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Toward a Human-centered Approach to Art Museum Design

Learning from Volunteers' Perceptions and Experiences

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Toward a Human-centered Approach to Art Museum Design: Learning from Volunteers' Perceptions and Experiences

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Abstract: This study advocates a human-centered approach to art museum design based on perceptions and experiences of users at The Nelson-Atkins Museum of Art in Kansas City, Missouri. Upon conducting in-depth surveys, the results and discussions are informed by the statistical evidence of the relationship between levels of occupant satisfaction, workspace design, and comfort. The study reveals how award-winning designs may fail to address architectural and interior design principles when lacking adequate accessibility and wayfinding, leading to subsequent obstacles in operations, maintenance, and management. It builds on a previous post-occupancy evaluation of museum users, which included visitors and staff, by adding a post-occupancy evaluation of volunteers, who were found to be a valuable resource for developing a comprehensive set of evidence-based design recommendations for future art museums and their additions.

Keywords: Museums, Volunteers, Architecture, Evidence-based Design

Introduction

The vast majority of museums have taken on a range of architectural modes and social roles, from becoming educational centers to showcasing advances in innovation and technology (Rosas 2016). Museums continuously draw visitors to their exhibitions, educational services, or even just to their innovative building designs, which have evolved thanks to the combination of creativity, available technology, and funding (Sunderland 2016). Their fast-growing collections of artworks require significantly more space and, in turn, the services and support of architects, urban planners, scholars, and philanthropists.

The evolution of art museums over the last fifty years allows for these buildings to adopt new, extended functions, which provide opportunities for shopping, education, eating, entertainment, and become iconic institutions for their local communities (Sunderland 2016; Rosas 2016). Their major goal, however, remains the exhibition and preservation of artwork (Newhouse 2006). In the last quarter of the twentieth century, museums have become increasingly popular and diverse architectural pieces, which inspire endless publications in museum studies (Macdonald 2006; Rosas 2016).

The Nelson-Atkins Museum of Art in Kansas City, Missouri, is one such museum that needed to create spaces for an increasing collection. This museum received a new building addition known as the Bloch Building in 2007. The addition, consisting of a series of five interlinked glass boxes known as “lenses,” opened its doors to the public on June 9th of the same year (Wood and Slegman 2007). The Bloch Building, designed by architect Steven Holl, went on to receive awards for its design and was labeled a success in architecture publications. Design and art critics’ reviews on the building describe how the project prioritizes design aesthetics, highlighting how molding the space has become the core of the modern idea of the museums (Preziosi 2006). Few publications, however, discuss user needs. The architectural forums focus on aesthetics, which in some cases have ended up receiving priority over the operations, maintenance, and management of new museum additions and new art museum buildings. Ideally,

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publications also highlight best practices and successful design processes at the intersections of interior, exterior, and environmental design.

The most common publications on visitor studies, socio-cultural and anthropological issues in the field of museology that are supported by the visitor experience, use annual attendance records, direct feedback, and reviews to support their conclusions (Carbonell 2012; Macdonald 2006). Other sources, such as architecture books and specifically those on museum design, primarily focus on building aesthetics, interiors, or individual architecture achievements, highlighting, for example, images of dazzling art galleries (Lepik, Zweite, and Burmester 2009; Macleod 2005; Cuttle 2007; Naredi-Rainer and Hilger 2004; Foster, Sudjic, and De Grey 2001). Cutting-edge aesthetics of museum additions have taken precedence over occupant experience and comfort. Altogether, the museum narrative so far has ignored areas where museum employees and volunteers perform their tasks (Giebelhausen 2006). It is uncommon to find research that combines environmental and workspace conditions in museums and almost none that addresses the post-occupancy experience of museum additions. The original Nelson-Atkins Museum of Art and its addition, the Bloch Building, are compared in this research because, among the diverse areas that this addition complemented and improved for the original museum, the absence of improvements in museum employees and volunteers' working conditions stood out during the post-occupancy evaluation (POE) in the previous study (Engineer and Anthony 2018).

