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Visualizing ASLA Conference Education Session Content, 2011, 2013-2023

ABSTRACT This study documents an inventory and analysis of ASLA conference education session learning objectives to understand content changes over a 12-year period. To date, no studies have investigated ASLA conference education session content. The dataset included learning objectives extracted from ASLA conference documents and created by featured speakers for 1,229 ASLA conference education sessions from 2011 and between 2013 and 2023. Text mining software that constructs and visualizes term networks, VOSviewer, mapped term frequencies, co-occurrence, and clusters for three quadrennial periods: 2011-2015, excluding 2012, for which learning objectives were not publicly available; 2016-2019; and 2020-2023. Voyant, a web-based text reading and analysis software, supplemented VOSviewer output by displaying term contexts, collocations, and frequencies. Term clusters that emerged across quadrennial periods varied in quantity and topic. Common clusters pertained to sustainability; diversity, equity, and inclusion; and construction, though not consistently across time. Participation in multiple sessions by some featured speakers, as well as frequent representation by some institutions within and across sessions, likely influenced results. Session content appears aligned with professional interests, with at least one exception; no evidence emerged about residential landscape architecture, a Professional Practice Network with a relatively large membership. Suggestions for future research and the conference format, including session

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proposal content, selection, focus, accessibility after conferences, and delivery mode, are

presented.

KEY WORDS VOSviewer, text mining, professional development, continuing education, topic

analysis, annual meeting

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INTRODUCTION

Concurrent education sessions are one of many activities that comprise American Society of Landscape Architects (ASLA) annual meetings (now called Conferences on Landscape Architecture). In 1979, ASLA advertised 15 education sessions available to prospective registrants in *Landscape Architecture Magazine* (*LAM*) (July, p. 373). Between 1981 and 1991 the number of education sessions in ASLA meetings doubled from "20 stimulating education sessions" to 40 (*LAM,* September 1981, p. 547; July 1991, p. 32-33). Alongside education sessions during the same time, ASLA offered infant care, "spouse programs," a golf tournament, a piano/vocal recital, and morning aerobics classes. Between 1991 and 2006, the number of education sessions advertised had doubled again, from 40 to 80 (*LAM,* June 2006, p. 151). Besides the "traditional ASLA tracks" during that period—'historic preservation,' 'practice management,' and 'technical innovations'—the 1999 Boston meeting included three tracks, 'people,' 'place,' and 'land,' each of which also addressed the "celebration of life," past, present, and future (*LAM*, June 1999, 144). Sometime between 2007 and 2011, ASLA began to offer more than 100 education sessions.

Education sessions serve several purposes and are arguably the focus of each conference. By far, respondents in Moen (2014) attended ASLA annual meetings more than other organizational conventions. All sixteen ASLA state chapter president respondents rated "continuing education credits" (or units, CEUs) and "meetings, conferences, or symposia" as most important to professional learning and growth (Moen, 2014). ASLA conference registrants

who attend education sessions may earn CEUs, otherwise known as Professional Development Hours (PDHs), that are needed to maintain licensure in 39 of 52 jurisdictions of the United States (https://www.asla.org/edrequirements.aspx). While CEUs rated highly in the total number of respondents' reported motives for attending professional meetings, Moen (2014, p. 42) reported greater ratings for "inspiration and ideas," "staying current with trends in the profession," and networking. Except for the latter, speakers deliver this content in conference education sessions.

An inventory and analysis of past ASLA education session content could inform future sessions, and by extension, landscape architectural practice. To date, neither a public inventory nor an analysis of sessions exists. However, several studies have investigated the content of Council of Educators in Landscape Architecture (CELA) conference abstracts (Newman, Li, Tao, & Zhu, 2021), *Landscape Journal* authorship and article content (Gobster, Iverson Nassauer, & Nadenicek, 2010; Powers & Walker, 2009), themes and trends over 40 years in *Landscape and Urban Planning* (Gobster, 2014); themes, trends, and future needs in *Landscape Journal, Landscape Review,* and the *Journal of Landscape Architecture* (Flanders Cushing & Renata, 2015); and position descriptions for landscape architecture faculty openings (Ozdil, 2020). Another study deployed a Delphi method to ascertain practitioner and academician opinions on the importance of landscape architecture research domains (Meijering, Tobi, van den Brink, Morris, & Bruns, 2015), while yet another used the Fein (1972) report, the 2004 LABOK study report (ASLA, CSLA, CELA, CLARB, & LAAB, 2004), work of Powers and Walker (2009), and course titles of every accredited Master of Landscape Architecture program in North America to identify knowledge domains (Langley, Corry, & Brown, 2018).

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The purpose of this study is to identify central topics of interest in landscape architectural practice. Specifically, this study examines how common educational themes in ASLA Conferences on Landscape Architecture changed across time, if at all. An inventory and analysis of recent ASLA conference education session content using text mining software detected the most prevalent terms, speakers, and institutions. The results contain terms, term clusters, and links that denote topic foci and relationships in landscape architectural practice within and across twelve annual conferences, as well as who is delivering and shaping session content. The discussion places the study results within the context of ASLA's core mission areas and professional practice networks (PPNs). This study concludes with recommendations for future conference content research, submission criteria, accessibility, and modes of delivery.

LITERATURE REVIEW

A literature search yielded three general topics: research, practice, and instructional methods. Given the emphasis on landscape architectural practice within ASLA, the following review focuses on four studies that investigated central themes and trends in practice.

Fein (1972, 1-1) is the older of two studies that ASLA conducted to "investigate existing attitudes toward the profession" and offer guidance so that landscape architecture can "make its full contribution to the development and maintenance of a suitable physical environment." Within the report, landscape architect respondents stated that 'esthetics,' 'comfort and pleasure for [the] individual,' 'ecological needs,' and 'public welfare and enjoyment' should be central to

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the practice of landscape architecture. However, the difference in percentage points between respondents' ratings of what then *was* and *should have been* central practical concerns indicated that ecological needs (-68% difference) and public welfare (-42% difference) were "far short" of desired (Fein, 1972, 1-28). In contrast, esthetics and comfort and pleasure for the individual were then equally central to practice (-20% difference). Of 11 "subject areas on which a very great or great emphasis should be placed in the professional training of landscape architects," 'principles of design' received the highest mean ratings among students, faculty, ASLA members, and non-members ($M = 95$), followed by 'ecology' ($M = 80$), 'construction' ($M = 67.75$), 'fine arts and esthetics' ($M = 67.5$), 'conservation' ($M = 66.5$), and 'social and behavioral problems' ($M = 50$). 'Problem solving' ($M = 39$), 'physical geography' ($M = 42.5$); 'botany, horticulture, agriculture' ($M = 44.75$); 'business management' ($M = 25.5$), and 'history' ($M = 14.5$) completed the list.

Thirty years later, ASLA joined four other organizations to author the Landscape Architecture Body of Knowledge Study Report (LABOK) (ASLA et al., 2004). The LABOK study investigated the professional core competencies and fundamental body of knowledge expected of graduates from accredited schools using responses from 255 participants, most of whom were ASLA members ($n = 207$) and practitioners ($n = 219$). ASLA et al. (2004, 14) identified "preliminary" knowledge area categories based upon the "desired time of acquisition and the level of skill expected at stages of professional development." Thirty LABOK study topics from across the nine domains that comprise the "more specialized knowledge" category may relate to ASLA education session content. Of these, 18 topics comprise "important areas for post-professional degree and in-practice acquisition" (ASLA et al., 2004, 14), most of which are

in the domains of 'site design and engineering' and 'construction documentation and administration.' Nine LABOK study topic areas across four domains are "important," five of which may be derived from practice and within the domains of 'public policy and regulation' and 'construction documentation and administration.'

A study by Chen (2013) compared responses from Fein (1972) and the LABOK study (ASLA et al., 2004) to those of 239 ASLA-member respondents, of whom 220 (92 percent) were practitioners. Compared to Fein (1972), respondents in Chen (2013) rated aesthetics as significantly less central to their "understanding of what the practice of landscape architecture should be concerned with;" they rated 'public welfare and enjoyment' and 'comfort and pleasure for the individual' as significantly more central. Respondents' ratings in Fein (1972) and Chen (2013) did not significantly differ regarding how central ecological needs should be to landscape architects' concerns; in other words, respondents in 1972 and 2013 thought ecological needs should have been, but were not, more central to practice. However, respondents in Chen (2013) stated that landscape architectural practice is based more significantly on scientific knowledge in natural sciences (e.g., forestry and biology) than respondents in Fein (1972).

