions emerge for other implications of UHI. For example, little is known about how UHI affects vegetation. However, a study by Waffle et al. [25] investigated the possibility of positive consequences of UHIs on urban vegetation, specifically food-producing plants.

Waffle and his team targeted the UHI and used it as a resource to extend growing seasons in Toronto, Canada. Modeling the urban microclimate, while evaluating the heat requirements for potential urban food plants, allowed the researchers to show how UHI reduced late spring and early autumn frosts, extending the growing season. The additional cumulative heat index values from the UHI offered potential for new urban foods, including wine grapes that are typically grown in southern France and not suitable to non-urban locations near Toronto.

The counter-intuitive idea of using "wasted" urban heat, stored in the materials of the architecture and landscape of a city, was shown to support unique urban food production opportunities. The evidence study opens a new avenue for urban agriculture research where future studies could identify the optimal urban microclimates for growing specific specialty foods.

3.3. Social Design

3.3.1. Elderly Use of Outdoor Spaces

There is strong evidence that spending time outdoors is healthy for people, and especially older adults. In response to this information, many assisted-living facilities have installed outdoor areas for use by residents. However, these areas often go unused even when the landscapes are designed to meet the needs of the users. A study by Rodiek et al. [26] identified doorways as a major barrier in many facilities. Doors that were difficult to open/close, and high thresholds and landings that were difficult to maneuver limited the amount of time that residents spent outdoors and how much they walked. The evidence for under-use of the garden space pointed not to the landscape as the reason, but to the access point, potentially precluding a renovation of the existing landscape. In this way, evidence-based landscape architecture extended to the interface with architecture to identify possible remedies. This suggests that even a well-designed outdoor space will go under-used because of something as simple as a poorly designed doorway, emphasizing the importance of focusing on the problem and not only its symptoms.

3.3.2. Health Care Garden Design

Hospitals provide facilities for health care professionals to help people recover from illnesses. It has become increasingly well-known that patient recovery is enhanced through access to outdoor spaces. However, these areas need to be designed, based on evidence, to meet specific needs of different kinds of patients. For example, Alzheimer's patients can easily get disoriented in a garden, so the walkways should all loop back to the start. However, sometimes architects include the outdoor spaces as essentially part of the building, and design them to be visually in concert with the overall design but not necessarily designed for the needs of the patients. One example is a cancer care facility in the Northeastern USA with a rooftop healing garden. The architect's plan for the garden was very rectilinear with mostly hard surfaces. The landscape architect who was retained to do a detailed design of the garden considered the scholarly evidence and found that people in these facilities wanted something that is more *homelike* and *gardenesque* as a contrast to the institutional space. When they met with the patient advisory group they presented some of their ideas, and the residents said they indeed wanted something less structured, and more homelike, and more gardenesque. The residents approved the alternative design that the landscape architect generated. Based on their research, they also provided other elements that are important in such a setting, such as a variety of places to sit, an easily walkable path, rich vegetation, an attractive water feature that looks like a river in the middle of the garden, places for one person and places for a few people, choices of sun and shade, heavily planted areas, and so on. It was far different from the architect's original plan, but it was strongly supported by the patient advisory group through a participatory process.

Despite these successes, some design components were supported by the evidence, but were not adopted by the hospital developers. For example, evidence suggested that people in facilities such as this strongly prefer moveable seating and seating with backs. The moveable seating was perceived as possibly leading to a cluttered look, and they thought backs on benches would obstruct the views from the garden so they rejected them. Evidence is also very clear that patients highly value shade so they can use the garden on hot sunny days, but this too was reduced because of disrupting the views. In a post-occupancy evaluation [27], the design elements that went against evidence were all identified as problems by patients at this hospital.

3.3.3. Urban Open Space for Earthquake Resiliency

Open spaces can provide many functions in cities including parkland, recreation, natural environments, storm water management, and cooling the city. A recent study by French et al. [28] identified another potentially very important function of open spaces—a safe area during and after an earthquake. In areas prone to earthquakes, open spaces become the place that people go to during and immediately after seismic events. They do not want to be near buildings that might fall on them so being in an open area often provides temporary safety. However, people often have to spend long periods of time there—potentially having to remain in the open space for days or weeks after an earthquake. Unless an open space is specifically designed for seismic resilience, people's health and well-being are at risk due to exposure, diseases, and lack of food and water.

The study by French et al. [28] used a systematic literature review to accumulate information from previous studies and consolidate the evidence into categories that can be used by landscape architects to design seismic resilience into urban open spaces. The study identified six 'themes' to consider when designing urban open spaces in seismically active areas: "Multifunctionality; networks; site location and suitability; size and function; site elements; and, social resilience" [28] (p. 1).