A human-centered approach to understanding back-stage design and operations provides architects, planners, interior designers, and developers with reliable tools for addressing the needs of those who operate the museum on a daily basis. The evidence-based design findings of this research are informed by occupant perceptions and experiences. This study draws from the well-established interaction between space and its influence in human activities (Tabarsa and Naseri 2017) and presents new approaches to museum design after including the perceptions and experiences of a much-ignored user group—museum volunteers. It highlights the importance of including their voices in decisions regarding museum design and operations.

A previous study by the lead author included a post-occupancy evaluation (POE) that consisted of a survey of more than eighty museum staff members, including directors and administration personnel, curators, security officers, and others. This study also included an analysis of visitors' online reviews of the museum on popular travel websites. Participants expressed wide-ranging concerns about the museum's present and future direction with regard to design, operations, and maintenance issues (Engineer and Anthony 2018). This article describes a subsequent POE of museum volunteers—a group of more than 500 users who were not included in the previous study—in the same museum. Upon visiting the museum and observing the front and backstage spaces and operations, it was evident that working conditions for these unpaid personnel were not optimal (Engineer and Anthony 2018). Volunteers, some of whom had worked at the museum for more than thirty years, provided a valuable source of feedback for future design recommendations since many of them interacted closely with visitors as docents or as check-in or information staff. They were also active and engaged members of the community; several had participated in focus group discussions with the museum architect Steven Holl and the museum administration in the early stages of the new Bloch Building museum addition design.

In summary, the goal of this study is to critically analyze current museum design and planning guidelines that did not adequately take into account different employee operations in the backstage and frontstage of the museum. Volunteers provided valuable feedback that gave an insider's view of how various spaces in the front-stage and backstage were utilized and whether the current design and operations aligned with the mission of the organization. A set of inquiries is drafted with the intent of understanding why design priorities often include increases in art collections, endowments, and changes in technology while pushing workspace layouts, environmental systems, accessibility, and wayfinding to the back burner. This study uses a

human-centered approach to perceptions and experiences that provide evidence of the relationship among levels of occupant satisfaction, workspace design, and comfort. It hypothesizes that learning the perceptions, attitudes, and behavior of volunteers will lead to an understanding of the human impact of the overall spatial layout and quality of new museum building additions.

Research Design

This study builds upon previous research, which included participant observations, user interviews and surveys, and visitors' and experts' reviews of the Bloch building addition at the Nelson-Atkins Museum of Art. Findings from the previous POE of museum staff and visitors are compared to those revealed by the results of a volunteer survey, along with a new set of participant observations. They are used to inform design recommendations for new museums and museum additions in the future. A statistical analysis of the textual and multiple-choice responses from volunteers provided insight into perceptions and experiences that complemented on-site observations. It helped in understanding the relationship between employee satisfaction and the design of their workplaces. The goal is to apply human-centric and evidence-based design recommendations to art museums, additions, and workspaces. Through this POE, the study aims to provide best practice, guidelines, and policy for future art museums.

Participants

Museums of all kinds must include multiple voices that are relevant to their collections, practices, and operations. In their volunteers, the museum captures the voices from the local community. They provide museums with a valuable source of feedback for improving their design, administration, and operations. Museum volunteers make vital contributions to the mission and goals since they are authentic community representatives.