Chen (2013) also performed a principal components analysis pertaining to the frequency with which respondents used research topics. Table 1 lists the factors that comprise the "judgmental design," "construction," "environmental systems," and "human systems" knowledge domains, which explained 35, 11, eight, and seven percent of response variance, respectively. Despite a low factor loading, 79 percent of respondents stated that they used 'sustainable design' research "often" or "very often" in practice. Mean response ratings and

standard deviations to this questionnaire item also indicated that respondents "often" used research related to 'plants and materials,' 'site engineering,' and 'construction techniques' in practice. Although garden history returned the highest factor loading of all 15 factors and domains (.826), only 26 percent of respondents used this research often or very often; the second lowest mean rating overall (1.84) suggested "rare" to "occasional" use. Chen (2013) concludes with a call for additional research in the knowledge domains of construction and environmental systems. Between 62 and 53 percent of respondents rated sustainable design, water resource management, construction techniques, ecology, and grading and circulation factors as potentially most helpful in practice.

Finally, one study related published research and ASLA professional practice networks (PPNs). Using codes associated with core knowledge domains and CELA conference tracks derived from previous studies, Flanders Cushing and Renata (2015) reviewed abstracts, key words, titles, and in some cases, cursory reviews of full texts, for 441 "research articles" published in *Landscape Journal*, *Landscape Review*, and *Journal of Landscape Architecture* between 1982 and 2012. Over one-quarter of total publications focused on history, whereas social and cultural processes and issues, aesthetics, landscape and land-use planning followed with 13, 12, and 11 percent, respectively. Climate change articles accounted for 0.5 percent, one of the least common topics. Trends from graphs over time suggest that history has gradually become less of a focus, as has vegetation and planting design. Green infrastructure, in contrast, increased, particularly between 1995 and 2011. Codes that share ASLA PPN names are distributed across publications; no evident concentration exists. The percentage of articles

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relative to PPNs is about equal in 6 cases. Parks and open space, landscape and land-use planning, and urban design yielded the greatest percentages and alignment. For 9 PPNs, including urban design, and sustainability and green infrastructure, the percentage of ASLA members in the PPN far exceeds the number of matching themed publications, which implies a misalignment between research and practice.

Table 1 presents a summary of terms that emerged from the literature review, in order of priority; consequently, these terms would likely emerge by text-mining conference education session learning objectives.

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Table 1. Summary of Terms from Literature Review.

Fein (1972)	LABOK (ASLA et al, 2004)[a]	Chen (2013)[b]	Flanders, Cushing, & Renata (2015)[c]
Aesthetics	Treatment of Toxic Materials	Plants & Materials[2]	Parks & Open Space
Comfort & Pleasure for Individual	Emerging Trends and Issues	Sustainable Design[3]	Landscape & Land-Use Planning
Public Welfare & Enjoyment	Noise Attenuation and Mitigation	Site Engineering[2]	Urban Design
Ecological Needs	Sustainable Construction Practices	Construction Techniques[2]	Sustainability and Green Infrastructure
Principles of Design	Land and Water Reclamation Procedures	Grading & Circulation[2]	Residential Design
Ecology	Life-Cycle Cost-Analysis	Aesthetics[1]	Historic Preservation
Construction	Public Relations, Outreach, and Image Development	Ecology[3]	Water/Hydrology
Fine Arts & Aesthetics	Basic Construction Law	Water Resource Management[3]	Women/Gender Issues
Conservation	Therapeutic Aspects of Design	Community Planning and Design[4]	Transportation
Social & Behavioral Problems	Floodplain Management	Representation & Communication[1]	Children, Youth, and Environments
Problem Solving	Land and Development Economics	Design Theory & Design Process[1]	Community Development
Physical Geography	Biofiltration and Other Alternative Drainage Methods	Profession of Landscape Architecture[1]	Tools and Technology

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Botany, Horticulture, Agriculture	Water Resource Management	History and Culture[4]	Health
Business Management	Interpretive Methods and Techniques	Public Policy[4]	Vegetation and Planting Design
History	Photogrammetry and Remote Sensing	Professional Ethics[1]	Campus Design
		Health and Landscape[3]	Reclamation and Restoration
		Geospatial Tools[3]	International Practice
		Garden History[4]	Design Build
		Environmental Psychology[3]	

[a]LABOK Study Report domain topics with a "time of acquisition" rated as "continuing education" by 7 percent or more of respondents.

[b]Arranged from highest to lowest mean response rate relative to how often respondents used research topic in practice. Superscript values correspond to the [1]judgemental design, [2]construction, [3]environmental systems, and [4]human systems design knowledge domains.

[c]See Figure 15, wherein the authors compared the percentage of articles that contained published research themes to Professional Practice Network (PPN) Membership.

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METHODS

Data Collection

The study dataset contains text gathered for a previous study (Kuper, 2019) from ASLA Annual Meeting programs and handouts, the ASLA website (https://www.asla.org/conference.aspx), and online through ASLA annual conference platforms (2015-2019), which also served as sources of recent data (2020-2023). Of the opportunities offered to conference attendees to earn PDHs, this study focused on concurrent education sessions, which were more numerous than general sessions, workshops, field sessions, and deep-dive sessions, and included with full conference registration fees. Spreadsheets documented education session codes, meeting times, PDHs, titles, learning objectives, featured speakers, and the institutions speakers represented for all conferences in 2011 and between 2013 and 2023. Additionally, spreadsheets recorded ASLA-assigned topic areas for sessions beginning in 2015, executive summaries (i.e., 50-word marketing statements) for 2011 sessions, some sessions between 2013 and 2015, and all sessions between 2016 and 2023.

Data Preparation

Three trial methods of data analysis to identify term clusters from ASLA annual meeting education session content informed the selection of VOSviewer with supplementary analysis utilizing Voyant. Numerous issues with the conduct of a Latent Dirichlet Allocation (LDA) using

Python occurred, including but not exclusive to disagreement between two different coherence scores (UMass v. UCL) that should have dictated the number of topics, ambiguity regarding the selection of a λ value to achieve optimal term relevance, and results that were not interpretable after multiple iterations. Voyant (https://voyant-tools.org/) provided term frequencies, contexts, trends, and collocations, but could not provide the same synthesis, visualization of overall term relationships, and output regarding links, link strength, and term occurrences across text corpora as VOSviewer.

VOSviewer, a "tool for constructing and visualizing bibliometric networks" that also "offers text mining functionality that can be used to construct and visualize co-occurrence networks of important terms extracted from a body of scientific literature" (https://www.vosviewer.com/), requires no coding knowledge or experience. In the list of 515 publications at vosviewer.com that have utilized VOSviewer is Gobster (2014), who deployed the software to identify themes in *Landscape and Urban Planning.* VOSviewer (VOS stands for visualization of similarities) automatically identifies frequencies with which terms occur together. These co-occurrences are then mapped on a two-dimensional plane and grouped into "clusters" by color. Terms that co-occur frequently are spaced closely together and share color. Additionally, terms that occur with greater frequency possess larger diameters than those that occur less frequently.

VOSviewer executed commands using both default and adjusted settings. VOSviewer performed a full counting of term occurrences using the default relevance score of 60 percent. The minimum number of term occurrences varied from the default value of ten to seven, six, or

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five to yield about three percent of each text corpus. Prior to mapping, following methods in Newman et al. (2021), I removed common and procedural terms like 'understanding,' 'explain,' 'attendee,' and variations of 'landscape architecture' and 'design', and retained substantive terms. In some cases, investigation of terms within the context of one text corpus dictated whether to include or exclude terms in visualizations across all quadrennial periods, if present (Appendix Table 1). After mapping all remaining terms, VOSviewer determined the number of clusters based upon the text corpus, type of counting (full), minimum number of occurrences, and relevance score percentage. Following a review of the results, additional iterations using each corpus in VOSviewer occurred until each term cluster contained linked terms, thereby suggesting the most coherent, interpretable results.

The methods possess inherent limitations. The term occurrence threshold, relevance score percentage, inclusion and exclusion of terms, and dataset sizes each affect term co-occurrences, clusters, and maps. Further adjusting each of these variables would yield results that differ from those in this study. Moreover, author-assigned cluster labels are often based upon the most frequent term(s) within each cluster; thus, some labels do not fully represent the clusters. Readers should review the maps and the description, tabular presentation, and discussion of the results for a nuanced understanding of topics that emerged. Synonyms, particularly across term clusters, did not appear. Nonetheless, VOSviewer would have identified and counted synonyms separately, thereby reducing term occurrences and co-occurrences, and altering relationships. Therefore, creating and deploying a thesaurus in VOSviewer would affect results too.

