LANDSCAPE ARCHITECTURE FOUNDATION

Practice-Based Research: Operationalizing Landscape Performance

Landscape Performance Webinar Series

Presentation 1: Research at Design Workshop
Presenter: Allyson Mendenhall, PLA, Design Workshop
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In this first presentation from LAF's Practice-Based Research: Operationalizing Landscape Performance *webinar, Allyson Mendenhall discusses research at Design Workshop and their measurement tools backpack. She highlights several examples of specific research related to human comfort.*

[00:10] Well thank you, Heather. I appreciate the introduction, and thanks everyone for joining. Yeah, so I am in the Denver office of Design Workshop. We are throughout the entire United States. Our current projects take us to China, South America, the Middle East, in addition to all over the country. We started in Aspen over 40 years ago by two academics and I still call us an academic practice which is probably why we're here talking about research and performance measurement today.

[00:50] We take the word workshop in our name very seriously. Practicing openly and collaboratively with clients and internal teams and communities. And as Heather mentioned, we practice and approach our projects with what we call DW Legacy Design through four lenses of environment, community, economics, and art. So adding art and aesthetics to the triple bottom line approach to sustainable outcomes that affect our built environment.

[01:26] Every project starts as a discovery. Really it's almost treated like an experience where you test things and that the parameters at the beginning and identify the challenges and the potential solutions. Looking through the four lenses of environment, economics, community, and art, we look at all the items -- all the metrics that are relevant to the project and crucial to its outcome. And going through this exercise as a team and with clients and communities, ultimately prioritizing and determining what's the most crucial to study and, of course, making it scalable to scope and see.

[02:15] And we are definitely very interested in writing about metrics and research. So how we can deliver measurable benefits in our projects and the need for a research agenda for the landscape profession in order to augment the work that we do and to dig deeper. And most recently we published a collection of articles in Architectural Worlds. The collection was on practice-based research and Architectural Worlds is a bilingual publication and design journal published in China and we collaborated with three academics to write about practice-based research from an internal firm point of view and also academics of leading design programs around the country.

[03:12] So our firm really believes that our clients and our agencies and our governments are really increasingly demanding credible data and quantified results, which is causing us, like many of our peer firms to adjust our design practices and incorporate performance measurement into the process of developing and testing sustainable solutions. By adding accountability into design practices, we're having to draw a more rigorous academic approaches to predict and then quantify outcomes, instead of relying on just speculation.

[03:50] So today I wanted to share with you some specific tools that we use when we go out onto a site, both at the beginning of a project and also throughout the process and also at the end. So Design Workshop has had a measurement tools backpack for the past few years and I'm going to

unpack it for you and share how we use a few of them. We started off as one backpack which was shared among all offices and it was shipped back and forth as teams wanted to use it to go out on site to conduct their site analysis. We now have added a backpack each year, so now each office has one and there's no need to share.

[04:45] As I said, the teams tend to use the backpacks to go out on site and to conduct site analysis. And I would call it kind of a deeper site analysis using tools that are collecting data about the site that can be used back in the studio to understand those existing conditions or baseline conditions. The backpack can also be used to, of course, to evaluate the implemented outcome of the project as well.

[05:18] So the tools that are in our backpack are devices that measure surface temperature, noise levels, light levels, speed, weather, bioclimatic data, and other counters for people, cars, bikes, etc. And a lot of them are related to human comfort. And you'll see as I highlight a few of them and that tends to be where we're using them the most.

[05:50] So one project I'd like to share with you where we use a few of these tools is the South Grand Boulevard Great Streets Initiative in St. Louis, Missouri. South Grand Boulevard and its bordering communities is known as the international community of St. Louis because of the diverse population and the wealth of ethnic restaurants in the area. However, it's a very transportation dominated place with nearly 25,000 vehicles per day on this corridor averaging speeds of 42 miles per hour which exceeds the limit by 17 miles per hour. It's 98% impervious. It averaged 80 accidents a year. Noise levels ranged from 64 to 74 decibels, which is way above the human comfort level. So clearly this is a transportation-dominated place, an undesirable environment for retails and restaurants, and very difficult to draw any vitality from the wonderful neighborhoods that border those corridors.

[07:05] The masterplan area is outlined in white and the phase one project area is outlined in orange. And I'm just going to show you how the team used a few of the tools. So this infrared digital thermometer is a hand-held laser gun that measures surface temperature of a variety of materials. You just really point it at about 12 to 18 inches away from a surface, and it gives you a reading. And it can be used to compare the relative impact of various materials on heat island effect and human comfort. So this is just a map of the corridor that the team took out on the site, and as you can see they took measurements at the corners and also mid-block at several times throughout the day to get that range of understanding of what gray concrete versus exposed concrete versus asphalt versus grass -- what the surface temperatures of all those were.