The targeted population for this study is that of museum volunteers in the Nelson-Atkins Museum of Art. The survey was offered to approximately 500 museum volunteers working in the museum on a rotating basis and eighty-one volunteers responded, resulting in a response rate of 16.6 percent. This response rate offered a 95 percent of confidence level with a 10 percent margin of error to the statistical significance of the study. It should be noted that volunteers in the Nelson-Atkins are unpaid personnel and they work in the museum because of their personal interest and investment in the arts, and the development of their local community and its resources. Volunteer experiences of working in the museum, therefore, are highly needed topics of conversation among professionals in charge of architecture design—especially in smaller, community museums such as the Nelson-Atkins which rely on them as a workforce for their daily operations. A systematic analysis of their responses was also a valuable source of feedback for improving marketing, human resources, production and operation processes in the Nelson-Atkins. Their diverse backgrounds and motivations to work as unpaid volunteers also made their input very valuable to the administration and decision makers for future improvements.

Problem Identification

Massive sums of money spent on design, construction, operation, and maintenance costs for museum additions require greater accountability of decision-makers and museum administrators toward their employees, visitors, patrons, and benefactors. Investment in renovations to allocate art reduces the deficit since it has been proved that both short and long visits to a museum always generate revenue through indirect spending in museum shops, cafes, etc. (Korjani and Namdar 2018). This is true not only at museums themselves but also in nearby areas (AAM n.d.).

However, revenues generated from rising museum attendance and sales are never enough. Museums require continual streams of significant funding in order to fulfill their role as stewards

of cultural heritage. In light of the pressing need for greater accountability to the public, therefore, future museum and expansion projects must put maximum emphasis on human welfare and human-centric design, based on credible collected evidence from systematic studies. New human-centered approaches via POE studies, for the design of new art museums and additions, are urgently required. Design aesthetics, scale, operations, and human comfort and context are elements that need to be in balance to avoid failure in museum design that may affect the interpretative process on new users (Claudio, Luca, and Luce 2018). The past, present, and future of the museum and its surrounding environment have to be considered along with the user experience (Tabarsa and Naseri 2017). Volunteers, in their different roles, have an informal employment relationship with the institution, which sometimes leads to unregulated working conditions and lack of amenities for their wellbeing. At the same time, their work performance is critical to museum operations.

For this research study, we seek answers to the primary question: How can post-occupancy evaluations of museums based on volunteer perceptions and experiences influence the design of museum backstage and frontstage spaces in order to create a more human-centered museum experience? The hypothesis of this study is that the answers to this question will lead to more successful, evidence-based design strategies for future museums and museum additions. The findings of this study are compared to post-occupancy studies of all other museum users.

Methods

The mixed method approach of this study includes a survey with textual and multiple-choice questions and uses field notes from participant observations of the site to add to the results, discussion, and conclusions of the study. The data collection and analysis looked primarily for relationships between the influence of the museum and museum additions (as a whole, as well as separate environmental variables) and the experiences and perceptions of workspaces in the backstage and frontstage, of museum volunteers. The survey was electronically distributed to the total population of 500 volunteers at the Nelson-Atkins Museum. The results prompted a set of recommendations to better answer to current design challenges and to better respond to the future socio-economic pressures on art museums.

Textual responses to the survey described the job duties of volunteers, their workspace locations, choices of best and worse spaces in the backstage private areas and front-stage, public areas, and proposed changes to improve the building addition. The responses were analyzed using keyword identification or keyword-in-context (Onwuegbuzie, Leech, and Collins 2012). This qualitative method for identifying words that contextually refer to similar situations or concepts allow grouping and quantification of these keywords. Once the keyword count allowed the identification of trends and patterns within the responses, the analysis proceeded to assign binary values allowing the use of Person Correlation Coefficient to determine relationships between different data variables, for example, the number of years working in the museum and having a specific workspace location.

The eighty-one responses to multiple choice questions showed rates in satisfaction and desirability towards characteristics of architectural elements and quality of the museum addition. The characteristics presented to the participants were: view of nature, view to outside, amount of daylight, amount of light, adequacy of space, acoustics, temperature, odor, aesthetic appeal, security, the flexibility of use, and accessibility for people with disabilities. These characteristics, along with the responses to the questions about the years that they have worked as a volunteer at the institution and the roles that they have executed, were found to be critical for describing areas of concern in workspaces during a few, selective in-depth interviews, and participant observations. The statistical evidence is presented using an analysis of variance (ANOVA) between the means of the overall satisfaction of workspace and the characteristics of these spaces. As a follow-up to the ANOVA, a t-Test Paired two samples as means is used to present

statistical evidence to describe how each characteristic individually relates to the concept of overall satisfaction workspace.