The dataset afforded text corpora variations. VOSviewer maps based only on learning objectives yielded different results compared to those derived from education session titles, executive summaries, and learning objectives. Due to the absence of executive summaries in 2011, 2013, and 2015, and difficulty interpreting results from corpora that included titles, summaries, and objectives, the text corpora included only concurrent education session learning objectives, thereby maximizing session content over the greatest duration, avoiding text redundancies and inflated term frequency values, and focusing on the content that speakers intended to deliver to attendees in exchange for PDHs (i.e., what attendees were supposed to learn). The widespread attention that the Covid-19 pandemic and Black Lives Matter movement garnered in 2020, within the context of education sessions from 12 conferences, dictated the division of the text corpus, creation and analysis of visualizations into quadrennial periods of 2011-2015, excluding 2012; 2016-2019, and 2020-2023. Thus, including 2012 education session content would alter the results for the 2011-2015 period. Additionally, creating visualizations for biannual, triennial, or six-year periods, rather than quadrennial, would alter the results too.

Finally, following formatting and file preparation in spreadsheet software, VOSviewer mapped education session speaker names, and separately, speakers' institutional affiliation (e.g., firm name or university). In each case, specifications included full counting, a minimum term occurrence threshold of two, and a relevance score of 100% (i.e., all speakers and affiliations meeting the term occurrence threshold). Although a few speakers represented multiple institutions, creating the VOSviewer maps required limiting education session speakers' representation to one institution. Thus, the overall total number of institutions and the frequency

of representation for some institutions is (negligibly) lower than a dataset that included multiple cases of representation.

All visualizations displayed line and label sizes with values equal to one and a visualization scale equal to 1.5. After exporting maps as .eps files to Adobe Illustrator, I replaced colors and shapes for presentation in black and white.

RESULTS

Table 2 shows that the dataset includes 1,239 education sessions from 12 ASLA Conferences on Landscape Architecture. From past to present, quadrennial periods contained learning objectives from 460, 463, and 316 education sessions. Between 2011 and 2023, excluding 2012, ASLA conferences offered an average of 104 education sessions per year. The 2020 virtual and 2021 in-person conferences offered the fewest education sessions, whereas the conferences between 2013 and 2018 averaged 118 sessions. Session durations began to vary in 2019; consequently, the number of available PDHs decreased. Between 2015 and 2019, many topics had few associated sessions. However, the topics of sustainable and resilient design/climate resiliency had, on average, nine and 11 sessions. ASLA did not assign topics to 12 to 14 sessions (e.g., "Inside the Studio") each of these years. Beginning in 2020, fewer topics existed, and ASLA assigned each topic many sessions.

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Table 2. ASLA Conference Education Session Sums, Professional Development Hour Assignments, Topics, and Topic Distribution, 2011, 2013-2023.

							Sessions Per Topic			
Year	Total Educ. Sessions	1 PDH Educ. Sessions	1.25 PDH Educ. Sessions	1.5 PDH Educ. Sessions	Possible PDHs/ Attendee	Topics	0 to 3	4 to 7	8 to 10	>10
2011	106	0	0	106	18	—	—	—	—	—
2013	119	0	0	119	18	—	—	—	—	—
2014	119	0	0	119	18	—	—	—	—	—
2015	116	0	0	116	18	30	15	11	3	1
2016	119	0	0	119	18	30	14	12	3	1
2017	120	0	0	120	18	29	13	12	2	2
2018	118	0	0	118	18	26	14	7	3	2
2019	106	33	42	31	12.5	23	13	4	4	2
2020	24	24	0	0	24	5	0	4	1	0
2021	72	45	27	0	11	7	1	1	1	4
2022	113	29	54	30	15.25	8	0	2	0	6
2023	107	44	40	23	14.5	7	0	0	0	7
Totals	1,239	175	163	901						

Note. Possible Professional Development Hours (PDHs) per attendee assumes attendance for each available education session per time slot and two 1-hour general education sessions; total PDHs will vary with field or deep-dive session attendance.

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Table 3. Summary, VOSviewer Processing for ASLA Conference Education Session Learning Objectives, 2011, 2013-2023.

Period	Words in Corpus	Term Occur. Threshold	Terms Meeting Threshold	Most Relevant Terms	Terms Included	Clusters
2011-2015	4,161	5	207	124	68	7
2016-2019	4,636	7	180	107	63	9
2020-2023	3,731	6	159	95	56	7

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Education Session Learning Objectives

Table 3 summarizes VOSviewer processing information. All education sessions in 2011 contained three learning objectives, whereas, with few exceptions, sessions between 2013 and 2023 contained four. Fewer education sessions in the 2020-2023 period correspond to fewer words in the text corpus. Going forward, author-assigned labels to term clusters that emerged in VOSviewer maps for each quadrennial period are italicized.

2011, 2013-2015. Figure 1 shows term clusters represented by unique grayscale values and shapes. Lines connecting terms indicate co-occurrence ("collocate" in Voyant); line width indicates link strength (i.e., co-occurrence frequency). Distinct inter-cluster links exist between 'garden' and 'plant,' 'soil' and 'cost,' and 'public space' and 'maintenance.' Distances between clusters and terms suggest relatedness. Generally, cluster terms are spaced apart from one another, though terms in *Soil, Plants, & Water* (with 'water' and 'hydrology' to the left of 'soil') exemplify a relatively well-defined cluster. Peripheral terms like 'environmental justice,' 'geodesign,' 'mock up,' and 'wetland' suggest anomalies and are less related to other terms and clusters.

Besides common stopwords (e.g., 'understand' and 'learn') in Voyant, 'design,' 'metrics,' 'landscape,' and 'projects' most frequently collocated with 'performance' in the first cluster, *Design Performance*. In the second, 'service' most often occurred in contexts related to professional services that landscape architects offer, as well as in 'ecosystem services.' In the *Garden* cluster, various garden types are mentioned, including rain, therapeutic, healing, vertical, and sensory. 'Design,' 'costs,' 'strategies,' and 'long (term)' are the most frequent collocates

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with *Maintenance*. The general contexts within which *Resources* occurs are natural and cultural, with the two exceptions being geodesign and data collection. 'Design' most frequently collocated with 'construction' in cluster six, along with, to a much lesser degree, 'landscape,' 'maintenance,' 'documentation,' and 'challenges,' whereas 'public space' collocated twice with many terms including 'maintenance,' 'impact' and 'development.' In the final cluster, 'soil' collocated with 'water,' 'design,' and 'plant' most often.

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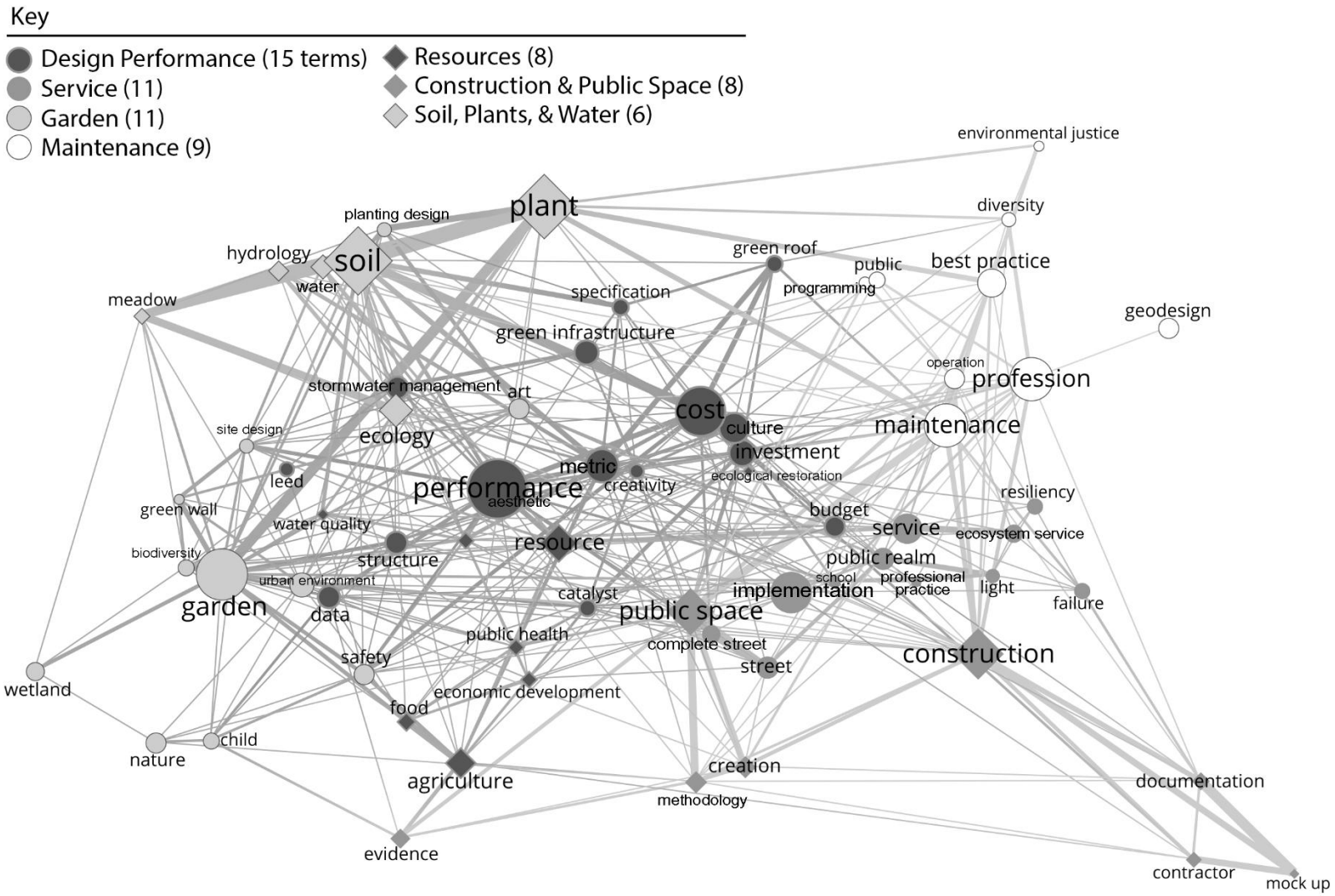