3.4. Cultural Design

Daylighting of Forgotten Historical Artifact

In 1999, the firm Ekistics Planning and Design was awarded the contract to layout a new condominium development in downtown Dartmouth, Nova Scotia. It was a small contract with a clearly defined program to accommodate a 50- to 60-unit condominium on a portion of land owned by the City. It could have been a quick and easy project, but the landscape architect and principal of the firm, Robert LeBlanc, was skeptical about why an odd-shaped property remained undeveloped and owned by the city. Instead of assuming that it was available for development, he started to investigate the site by looking at old aerial photographs from the 1930s. He compared them to recent photographs, and could discern the faint shape of underground structures. On-site measurements verified that a rectilinear feature was buried on the site. He then investigated the history of the site and determined that it included one of the first skate-making factories in the world [29] as well as portions of the old Shubenacadie Canal which had been buried for hundreds of years. The photographic records were sparse, and the written history and mapping was rich but inconclusive about exact locations.

The idea of daylighting the old canal system, much of which had been buried in an underground culvert, started to take shape. Could a design reconnect the ocean to the original lake system which was converted to an inland railway in the mid-1800s? After presenting the historical concept to the municipality and sharing the information with the community, momentum started a push to uncover the remains of the old marine railway and bring the canal back to life.

What started as a simple development siting project has revealed a river long lost, connecting fish back to the inland lakes using a fish passage built into the daylighting, and restoring nearby ice for skating. The old lock system still lies dormant under a street in the downtown but there are plans to close the street and restore some of the locks in the near future. The evidence-based approach led the City to realize an opportunity in the Shubenacadie Canal Greenway that links downtown Dartmouth with other sections of the canal. Unfortunately, the condominium development was still built on a portion of land that had additional opportunity for restoration, but much of the land was saved as an urban heritage park. If LeBlanc and his clients at the Municipality had simply followed standard procedures and sited the residential development as requested, the canal and the greenway may have remained underground forever.

4. Discussion: Process for Integrating EBLA into Practice

The cases we describe used a range of processes, but there were some common characteristics that can be instructive as seen in Figure 1. First, in every case, the landscape architects involved had what one author called "amicable skepticism" [30] as they questioned standard approaches or things that sounded like opinions or beliefs for which strong support was not apparent. These landscape architects were not recalcitrant, but wanted to verify approaches before investing in a direction through design. They were intellectually curious, questioning what was genuine knowledge and recognizing if it was absent.

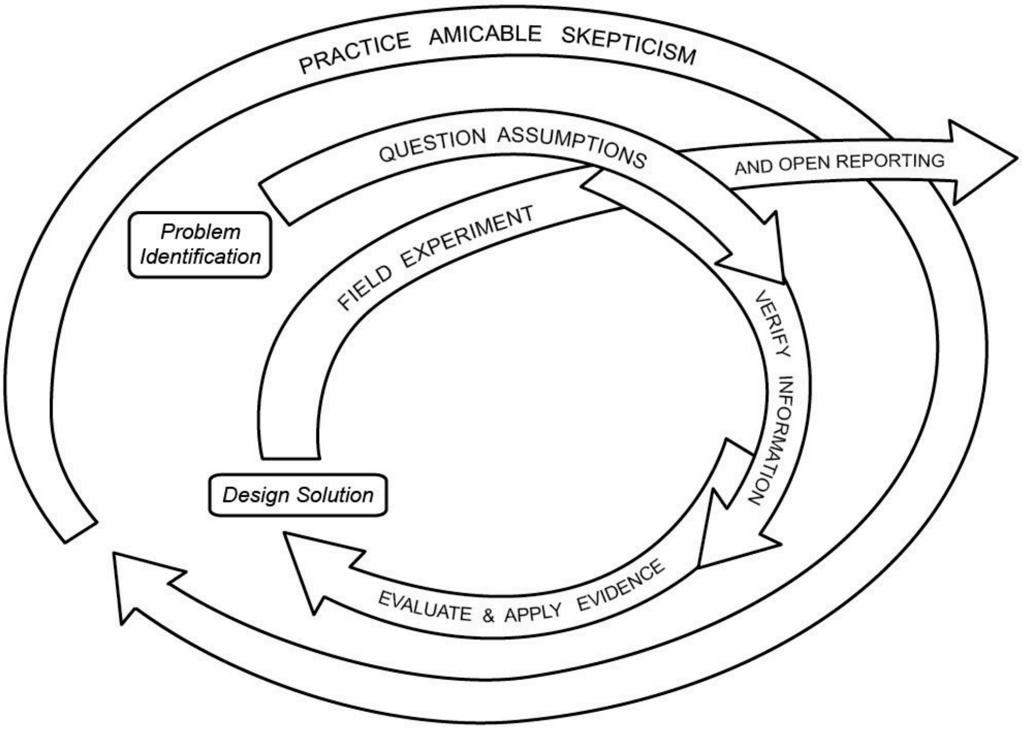

Figure 1. The five characteristics of Evidence-Based Landscape Architecture. Amicable skepticism is constant, while unique projects begin with the problem identification and continue to design solution. Three characteristics dominate design phases. The final characteristic continues after the design solution.