Results

From the eighty-one responses, six came from participants with less than one year of work experience at the museum, sixty had between one and ten years, nine between eleven and twenty years, and six between twenty-one and forty years.

Six participants identified themselves as a general volunteer, twenty as docents, two as employees in data entry, five as shuttle-cart drivers, two in administrative positions, and eight as museum guides. For questions such as “which workspaces in the museum are the best and why,” and “which workspaces in the museum are the worst and why,” the best spaces were identified as the library and the private offices of administrative personnel. Meanwhile, the lobby, the basement, and the volunteer private workspaces were identified as the worst, as shown in Figure 1 below.

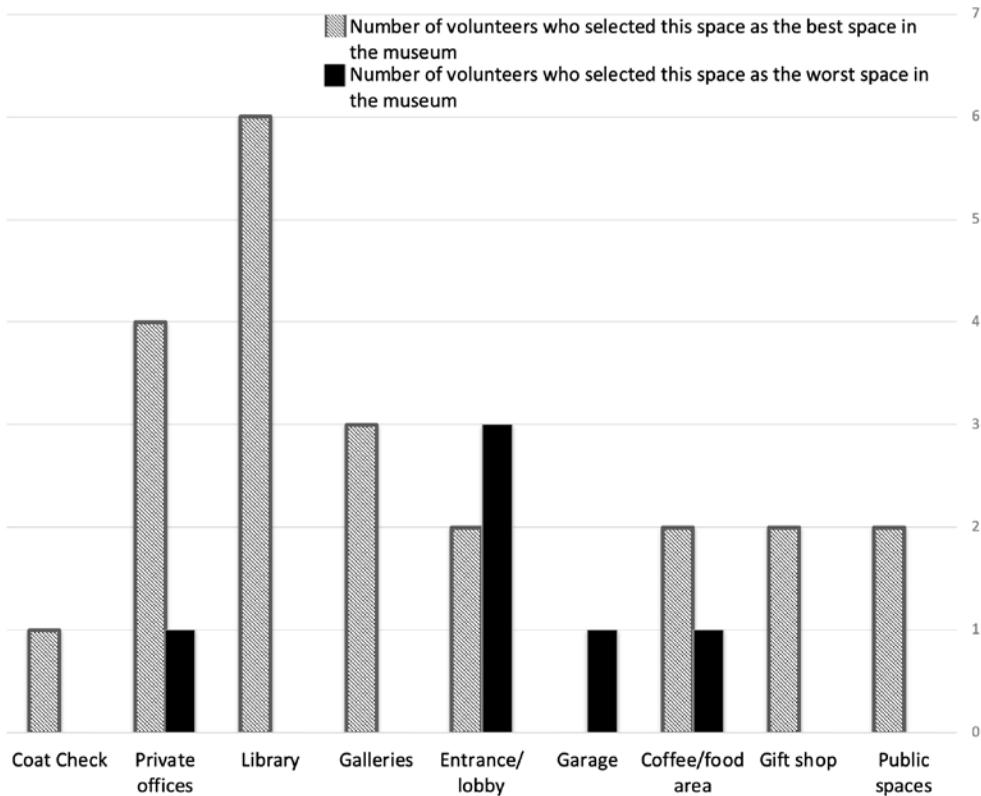


Figure 1: Contrasting Perceptions of Workspaces by Museum Volunteers at the Nelson-Atkins Museum
 Source: Engineer and Bernal

The participants listed multiple characteristics for a good workspace. They were sorted into eight main groups: adequacy of space, accessibility, daylight, adequacy of acoustics, sightline, temperature, airflow, and good aesthetics. The worst spaces to work, according to the participants, were characterized by a lack of adequate space, lack of accessibility, lack of daylight, and poor sight lines. When the participants were asked what they would change if they

had an opportunity to change one thing in the Bloch Building, they mentioned better signage, fixing roof leakages, providing adequate acoustics, better temperature control, adequate lighting, more space allocation for different functions, and better, more advanced technology. The lack of signage in circulation areas was the most popular response.