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Figure 1. Visualization of ASLA conference education session learning objective term clusters, 2011, 2013-2015.

2016-2019. Figure 2 represents the nine-cluster map for this period. *Profession* contains references to the 'experience' and wisdom of practitioners within the context of careers, as well as the sensory or cultural 'experience[s]' of site visitors and stakeholders. As a result, the intra-cluster link between 'practitioner' and 'experience' is strong. Stronger still is the intra-cluster link between 'inclusion' and 'equity,' which occurred within the contexts of race, ethnicity, gender, the economy, and the environment. In *Nature & Innovation*, 'nature' collocated with 'design,' along with 'based,' 'solutions,' and 'play.' Terms associated with examples of nature-based solutions appeared in the same cluster. However, 'innovation' occurred in several contexts, not all of which were natural. VOSviewer positioned 'climate' and 'green infrastructure' together, as well as 'climate change' and 'barrier' atop one another; these proximate locations indicate close relationships despite being in different clusters. 'Plant,' 'soil,' and 'water' appeared together in a cluster again during this period. 'Soil' and 'water' possessed a strong intra-cluster link. The inclusion of additional terms in this cluster implies a change in scale (e.g., 'region') and association with, but not a focus on, social parameters like 'community engagement' and 'gentrification.' *Public Health & Safety* includes 'safety,' which collocated most often with 'welfare' and 'public' in Voyant, and possessed a strong intra-cluster link with 'health' in VOSviewer. 'Climate change' appeared in this cluster and collocated most often with 'public' and 'community.' *Sustainability* occurred most frequently in the cluster of the same name, and closely related to 'operation,' 'programming,' and to a lesser degree, 'maintenance.' The moderate intra-cluster link with 'social equity' is supported with frequent collocations with

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'social' and 'design' in Voyant. 'Maintenance' collocated with 'operations,' 'long (term),' 'design,' 'sustainable,' and 'management.' The map also shows clusters associated with *Art and Public Space* and *Models*, which is closely associated with 'partnership' on the map and pertains to frameworks for business, parks, development, simulations and predictive scenarios, and governance. While *Design Process* contains terms associated with design principles and standards, the term also possesses inter-cluster links with 'sustainability,' 'construction,' 'plant,' 'water,' and 'soil;' 'inclusion,' 'innovation,' 'model,' and 'experience.' Finally, *Technique*, at bottom, one of the least related and linked term clusters, collocated most often with 'learn,' then less often with 'public,' 'tools,' and 'strategies,' and within various contexts ranging from design and drawing to excavation and research.

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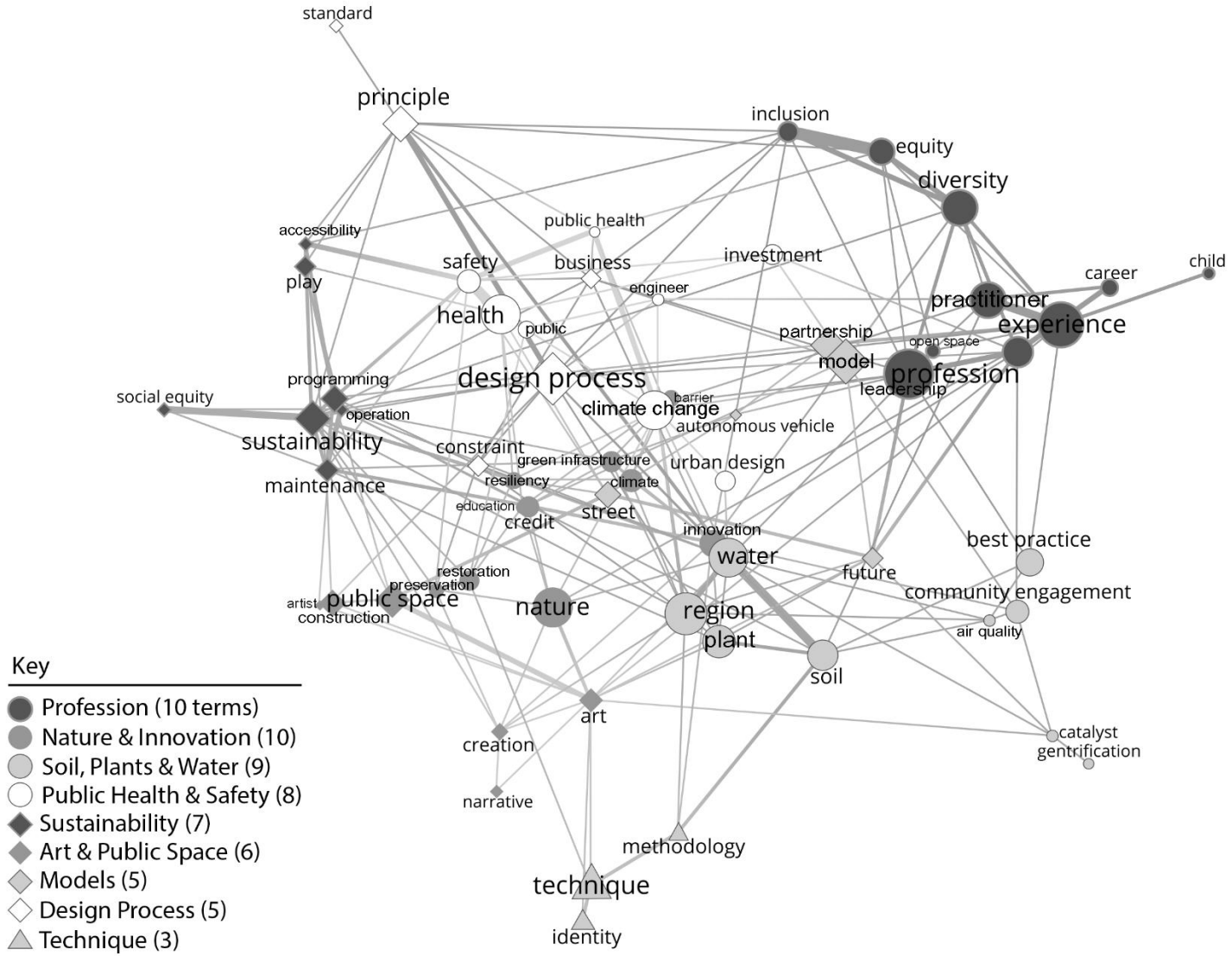

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Figure 2. Visualization of ASLA conference education session learning objective term clusters, 2016-2019.

2020-2023. Figure 3 shows that the strongest intra-cluster links exist between 'profession' and 'future,' 'diversity' and 'inclusion,' and though weaker, between 'implementation,' 'detail,' and 'stakeholder.' The strongest inter-cluster links exist between 'profession' and 'diversity,' and to a lesser degree, 'inclusion' and 'narrative.' Moreover, the *Infrastructure* and *Stakeholder Engagement* clusters are located on the periphery of other inter-related clusters and terms, thereby suggesting discrete topics. On a smaller scale, the proximity of 'client' to 'professional' and 'inclusion,' as well as 'narrative' and 'place,' 'principle' and 'diversity,' 'experience' and 'community engagement,' 'methodology' and 'contractor,' and 'profession' and 'technology' suggest close relationships.