[08:12] And what they found and were able to, kind of, use to build a case was that by reducing the amount of asphalt and increasing planted areas and pervious pavement, they were projecting to be able to reduce the heat index by 14.4%.

[08:50] The digital sound level meter is another tool, another device, that measures and records sound levels ranging from 40 to 130 decibels. And sound level data can be analyzed to identify where sound levels are inappropriate for human comfort and where design intervention is needed. So again using a map of the corridor, the team recorded their measurements at key points along the corridor and then came back into the studio, or into the office, to capture that data. And what they were able to do was to create a case for a "road diet" demonstrating the levels of the noises and advocating for reduced speeds to help reduce the noise levels. They also conducted surveys with the community to gauge their experience of shopping and dining in these noise levels and the negative impact on those experiences.

[10:00] They did research to understand what the typical human comfort level is in terms of noise. And it's about 60 decibels before extreme annoyance at various types of noises and kind of set that within a range of known noises and noise levels. And so experimenting -- using the project as an experiment and researching the different scenarios and options -- they conducted a pilot test showing the proposed lane reduction and bulb-outs, and during this test the average peak noise level fell by 17 decibels and met that target noise level of 60 decibels. So the street during this

pilot was only a third as loud as it was previously and therefore provided a more comfortable experience for shopping and dining.

[11:02] So a second project that I'd like to share is Capitol Valley Ranch. This homestead is a one acre property amidst a 35 acre working ranch in Pitkin County, Colorado. Set against some of the majestic ridgelines of the Rocky Mountains, it's quite beautiful, but also the unsheltered, high altitude property is exposed to the region's unpredictable and often harsh weather including strong winds, intense solar exposure, and significant snowfalls. So part of the designer's intention, our intention, had been to extend the time that people could spend outdoors in a comfortable environment despite these intense weather conditions.

[12:02] This project was part of a LAF case study last summer and was studied by Utah University's Bo Yang, along with his students Pamela Blackmore and Chris Binder. And you can look at this case study on the LAF website and also download the methodology, but I'm going to share one of the tools that this team used to understand the bioclimatic conditions and their effects on the human comfort of the residents.

[12:35] So the analysis of the Utah State Team looked at these outdoor spaces during the summer in the morning, afternoon, and evening, and to understand if modifying the effects of wind and using passive solar techniques such as building orientation, thermal massing, and tree placement were successful. So were the designer's objectives and intentions when implemented, were they successful? So again looking at those objectives, allowing late morning sunlight in to warm up a space or evening shade to cool a space. The team used Victor Olgyay's *Design with Climate* and the principles of the Bioclimatic Approach as the foundation for this study in understanding the effects on human comfort and applying to this particular situation.

[13:32] So they looked at 60 sampling locations on the property and they understood from interviews with the clients behaviors and the times of day that the family was likely to spend in certain places. They used this Kestrel 4000, a kind of a weather tool to measure various climatic conditions that is part of the backpack, for onsite data collection. They used GIS to interpolate the data and then they analyzed it in Excel. Collecting the data meant going to each of these sampling locations and taking readings for temperature, relative humidity, and wind speed, which is really fairly simple with this tool. The 60 different locations were captured as the data with the tool. And so for three times a day, those 60 points where mapped. They were interpolated in GIS and then mapped showing relative humidity and temperature across three times of the day.

[14:50] So using Olgyay's Design with Climate, the identification of the Human Comfort Zone, they looked at the array of the data points and which ones fell within the human comfort zone…and determined that 77% of the outdoor space fell into the zone in the morning, 42% in the afternoon, and 48% in the evening. So these were their findings and a way to gauge success of the intention of the designer in trying to warm up or cool down these outdoor spaces in order to extend their life and their use during the day.

[15:37] So the tools in our backpacks, none of them are very expensive, but they do have price tags attached to them. I did want to share that the iPhone has many free applications that you can get, including light meters and decibel gauges. So I encourage you to use that resource and explore its capacity since it's nice that there's no cost attached to it. And I also wanted to share the resources where we purchased our tools, which is Amazon, Forestry Supplier's, Inc., and Extech.

[16:17] So just to conclude, our firm is increasingly integrating applied research within our project parameters and realizing that we need to augment our technical capabilities and research capacity to be able to address the complexities of the projects we take on -- they're wonderful complexities -- but also to be able to truly implement sustainable solutions in the built environment. So thank you very much.