The correlation between years working at the museum and being assigned to a specific workspace location was found to be insignificant ($p < 0.05$). The correlation between years working at the museum and identifying the need for physical change to the addition was also insignificant ($p < .05$).

The ANOVA applied to the means of every response (μ_1 to μ_{13}) in Table 1, demonstrate that, since P-value is larger than 0.05 the hypothesis: “the overall satisfaction of workspace (μ_1) rate is statistically equal across the characteristics presented in the multiple-choice questions (μ_2 to μ_{13})” is rejected. These results indicate that at least one of the values does not have the same rate as μ_1 overall satisfaction of workspace.

Table 1: One-Way ANOVA

<i>Groups</i>	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>
μ_1	55	306	5.56	3.51
μ_2	55	289	5.25	5.49
μ_3	55	284	5.16	6.25
μ_4	55	294	5.35	6.01
μ_5	55	310	5.64	3.98
μ_6	55	282	5.13	3.71
μ_7	55	274	4.98	4.09
μ_8	55	278	5.05	3.57
μ_9	55	298	5.42	3.28
μ_{10}	55	283	5.15	4.35
μ_{11}	55	299	5.44	4.21
μ_{12}	55	271	4.93	4.70
μ_{13}	55	264	4.80	4.46

Source: Engineer and Bernal

The result to the t-Test: Paired Two Sample for Means Correlations indicates how it is the overall satisfaction of workspace (μ_1) compared to each of the values in μ_2 to μ_{13} . Table 2 shows P values in the one-tail and two-tail columns that are less than 0.05. These values indicate what characteristic is closer to μ_1 overall satisfaction of workspace (Table 2).

Table 2: t-Test: Paired Two Sample for Means Correlations

$\mu 1$	$\mu 2$	$P(T \leq t)$ one-tail	$P(T \leq t)$ two-tail	Pearson's Correlation	Interpretation
Satisfaction with the overall work space	Satisfaction with the amount of view of nature	0.07	0.14	0.76	closely correlated
Satisfaction with the overall work space	Satisfaction with the view to the outside	0.04	0.09	0.74	closely correlated
Satisfaction with the overall work space	Satisfaction with the amount of daylight	0.15	0.30	0.78	closely correlated
Satisfaction with the overall work space	Satisfaction with the amount of light	0.16	0.32	0.96	correlated
Satisfaction with the overall work space	Satisfaction with the Adequacy of space	0.03	0.06	0.62	somehow correlated
Satisfaction with the overall work space	Satisfaction with Acoustics	0.01	0.02	0.59	somehow correlated
Satisfaction with the overall work space	Satisfaction with Temperature	0.02	0.04	0.55	somehow correlated
Satisfaction with the overall work space	Satisfaction with Odor	0.28	0.57	0.49	half way correlated
Satisfaction with the overall work space	Satisfaction with the Aesthetic	0.05	0.10	0.81	closely correlated
Satisfaction with the overall work space	Satisfaction with Security	0.31	0.62	0.55	half way correlated
Satisfaction with the overall work space	Satisfaction with Flexibility of use	0.01	0.02	0.55	half way correlated
Satisfaction with the overall work space	Satisfaction with Accessibility	0.01	0.01	0.43	almost not correlated

Source: Engineer and Bernal

As shown in Figure 2 below, the results of the Pearson’s correlation indicate that the amount of view to nature, view to the outside, and amount of daylight are characteristics that have same levels of concern by volunteers when describing their overall satisfaction with the workspace. Meanwhile, accessibility is less likely to be a factor that alters volunteers’ perceptions of overall satisfaction with their workspaces.