Climate Change and 'principle' occur within the context of phrases like "social justice," "design justice," and "vulnerabilities for local communities," as well as "universal design," "anti-racist," and "feminist." The *Profession* cluster contains regular collocations with 'practice' and 'landscape' and within the context of several topics including students' entrance into landscape architecture; career trajectories; diversity, equity, and inclusion; education about racism; and representation by immigrants and Black, Indigenous, and People of Color. 'Research' collocated most often with 'practice,' perhaps indicating the greater relevance in the profession, or greater relevance within the smaller text corpus, relative to the other two quadrennial periods. 'Urban' collocated most with *Infrastructure*. 'Resilient' is often situated within the context of 'infrastructure,' as is transportation, water (e.g., coastal, marine, flood control), and in two instances, "aging." 'Nature' collocated most often with 'based.' Several

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terms related to the *Diversity, Equity, & Inclusion* (DEI) cluster, which includes 'experience,' 'art,' and 'community engagement,' have approximately equal occurrences and link strengths. Indeed, these three terms appear within the context of DEI, specifically regarding "multi-lingual communities," disabilities," "segregation, inequity, and mistrust;" "ethic of partnership," "leftover spaces and equitable community engagement in the arts;" and "art-driven community engagement." *Stakeholder Engagement* contained inter-cluster links to 'universal design,' 'disabled person,' 'client,' 'community engagement,' 'climate change,' and 'profession.' *Green Infrastructure* linked to other clusters via 'public realm,' 'climate change,' and 'resource.' The final cluster, *Resources*, contained inter-cluster links to several terms including 'sustainability,' 'green infrastructure,' 'climate change,' and 'universal design.'

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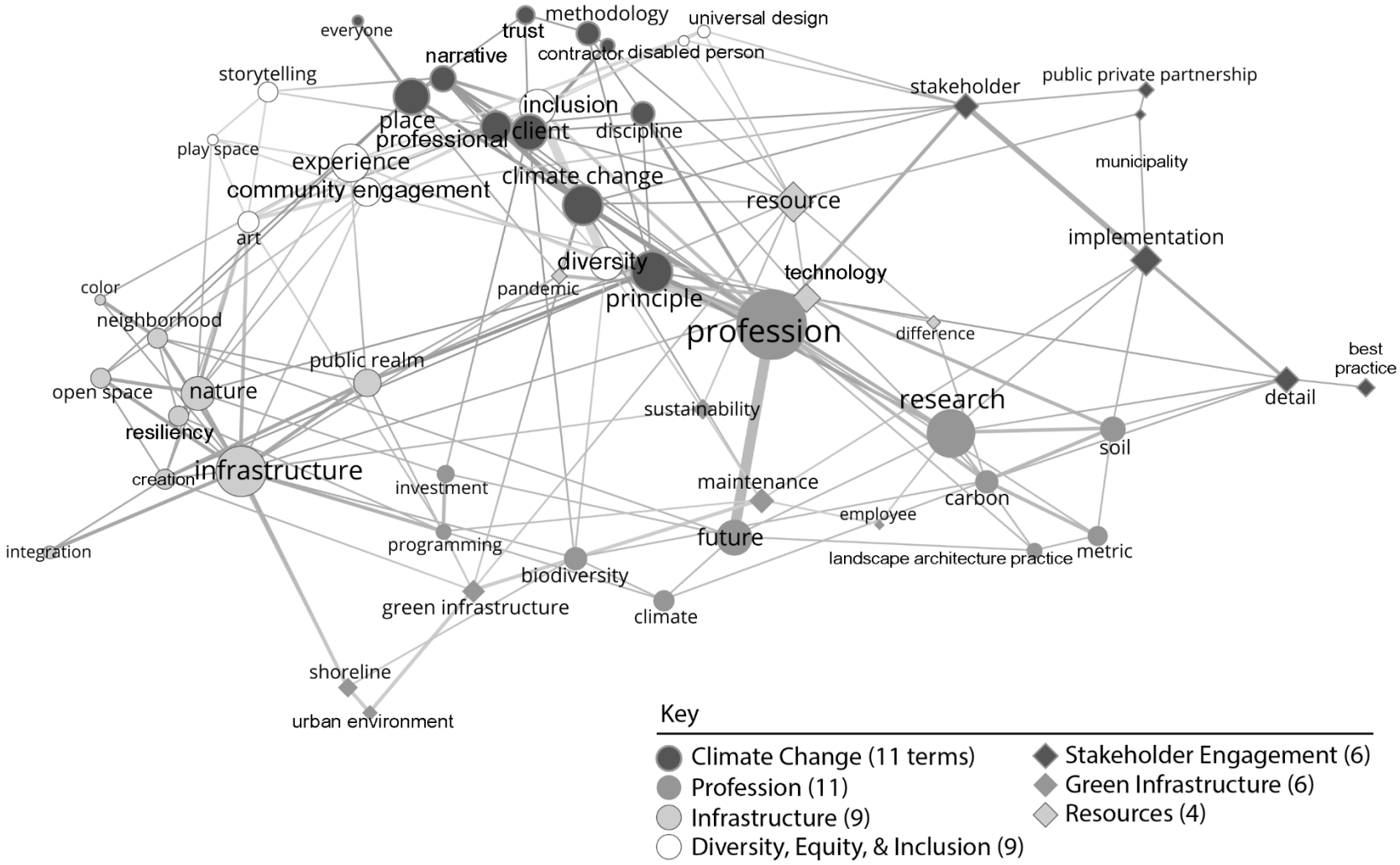

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Figure 3. Visualization of ASLA conference education session learning objective term clusters, 2020-2023.

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Education Session Speakers

Speakers' institutional affiliations. VOSviewer identified 1,596 unique institutions across 4,109 instances of representation in the dataset, of which VOSviewer mapped relationships for 489 institutions present two or more times. VOSviewer returned 31 clusters that have two or more links and 25 institutions that do not possess links to others. Of 62 institutions represented in 10 or more education sessions in Table 4, 12 universities are present along with two non-profit foundations, two governmental entities, *Landscape Architecture Magazine*, and ASLA (and 14 occurrences of presenters without an available affiliation). Twenty-five institutions had 20 or more instances of representation (~35% of total), including three universities, Trust for Public Land, and 21 firms. Overall, the ten most represented institutions accounted for over 13% of total instances of representation. Of these, Sasaki, Design Workshop, Olin, and SWA Group had 94, 82, 61, and 59 instances of representation, respectively, or over 7% of the total. Each of these firms also returned the greatest numbers of links (from 59 to 84) and link strength values (from 95 to 157). In contrast, the means for institutional links, link strengths, and occurrences equaled seven, nine-and-a-half, and six, respectively, with most represented in fewer than five sessions (~75% institutions) and possessing ten links to other institutions (~80%).

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Table 4. Institutional Cluster Summary, ASLA Conference Education Session, 2011, 2013-2023.

Cluster[a]	Institutions in Cluster w/ ≥ 10 Occurrences[b]	Total Inst. in Cluster	Max. Inst. Occur.	Inst. w/ 6-10 Occur.	Inst. w/ ≤ 5 Occur.	Max. Links	Inst. w/ >20 Links	Inst. w/ 11-20 Links	Inst. w/ ≤10 Links
1	Michael Van Valkenburgh Assoc	25	42	4	20	43	1	2	22
2	Louisiana State Univer	23	10	5	17	16	0	3	20
3	ASLA, Mithun, Site Design Group, Landscape Architecture Magazine	23	19	2	17	34	2	3	18
4	Hoerr Schaudt Land Arch, Rana Creek Design, Conservation Design Forum	23	17	3	17	19	0	3	20
5	Univ of Calif Berkeley, Univ of Washington, Univ of Texas at Arlington	23	22	1	19	31	2	3	18
6	Lehrer and Assoc/Studio MLA, Ten Eyck Land Arch, Not Available, Land Arch Found, San Francisco Public Work	21	23	2	14	42	4	0	17
7	Hargreaves Jones, Base Land Arch	21	20	5	14	30	1	3	17
8	Trust For Public Land	19	24	3	15	31	1	1	17
9	Design Workshop, Andropogon Assoc, WRT, EDSA, Civitas	18	82	3	10	84	3	2	13