Second, by questioning assumptions, compartmentalizing beliefs or traditions, or challenging conventional norms, the landscape architects sought additional information. In the UHI research by Waffle et al. [25], the normal assumption of UHI as a problem was not completely satisfying to the landscape architects, and they began to consider that conditions of increased air and surface temperature and longer frost-free periods might identify UHI as opportunities. For the 2020 Olympic marathon route, landscape architects were not satisfied that the proposed course simply met normative criteria for competition while not considering the thermal safety of the runners, so they extended to investigate attributes that literature had identified as important. These landscape architects withheld their assumptions, beliefs, and traditions to consider the UHI effect on a marathon route from a new perspective.

Third, the landscape architects continued asking questions of their knowledge and the claims and supports of others and searched for factual evidence. In the health care garden design, the landscape architects checked their knowledge by scouring the scholarly literature for advice and by engaging with a patient advisory group for verification at the scale of the project. They did this to see if the literature could be confirmed for a specific place and time, giving them confidence for their claims for movable seating with back support and shady settings. In Dartmouth, the landscape architect was perplexed by a piece of publicly-owned land that had an odd shape, was between waterbodies, and a lack of documentation that set him on a path to read the landscape's clues.

Fourth, the landscape architects evaluated the evidence for how it fit their problem. Identifying sound evidence that fit the situation and questioning evidence that might not adequately fit are two approaches that are needed to achieve EBLA. In our examples, the schoolyard shading, urban heat illnesses, and Montreal biodiversity corridors all indicate how landscape architects selected salient evidence for the unique landscape problems. Cox et al. [15], for example, addressed shade guidelines that originate in a different latitude and hemisphere, and where excessive sun exposure is common. Graham et al. [22] used geo-referenced emergency call data gathered during measured heat intensity periods and matched those data to landscape characteristics for Toronto. Students used current, local research findings rather than more general advice to propose new landscape designs that support Monarch butterflies in Montreal.

Finally, and in some of these cases that have been executed or tested, (e.g., [22]), the EBLA practitioner or researcher is treating the landscape design as a hypothesis that has become a field experiment upon its establishment, and from which more evidence can be gathered. Ahern [31] pointed out that designs become the embodiment of hypotheses about performance, and once constructed they are field experiments that need only to be monitored and openly reported to build the body of knowledge for landscape architecture. A final EBLA step is to execute the field experiments, monitor their outcomes, and openly report the findings to continue to advance the evidentiary base.

5. Limitations and Future Research

The approach to identifying projects for this study was designed to provide a wide range of projects, but it did not yield a complete picture of the ways that EBLA can be used in landscape architecture. Future research could undertake a more comprehensive search for projects and applications.

EBLA can be time consuming and is not expected to be used on every part of every landscape architecture project. Some projects have time or budget constraints, others will be too large and complicated or too small and have specific, easily achievable design goals. Many landscape architects do not have the knowledge and skills required for some of the EBLA steps but are well-trained to address many design issues through traditional approaches. Future research could provide specific steps or guiding questions to assist landscape architects in using EBLA.

This paper has not distinguished between public, private, and academic projects and has assumed that the same five characteristics are equally relevant in all spheres. Future research could investigate how the EBLA process might be different for different kinds of practice.

6. Conclusions

This series of vignettes and case studies described provide a number of examples for including EBLA in a wide range of landscape architecture projects. Despite projects ranging in topic from children's health in school grounds to well-being of the elderly who wish to spend time outdoors, and from frozen skating canals to hot marathon routes, the process followed had five main characteristics in common:

1. Amicable skepticism
2. Questioning of assumptions
3. Verification of information
4. Application of evidence to the problem at hand
5. Openly reported, replicable

These five activities will necessarily be adjusted and modified depending on the project and the topic, but as landscape architecture advances as a profession, it is important that practitioners understand how to use evidence in support of their designs. Our intent in this paper was to show how landscape architecture can play an important role in designing human habitat for health and well-being through robust, evidence-based scholarly practice, meeting the physical, biological, social and cultural needs of humanity and the world.

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