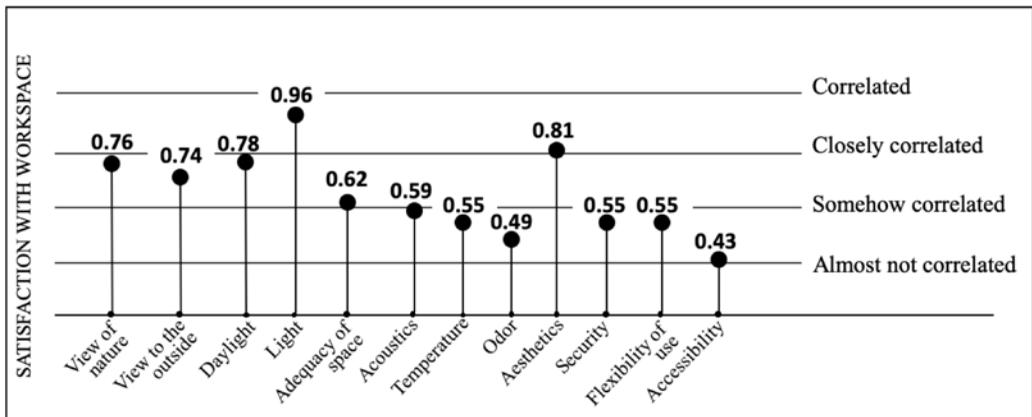


Figure 2: Correlation of Means with Satisfaction with Workspace

Source: Engineer and Bernal

Figure 3 summarizes the major findings from observations, characteristics of comfort described in the survey responses by volunteers, and their perceptions of worst and best workspaces, as well as the spaces that need to be changed in some way. These findings had the following highlights:

- a) Lighting, including that from natural and artificial sources, influences the perception of a good or bad space. It is a characteristic that it is closely correlated to the description of comfort and may be currently in need of attention at the Nelson Atkins Museum.
- b) Sightlines, including views to nature, to the outside, and to the exhibits, are largely seen as a characteristic of a good workspace. It is also important to the perception of comfort and may influence the perception of a bad workspace.
- c) Space (scale and volume of one’s workspace) is a characteristic that may influence the perception of a bad or good workspace. It is also moderately correlated to the concept of comfort.

Acoustics and temperature also follow similar trends, while air quality and aesthetics are correlated to the concept of comfort but not used in descriptions of good or bad spaces. Finally, accessibility, while clearly identified as a characteristic for bad spaces, is also the least correlated to the perception of comfort.

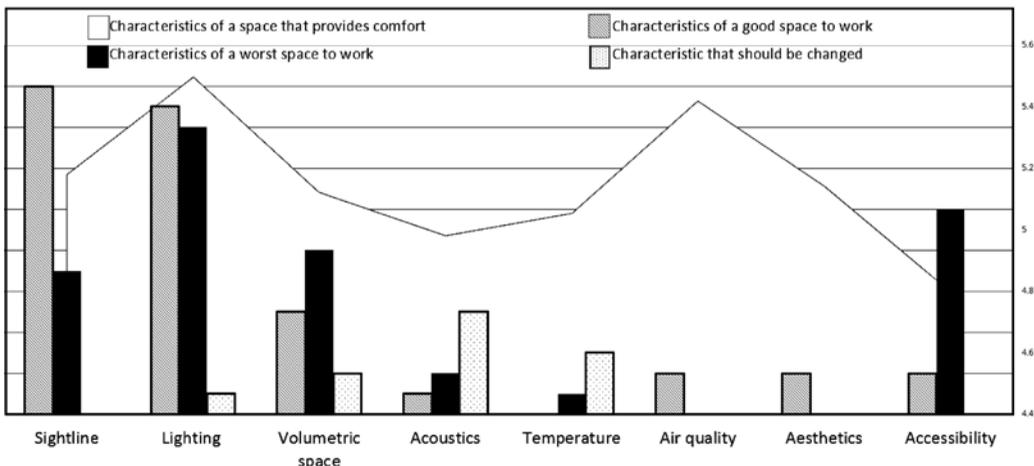


Figure 3: Overlapping Characteristics with Perceptions of Works Space
 Source: Engineer and Bernal