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10	Nelson Byrd Woltz, James Corner Field Operations, National Park Service, Duke Univ	18	42	1	13	41	4	0	14
11	Univ Of Virginia, Oehme Van Sweden, Cultural Landscape Found	18	17	3	12	28	2	1	15
12	Stoss, HR&A Advisor	18	19	0	16	23	1	1	16
13	Smith Group, Coen+Partners, Rutgers Univ	18	19	1	14	23	1	3	14
14	Penn State Univ	17	13	4	12	17	0	4	13
15	Olin, AECOM	17	61	5	10	76	2	2	13
16	SWA Group, Biohabitat, Ohio State Univ	16	59	2	11	59	2	2	12
17	Reed Hilderbrand, Siteworks	16	46	4	10	54	1	1	14
18	PWP Land Arch, CMG Land Arch, OJB, Snøhetta	15	31	2	9	27	2	3	10
19	Mikyoung Kim Design	15	14	0	14	17	0	1	14
20	DTJ Design	14	14	2	11	10	0	0	14
21	MIG, Kounkuey Design	13	25	1	10	18	0	2	11
22	RIOS, D Land Studio	13	29	0	11	25	1	1	11
23	SCAPE	11	40	1	9	43	1	1	9
24	Land Collective	10	19	1	8	21	1	0	9
25	Harvard GSD, Univ of Pennsylvania	8	27	1	5	38	2	1	5
26	None	8	6	1	7	6	0	0	8

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27	N. Carolina State Univ	5	17	0	4	18	0	1	4
28	Sasaki	5	94	0	4	75	1	0	4
29	Gustafson Guthrie Nichol (GGN)	4	31	0	3	38	1	0	3
Totals	62	455		57	336		36	44	375

Note. Excluded are 29 clusters, which each contain 3 or fewer institutions (*N*=58).

[a]VOSviewer classifies cluster numbers, which correspond to institutions, links, and link strengths in the cluster.

[b]Institutions are listed in descending order by the number of occurrences.

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Speakers. Education session presenters totaled 2,511. With a few exceptions, each session included between two and five speakers with a mean of three. Between 2015 and 2018, more sessions included four speakers than three (M = 61 sessions v. 42). Beginning in 2019, the trend reversed; an average of 82% of sessions each year included three speakers. Overall, greater than 75% of individuals spoke once. Of the speakers who presented two or more times, 50% presented twice, another 17% presented thrice, and another 9% presented four times. Just under 1% of speakers, or 24 people, presented 10 or more times. Eight individuals presented in ≥ 14 sessions. Of these, one speaker presented a total of 20 times, twice participating in four sessions in one year, which is equal to the participation of 56 other speakers, or two percent of all speakers, across the 12 years of this study.

Table 5 presents a summary of the VOSviewer cluster results. On average, 83% of all speakers within clusters participated in two to five sessions. Sixty-eight percent of speakers had two to five links to other speakers. Almost all the most frequent speakers are executive practitioners. University faculty members are present, and some speakers have dual roles as practitioners and academicians. Frequent speakers' average links to and link strengths with other speakers are two-and-a-half times that of the overall means. While some frequent speakers often served as the primary affiliate of well-represented institutions, several frequent speakers collectively contributed to the occurrences of the most represented institutions (e.g., Diane Fernandez Bibeau, Michael Grove, et al. for Sasaki; Kurt Culbertson, Steven Spears, et al. for Design Workshop; Lucinda Sanders, Richard Roark et al. for Olin; and Gerdo Aquino, Anya Domlesky, et al. for SWA Group).

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Table 5. Featured Speaker Cluster Summary, ASLA Conference Education Session, 2011, 2013-2023.

Cluster[a]	Speakers w/ ≥ 6 Occurrences[b]	Speakers in Cluster	Max. Speaker Occur.	Speakers w/ ≥ 10 Occur.	Speakers w/ ≤ 5 Occur.	Speakers w/ ≥ 10 Links	Speakers w/ ≤ 5 Links
1	Diane Jones Allen, Kurt Culbertson, Frederick Steiner	31	14	2	28	3	23
2	Michael Grove, Annette Wilkus, Andrew Lavallee, Kongjian Yu	28	9	0	24	4	17
3	Kate Orff, Mikyoung Kim, Steven Handel, Shane Coen, Michelle Delk, Gary Hilderbrand, Catherine Seavitt Nordenson, Thomas Oslund	27	11	1	19	9	13
4	Mark Focht, Thomas Tavella, Martha Schwartz	27	7	0	24	2	21
5	Bradley Cantrell, Nina Marie Lister	24	9	0	22	2	16
6	Kona Gray, Anya Domlesky	21	8	0	19	3	17
7	Thomas Woltz, Charles Birnbaum, Ken Smith, Eric Groft, Lucinda Sanders, Susan Van Atta	21	19	2	15	5	11
8	Debra Guenther, Erin English, Jeffrey Bruce, Richard Roark, John Swallow	20	9	0	15	4	13

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9	Allyson Mendenhall, Mark Dawson, Hana Ishikawa	20	9	0	17	3	15
10	Mark Hough, Thomas Balsley, Adrian Benepe	20	12	2	17	3	14
11	Mia Lehrer, Keith Bowers, Kristina Hill	19	17	2	16	4	13
12	Diana Fernandez Bibeau, Allegra Bukojemsky, Kevin Burke	18	11	1	15	2	14
13	Chris Reed, Shannon Nichol, Bradford McKee, Jim Schuessler	18	10	2	14	3	10
14	Larry Weaner, Kate Kennen, Claudia West	17	8	0	14	0	12
15	Laura Solano, Nina Chase	17	15	1	15	2	13
16	Gina Ford	17	17	1	16	1	14
17	James Burnett, Adam Greenspan, Peter Walker, Kevin Conger, Thomas Rainer	16	8	0	11	3	9
18	Jose Alminana, Emily Mccoy, Christian Gabriel	16	12	2	13	3	8
19	None	16	5	0	16	2	10
20	Eric Kramer, James Sottilo	15	14	1	13	1	10
21	Daniel Tal, James Sipes	13	8	0	11	0	11
22	David Yocca, Mike Albert	13	10	1	11	2	9
23	Steven Spears, Christine Ten Eyck, Susannah Drake, Mark Rios, Anna Cawrse	13	12	2	8	4	6
24	Laura Marett	13	6	0	12	0	11

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25	Meg Calkins, April Philips, Hunter Beckham	13	10	1	10	2	8
26	Barbara Deutsch	12	6	0	11	1	8
27	Steve Benz, Laurie Olin	11	6	0	9	2	3
28	Pippa Brashear, Pamela Conrad, Gena Wirth, Vaughn Rinner	10	9	0	6	3	5
29	Gerdo Aquino	9	11	1	8	1	7
30	Mary Margaret Jones	9	12	1	8	1	8
31	James Corner, Mark Johnson	9	6	0	7	2	6
32	Hitesh Mehta, Todd Hill	9	9	0	7	0	8
33	Patricia Algara	7	6	0	6	0	5
34	David Rubin, Thaisa Way	7	20	1	5	2	5
35	None	6	4	0	6	0	5
Totals	94	562		24	468	79	378

Note. Excluded are 28 clusters, which each contain 5 or fewer speakers (*N*=63).

[a]VOSviewer classifies cluster numbers, which correspond to speakers, links, and link strengths in cluster.

[b]Speakers presented in descending order by occurrences.

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DISCUSSION

The results indicate that educational themes at ASLA Conferences on Landscape Architecture have changed during the last 12 years. How?

While the smaller number of education sessions between 2020 and 2023 can be understandably explained by the meeting mode modifications caused by the Covid-19 pandemic, the trend toward shorter session durations that began in 2019 (Table 2) continues beyond the pandemic. (ASLA calls only for 75-minute education session proposals for the 2025 conference, including 15 minutes of Q&A.) Consequently, less time is available for content delivery and presentation of details, though topic complexity has arguably increased (e.g, social aspects related to sustainability).