Discussion

The findings from this POE of museum volunteers matched closely with those from the POE in a previous study by the lead author of all other museum staff, which included administration personnel, curators, library and human resources personnel, cafeteria employees, security officers, and other museum staff members. Volunteers’ descriptions of their job positions revealed a diverse set of assignments and responsibilities that required a variety of workspace types. Findings from observations and the survey of spaces that required improvements, however, revealed that the criticism of these spaces was independent of the duties of the volunteers. Job-related duties and number of years/months the volunteers had worked at the museum were analyzed to check as of whether they influenced the criticism of museum spaces. The number of years worked at the museum was useful to determine whether seniority was taken

into consideration to assigning work duties or workspace locations. No significant relationships were found between these data variables. The study followed other inquiries to establish how the volunteers can effectively be considered in a human-centric approach to museum design satisfying the different type of experiences (Claudio, Luca, and Luce 2018).

Daylight and sightlines were found to be leading factors influencing volunteers' overall perception of workspaces. This interpretation is validated by analyzing the list of characteristics in survey responses that make a best (good) or worse (bad) space to work. The result was also found to be consistent with several previous studies showing that the flexibility of space and available storage in workspace contribute directly to satisfaction and worker performance (Korjani and Namdar 2018). Observations in previous visits revealed that crowded offices and obstacles preventing easy access to workspaces were a major problem. It was not surprising, however, that lighting, both natural and artificial, is important and needs to be studied thoroughly during the design of any building. Daylighting in museums, especially, must be carefully designed for the preservation of art. It was found that natural light may have been completely avoided in many museum spaces in order to meet preservation standards. Volunteers pointed out that daylighting for the wellbeing of museum staff, was also a necessity. A museum can effectively serve the functions of both, effective preservation and workplace daylighting strategies across different front-stage and backstage areas. It leads to positive psychological and physiological impact on its workers, as well as more positive workspace perceptions (Al-Sallal et al. 2018).

Clear sightlines, especially to art and nature, may introduce new design approaches incorporating concepts of bionic architecture since it is believed that integration of beauty and nature leads to improving the building environment for its occupants (Farokhizad and Sabernejad 2016). Besides the benefits to working conditions, visitor experience also benefits from better views to and from all the spaces of the museum, including exhibition rooms (galleries). Also, safety is enhanced and there are more possibilities for interactive and educational activities which are beneficial to families with children (Larson 2017).

Design Recommendations

The findings from this study of volunteers along with the previous study of all other museum staff and visitors led to data-driven and human-centered strategies to improve the design of spaces in private backstage areas as well as public, frontstage areas of the museum. They resulted in a set of general design recommendations for future art museums and new building additions. Only some of these recommendations may be feasible improvements for the Bloch Building at Nelson-Atkins Museum of Art, given that it is already constructed and running for twelve years. Some could also be implemented in a limited capacity. Most importantly, these recommendations build on existing knowledge and address gaps in already-published planning, design, and operations guidelines for museums.

A: Visual Communication

Items that need improvement: Circulations, wayfinding, and signage.

Location: Frontstage visitor areas as well as backstage work areas.

Purpose: Visual communication serves multiple purposes including safety, by improving the visibility from one room to another. This supports surveillance, energy savings through the use of direct or indirect daylight from courtyards or common areas, wayfinding by letting people see what it is next from their location and—if the exhibition requires—good wayfinding to avoid the use of signage which interferes with the aesthetics of spaces and exhibits.

Example: Providing sightlines to and from different types of spaces by alternating spaces with different sources of lighting, integrating different colors and textures in walls and floor finishes, and providing dynamic transitions across the museum. The better design of visual

communications also allows for improved interactions between backstage operations while remaining hidden from visitors as much as possible.

B: Interaction between Indoors and Outdoors

Items that need improvement: Physical and visual connections.

Location: Indoor and outdoor spaces.

Purpose: Better connectivity between indoors and outdoors would allow the strategic integration of gardens, courtyards, and better views when possible. Nature brings new color pallets to the artificial environments; brings freshness, and benefits air quality and shading; and provides opportunities to break rigid patterns from exhibit elements (panels, lighting fixtures, frames, and others). Improved daylighting strategies could add to energy savings, improve occupant satisfaction and wellbeing, and better regulate circadian rhythms. While daylighting raises art conservation concerns in museum galleries and certain workspaces such as art conservation work areas, the art galleries in the Bloch building addition of the Nelson-Atkins Museum of Art demonstrate how these strategies could work with careful management and design to optimize both occupant experience, and art conservation needs.

Example: If planned carefully with daylighting, check-in, and security surveillance strategies, opening to the outdoors may provide more opportunities for improved visitation for the museum's collection.

C: Control of Physical Barriers

Items that need improvement: Long distances, crowded spaces, accessibility needs, and improving lighting and acoustics.

Location: Workspaces and amenities, such as restrooms, break areas, or parking lots.

Purpose: Occupied spaces in the museum should have optimal indoor environmental conditions, which include accessibility for people with special needs, adequate lighting, odor and noise control, and other aspects that are most affected by the presence or the absence of physical barriers. The barriers as observed in this study, such as long distances and excessive or inadequate furniture, are mostly due to generic design principles for workspaces that do not satisfy individual or specific work needs.

Example: Designing multiple workstations across the museum, possibly near transitional spaces, will contribute to shortening distances and will distribute activities currently concentrated in centralized workspaces. It would help reduce storage in desks, shelves, cabinets, and reduce long corridors, which will benefit accessibility and lower stress levels.

Conclusions

The research findings call for cross-disciplinary collaborations of design teams and leadership skillsets. Physical requirements of accessibility and human comfort are critical to participants. The findings indicate that new approaches to museum design are urgently needed. Volunteers in their different roles are, because of their numbers and diversity, a population that should be better included in any decision with regard to design, accessibility, way-finding, operations, maintenance, and museum management. Volunteers may or may not get recognition for their work and are usually unpaid, but are valuable resources all the same. Based on the fact that their interest in volunteering may be motivated by their own previous experiences as visitors, the voices of volunteers are critical in informing human-centric approaches to evidence-based museum design.

Findings of this study indicate that the spatial needs of employees in backstage areas are often overlooked as compared to frontstage areas. Greater sensitivity to the needs of these employees and minor improvements to designs of these spaces even after occupancy may reduce absenteeism and turnover. Recommendations to positively influence occupant perceptions and

experiences of museum backstage and frontstage spaces are organized into three types based on the findings of this study: visual communication, interaction between indoors and outdoors, and control of physical barriers. These recommendations are necessary investments for the long-term wellbeing of occupants. Conducting human-centered research studies and continually making efforts to improve museum backstage and frontstage spaces will promote active participation and wellbeing of museum volunteers, permanent staff, and visitors. Identifying and anticipating occupant needs in advance, during the early stages of design will result in museums that are conducive to health and wellbeing.

With new additions come new problems, often unanticipated and hard to imagine until construction is complete. This study aims to serve as a catalyst for change. It challenges future decision-makers—whether they are museum administrators, museum boards, architects, or designers—to do better. As the findings reveal, the state of the occupants needs the same attention as the state of the art.

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