Compared to term clusters from sessions in 2011 and between 2013-2015, 'performance,' while present in the text corpus and most often collocated with 'landscape,' did not appear between 2016 and 2019, suggesting decreased relevance. The same is true for (professional and ecosystem) 'service' and 'garden.' In contrast, 'soil,' 'plant[s],' and 'water' remained relevant. 'Maintenance' appeared again, though acquired a new association, with 'sustainable.' 'Art' gained relevance, as did 'model.' 'Public 'health' and 'safety,' became more relevant as did 'sustainability' and 'climate change,' perhaps, as anticipated, in response to the 2018 IPCC *Special Report* on *Global Warming of 1.5°C*, 2017 We Are Still In declaration, and U.S. intention to withdraw from the Paris Agreement. Most pronounced was the emergence of

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'diversity' within the context of and collocated with 'equity' and 'inclusion,' which was almost entirely absent from the previous quadrennial period, 2011, 2013-2015, and could explain the decreased relevance of other terms. Rather than emerging between 2020 and 2023, as anticipated, *DEI* emerged sooner, when the Black Lives Matter movement gained national recognition, Donald Trump became president of the U.S., the Environmental Justice PPN was created (2016) and ASLA, CELA, and CLARB issued a joint statement that addressed a lack of diversity in the profession (Miller, McNamara, & Smoot, 2022).

Comparatively, 'performance' occurred 3.5 fewer times between 2020 and 2023 than during the previous two quadrennial periods and remained less relevant, as did 'garden,' which was hardly mentioned. 'Soil,''plant[s],' and 'water' no longer emerged as a separate term cluster after having been present in both previous quadrennial periods. *Public Safety and Health* and *Models* did not emerge again, but 'art' did, at least within the context of 'experience' and DEI. 'Maintenance' remained relevant, as did professional matters. However, formerly embedded within *Profession* between 2016 and 2019, DEI, climate change, and stakeholder engagement emerged as separate term clusters between 2020 and 2023, thereby implying greater relevance. Further, as the interlocking locations of these clusters in the VOSviewer visualizations for the 2016-2019 and 2020-2023 periods suggest, each often related to one another in education session learning objectives.

The findings imply that central topics in the practice of landscape architecture have shifted in the half-century since the Fein (1972) report and Chen (2013). Especially between 2020-2023, terms in the results like 'biodiversity,' 'green infrastructure,' 'sustainability,'

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'universal design,' and 'disabled person' imply that 'ecological needs' and 'public welfare and enjoyment,' which Fein (1972) found *should* be central to practice, may have displaced, or perhaps added significance to, 'esthetics' and the 'comfort and pleasure for [the] individual.' Further, the results suggest that emphasis in professional training, overall, is being placed upon 'principles of design,' 'ecology,' and 'construction,' as desired by respondents in Fein (1972). Terms that emerged also imply that practitioners have placed more emphasis on 'conservation,' 'social and behavioral problems' (e.g., systemic racism, inequity, disabilities), and because of the recent attention directed toward professional sex, gender, race and ethnicity inequities and homogeneity, perhaps even 'business management,' which respondents in Fein (1972) rated second lowest in need of emphasis.

Term cluster labels agreed with some of the 15 LABOK study (ASLA et al., 2004) domain topics (Table 1) wherein practice may be the principal source of knowledge and practitioners acquire this knowledge through continuing education, including 'sustainable construction practices,' 'public relations, outreach, and image development,' 'floodplain management,' 'bioinfiltration and other alternative drainage methods,' 'water resource management,' and 'construction equipment and technologies.' Little to no evidence emerged that indicates 'treatment of toxic materials,' 'noise attenuation and mitigation,' 'basic construction law' and 'land and water reclamation procedures including quarry, mine, and landfill reclamation,' are represented in term clusters though greater than 10 percent of LABOK study respondents' stated that continuing education is the appropriate time of acquisition for these and other topics. Terms like 'carbon' and 'climate,' in 2020-2023, suggest that education sessions

addressed 'lifecycle cost-analysis,' and the *Garden* cluster in 2011, 2013-2015 addressed the domain topic of 'therapeutic aspects of design.'

Aspects of Chen's (2013) four knowledge domains remained relevant. In the judgmental design domain, the 'professional ethics' and the 'profession of landscape architecture' knowledge areas are evident in term clusters, as are 'construction techniques' and 'plants and materials' in Chen's (2013) construction design knowledge domain. The results indicate continued relevance of 'water resource management,' in the environmental systems domain, and 'sustainable design' and 'ecology,' both of which respondents rated as the most-used research in practice. Generally, the human systems knowledge domain, which included 'garden history,' 'public policy, 'history and culture,' and 'community planning and design,' was least relevant, in support of Chen's (2013) findings.

Figures 1 through 3 show that term clusters varied from seven to nine across quadrennial periods in this study, whereas ASLA's topics decreased from 30 to seven, with five topics available for the virtual 2020 conference. Despite differences in topic numbers, cluster topics aligned with the most frequent ASLA-assigned session topics. For example, between 2016-2019, ASLA assigned between nine and 13 sessions the topic labels 'resilient design,' 'sustainable design,' or 'climate resiliency.' One cluster for this period emerged as *Sustainability* while two other clusters, *Public Safety & Health* and *Nature & Innovation*, included pertinent terms. ASLA also assigned 'Practice management (contracts, finance, insurance, and personnel)' to between 5 and 10 sessions during each of these years. Relatedly, the *Profession* cluster appeared in this study, though other labeled clusters may include related topics. Although the top two most

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frequently ASLA-assigned topics vary between 2020 and 2023, terms, term clusters, and labels are in general agreement with ASLA conference track names and topics, with one exception: ASLA's special topic, 'Olmsted and beyond: practice in progress,' is not evident.

Table 6 presents potential alignments between some term clusters that emerged from ASLA conference education session learning objectives and Professional Practice Network (PPN) titles and member counts.

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Table 6. Professional Practice Network (PPN) Membership and Associated Term Cluster Labels.

PPN Network	Members, 01/25	% Total	Members, 06/2012	% Total	Related Term Cluster Labels
Sustainable Design and Development	3,979	12.28%	2,360	19.23%	Design Performance; Service; Nature & Innovation; Public Health & Safety; Sustainability; Climate Change; Profession; Infrastructure; Green Infrastructure
Parks and Recreation	3,859	11.91%	1,128	9.19%	Construction & Public Space; Profession; Art & Public Space; Infrastructure
Women in Landscape Architecture	3,484	10.75%	317	2.58%	Profession; Diversity, Equity, & Inclusion
Urban Design	3,153	9.73%	1,531	12.47%	Service; Garden; Construction & Public Space; Public Safety & Health; Art & Public Space; Models; Infrastructure; Green Infrastructure
Residential Landscape Architecture	3,062	9.45%	1,142	9.30%	
Campus Planning and Design	2,134	6.59%	453	3.69%	Service
Planting Design	1,754	5.41%	148	1.21%	Garden; Soil, Plants & Water; Profession
Landscape-Land Use Planning	1,349	4.16%	1,004	8.18%	Maintenance; Resources; Stakeholder Engagement; Green Infrastructure
Ecology and Restoration	1,158	3.57%	460	3.75%	Design Performance; Service; Garden; Resources; Soil, Plants & Water; Nature & Innovation; Profession; Green Infrastructure
Healthcare and Therapeutic Design	1,111	3.43%	375	3.06%	Garden; Resources; Public Safety & Health
Transportation	1,060	3.27%	510	4.16%	Service; Models; Infrastructure
Digital Technology	1,046	3.23%	275	2.24%	Maintenance; Technique; Resources

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Children's Outdoor Environments	1,015	3.13%	239	1.95%	Garden; Profession; Sustainability; Diversity, Equity, & Inclusion
Design-Build	928	2.86%	861	7.02%	Construction & Public Space
International Practice	925	2.85%	381	3.10%	
Historic Preservation	906	2.80%	460	3.75%	
Water Conservation	875	2.70%	367	2.99%	Design Performance; Garden; Resources; Soil, Plants, & Water; Green Infrastructure
Community Design	299	0.92%	262	2.13%	Soils, Plants, & Water; Infrastructure; Diversity, Equity, & Inclusion; Stakeholder Engagement
Environmental Justice	216	0.67%	.	.	Maintenance; Profession; Soil, Plants & Water; Sustainability; Diversity, Equity, & Inclusion
Education and Practice	90	0.28%	.	.	
Totals	**32,403**		**12,273**		

Note. Member counts for January 2025 acquired from LinkedIn pages via https://www.asla.org/PPN.aspx. Membership in more than one PPN is possible.
For 2012 values, see Table 2 in Flanders Cushing and Renata (2015).

In comparison to the 2012 member values in Flanders Cushing and Renata (2015), membership in each PPN has grown. The proportion of total members in 'sustainable design and development,' 'landscape-land use planning,' and 'design-build' PPNs have declined between 4 and 7 percent, whereas membership in 'planting design' and 'women in landscape architecture' increased 4 and 8 percent. Terms that emerged from corpora suggest that 'sustainable design and development,' 'urban design,' and 'ecology and restoration' PPNs each related to the greatest number of term clusters. The 'women in landscape architecture' PPN now has the third most members; although 'woman' did not emerge in the results, the term emerged in processing iterations of the 2016-2019 text corpus that specified a 6-term threshold, and 5- and 6-term thresholds for text corpora derived from session executive summaries, each within the context of the cluster labeled *Profession.* 'Residential landscape design' remains one of the largest PPNs, yet the study results did not yield terms or clusters related to this topic.

Perhaps the education session speakers and the institutions they represented can explain some of the results. Over two-thirds of speakers and institutions participated in one session. A minority participated frequently and benefitted from the greater visibility, connections, and opportunities that involvement in ASLA conference education sessions may yield. Further, the knowledge and experiences of frequent speakers and institutions likely influenced session content, and by extension, conference content and term clusters that emerged in this study. These institutions and their representative speakers, often principals, work on and present primarily public or large, private and institutional projects. While their influence on professional norms and foci can positively impact collective, professional goals, such as becoming a zero-emission

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profession by 2040 (Aquino et al., 2024), these speakers and institutions may not reflect the work, interests, and educational content most landscape architecture practitioners want or need. Thus, topics such as residential landscape architecture, campus planning and design, and to some extent, women in landscape architecture, are absent or minimally present in the results. Future research, beyond this study, could replicate, challenge, and extend the findings herein and help better align professional interests, needs, and conference content delivery.

CONCLUSION

Accordingly, the study results afford several research opportunities. First, the findings do not address whether *published* session learning objectives matched *presented* session content. The findings simply assign labels to terms grouped together based upon term occurrence and co-occurrence in session learning objectives. Education session transcripts would yield a larger, more detailed text corpus of actual content that speakers delivered to attendees. Future research could perform text mining of delivered session content using materials and methods in this study, or those of natural language processing with Latent Dirichlet Allocation (LDA), which may generate different and more detailed results.

The effectiveness of the didactic education session delivery method is worth investigating. Boud and Hager (2012, p. 22, 23) argue that professional development should focus less on the acquisition of hours or units and more on learning and practice, which "integrates what people do, where they do it, with whom and for what purpose." Literature from

educational and medical professionals indicates that instructional methods matter. An "umbrella review" pertaining to teacher continuing professional development and learning by Cordingley et al. (2015) concluded that the didactic model, "in which facilitators simply tell teachers what to do, or give them materials without giving them opportunities to develop skills and inquire into their impact on pupil learning is not effective." Khan and Coomarasamy (2006, 3), reported improved knowledge, skills, attitudes, and behavior with clinically-integrated teaching, or evidence-based medicine, which includes "formulating structured queries from specific clinical problems, searching and acquiring relevant literature, appraising it for quality and, if appropriate, applying the findings taking into account patient's own preferences and values." Across eight systematic reviews containing 444 studies published since 2003, Cervero and Gaines (2015, 136) reported that continuing medical education (CME), which is more interactive, uses more methods, involves multiple exposures, is longer, and focused on outcomes that are considered important by [the] physician," has a reliably greater positive impact on physician performance. Measuring the effectiveness of continuing professional development is difficult (Barnes, Bullock, Bailey, Cowpe, & Karaharju-Suvanto, 2012). Researchers within or outside of ASLA undertaking such an investigation may begin by utilizing the questionnaires that ASLA administers following education sessions.

ASLA conference deep-dive and field sessions may be less didactic, more interactive, and more conducive to allowing attendees to apply (or directly experience) content in comparison to concurrent education sessions. Consequently, deep-dive and field sessions could yield more effective, practical learning outcomes. Further, given the 2024 conference session

schedule and PDHs assigned to these session formats, reformatting future conferences to focus primarily on deep-dive and field sessions could allow attendees to earn as many or more PDHs in equal time. Prior to or as part of investigating these possibilities, text mining and or performing an LDA on learning objectives or transcripts of past deep-dive and field sessions would be worthwhile, as would determining learning effectiveness of past field and deep-dive sessions.

Two additional lines of research are worthwhile. First, researchers may review and repeat the study conducted by Fein (1972) and Chen (2013) to determine whether the central knowledge domains of landscape architecture have changed, as the results in this study suggest. Second, replicating the LABOK study (ASLA et al., 2004), now over 20 years old, could also be enlightening. In both cases, revisions to ASLA conference tracks should follow.

This study concludes with five suggestions for ASLA regarding the format of annual conference education sessions. First, ASLA's Annual Conference Education Advisory Committee should conduct an anonymous review and selection of session proposals that exclude speaker biographies and qualifications and hence focus on content and learning instead of recognition and reputation. ASLA should request speakers' titles and, prior to anonymous review, prioritize junior-level speakers who have not presented in at least the last two years. Submission requirements for 2024 and 2025 encourage the selection of speakers who contribute to session panel diversity and did not present the previous year. The study results herein do not indicate whether ASLA's requests to date have begun to diminish the dominance of some featured speakers. A future study can better determine whether speaker diversity has changed.

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Second, given the results of this study and ASLA's intent to "apply a climate and biodiversity focus to all ASLA conferences" (ASLA, 2022, 44), ASLA should focus education sessions solely on aspects of sustainability, which include climate change, biodiversity; diversity, equity, and inclusion, transportation, water quality, and other interrelated topics. Residential design, which is absent from study results, should be included, as should campus planning and design. Aesthetics, site design and engineering; plants, soil, and water; construction documentation and administration, maintenance, and business administration are and will remain professional mainstays, but must address sustainability. Going forward, ASLA must distinguish between and avoid conflating sustainability and climate change, as is done in the Global Alliance commitment of the third ASLA Climate Action Plan (CAP) goal, Advocacy. Further, associating education sessions with UN Sustainable Development Goals (SDGs), and more specifically, targets and indicators, when applicable, supports the fifth objective of this CAP goal (ASLA, 2022). An ambitious ASLA could assign PDHs *only* to sessions wherein sustainability is central and explicit. Doing so would make the priorities of ASLA clear and expedite the realization of some CAP objectives.

The third and fourth suggestions call for bolstering education session proposals with more detailed content and making such content open-access. Besides learning objectives, 2025 ASLA conference presentation proposals require 50-word marketing statements, session outlines, and two to four sources of information. Example submissions from 2024 and 2025, and handouts from 2013-2015 and 2024, vary in content quantity, quality, and utility. Future submissions should use learning objectives to structure session outlines, possess term definitions

and complete sentences (rather than words and phrases), avoid jargon, and present key conclusions and statements of relevance (so, what?) to maximize attendees' potential learning and future reference. Implementing these suggestions should also aid the review and selection of sessions described above.

'Research' emerged as a term in the *Profession* cluster between 2020-2023, in support of published evidence that indicates some landscape architecture offices have dedicated research entities (Barnes et al., 2024). To encourage "positive change across the design industry," "collective knowledge-building," and utilize existing infrastructure for dissemination of knowledge (e.g., conferences) (Barnes et al., 2024, 97, 109), ASLA should make education session proposals, slide presentations, and video recordings publicly and freely available for four or more years following each conference. Restricting the availability of this information to during conferences prohibits participation by landscape architecture students, practitioners, academicians, and others interested in the profession who may be excluded or marginalized (e.g., LGBTQI+, lactating mothers, those with visa restrictions) at typical in-person conferences or burdened financially with conference registration, travel, hotel accommodations, meals, and the loss of billable hours. Restricting the availability of education session content following conferences to only ASLA members, with or without a paywall (via ASLA's Online Learning Library), limits participation, knowledge building, opportunities for collaboration, and collective achievement of professional goals.

Fifth and finally, ASLA's stated objective to "achieve zero emission[s] in all of its business operations by 2040 for advocacy and education" (ASLA, 2022, 16), implies that the

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delivery mode of future education sessions will change and could affect the achievement of learning objectives. Virtual conferences emit nearly zero emissions, whereas hybrid conferences could emit considerably less than ASLA's centralized, in-person conferences (Kuper, 2022). Evidence indicates that the effect of asynchronous e-learning on healthcare professionals' behavior is as effective as clinical instruction or better than no instruction (Sinclair, Kable, Levett-Jones, & Booth, 2016); webcasts had a significant, positive effect on medical students' knowledge and application scores compared to live lectures (Vaccani, Javidnia & Humphrey-Murto, 2016); and webcasts may be "trivially" more effective than other delivery modes, including in-person (Gegenfurtner & Ebner, 2019). ASLA should modify and expand the 10-item multiple-choice or true/false quiz required for all session proposals to measure participant knowledge (and skills), pre- and post-session, now and in the future, to inform delivery and maximize learning.

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