
edra core
improving environments through research excellence

2017
RECIPIENT PROJECT
PROFILES

edra
Environmental Design
Research Association

ABOUT CORE

Practitioners who conduct design research as part of their work have much the same interest as academic researchers in receiving validation and credit for the quality of their research efforts. Currently, the credibility of academic research is judged on the basis of well-established protocols and peer-review processes generally associated with the publication of scholarly articles describing their research. However, this means of recognition is not normally available to design professionals, who tend to be focused on project delivery and business, and are less likely to prepare formal scientific reports. The response to this situation, developed by the Environmental Design Research Association (EDRA), is the Certificate of Research Excellence (CORE) program. CORE is a structured evaluation program based on criteria—applied by trained experts—to confirm the quality of practice-based design research.

CORE recognizes rigorous and impactful practice-based design research that sparks innovation and promotes best practice in environmental design.

EDRA CORE's unique evaluation framework:

- Identifies practice-based environmental design research that is not only rigorous, but also offers measurable value, meets industry challenges, and advances design thinking;
- Recognizes the importance of research in practice;
- Provides a compass to guide designers, researchers, organizations, and manufacturers in their research and evidence-based design efforts; and
- Builds on EDRA's tradition of inquiry, reflection, and collaboration and its commitment to innovation.

2016-17 was the second of three pilot years for the EDRA CORE program, with five projects earning CORE recognition.

CAMPUS CAPITAL FRAMEWORK: MAPPING MEANING TO INFORM THE MICHIGAN UNION RENOVATION

[Workshop Architects](#), University of Wisconsin Milwaukee, School of Architecture & Urban Planning

Research team: Brian Schermer, Jan van den Kieboom, Peter van den Kieboom, Nick Robinson, Sweta Meier

The University of Michigan-Ann Arbor commissioned a programming and conceptual design study to revitalize its historic Michigan Union. The process was organized to reach the broadest possible constituency of students so that the findings would reflect the collective voice of the campus community. The social research portion of this project pioneered a new line of inquiry, called the Campus Capital Framework (CCF), which along with other collaborative inquiry, substantially informed key decisions.

The CCF is an online, participatory mapping survey that assessed the significance that students attribute to the Michigan Union and other important places on campus. The framework provides a means to measure student perceptions of a university's physical campus in terms of places that help generate four forms of capital: (1) social, (2) intellectual, (3) symbolic, and (4) restorative.

Results showed that the Michigan Union not only ranks among the most significant places on campus, but is also the only place that ranked among the top settings for each form of capital. These findings provided administrators and designers with a baseline measure of place meaning on campus for the Michigan Union and future campus planning projects, and a basis for future post-occupancy evaluation.

Despite its status as a beloved icon, students expressed a strong desire for the building to play an even more significant role in their college experience. Through other collaborative inquiry, including focus groups, intercept interviews, workshops, and additional online survey questions, students advocated for a revitalized center for student life that would reflect their most cherished values: inclusion and activism. Further, they felt that these values could best be actualized by positioning the Michigan Union as a place to: (1) help students find their niche, (2) turn for comfort, care, and social support, (3) inspire campus pride and a sense of history, (4) foster involvement, collaboration, creativity, and debate, and (5) study while maintaining social connections.

Taken together, the CCF and other collaboration provided the basis for critical programming and design decisions, which included: investment in additional social lounge and study space; improved and updated space for wellness, counseling, and care; a state-of-the-art Idea Hub to facilitate student initiative and involvement; and restoration of the building's gracious proportions, pathways, and character. It also validated investment in key architectural design moves, such as creating an enclosed, light-filled courtyard in order to expand lounge and study areas, strategic rezoning of social and involvement spaces to the ground and second level, and restoration of the interior's gracious proportions and pathways.

Read the full [Michigan Union Renovation](#) report.

EVALUATING HIGH-PERFORMANCE DESIGN STRATEGIES TO IMPROVE EDUCATIONAL PERFORMANCE AND OCCUPANT WELL-BEING: A COMPARATIVE PRE- AND POST-OCCUPANCY EVALUATION OF A SCHOOL IN CAMBRIDGE, MASSACHUSETTS

[Perkins Eastman](#)

Research team: Emily Chmielewski, Katie Herber, Heather Jauregui, Sean O'Donnell, Jana Silsby

In the summer of 2015, an interdisciplinary team of practice-based design researchers, sustainability specialists, leaders in K-12 design, and school administrators joined together to conduct a comparative pre- and post-occupancy evaluation of a pilot project that co-located a middle school, elementary school, and preschool within one building. The study was performed in order to confirm successful achievement of the project's design goals and to understand if and how high performance design strategies impacted building occupants' well-being and performance. The study was also used to test a process for a standard practice of facility evaluation within the K-12 practice of our design firm.

We evaluated two pre-occupancy sites that were being used as swing spaces for the school district, and one post-occupancy site: the newly designed and built Dr. Martin Luther King, Jr. School located in Cambridge, MA. In both the pre- and post-occupancy evaluations, we explored many aspects of student and staff satisfaction, performance, wellness, and other psychological and physiological experiences. Our methodology included before and after questionnaires, archival data review, and on-site quantitative measurements of the indoor environment.

Through this comprehensive pre/post-occupancy evaluation process, we were able to collect qualitative and quantitative information that compared actual indoor environmental quality metrics against occupant perceptions. We found that the high performance design strategies employed in the design of the new school not only had a significant impact on occupant satisfaction, but also had measurable impact on building performance. These findings tie high performance design strategies to improved building performance and increased satisfaction, bringing the theoretical value-add proposition for high performance design into reality.

The study's findings were shared with the project's designers and client, as well as the K-12 industry at large to advance best practices. The study has many benefits for a major school district, including: justification of major capital expenditure; accountability to constituents and stakeholders; and design guidance for replication or fine-tuning for future schools, which can also contribute to greater efficiencies in future spending. Furthermore, because the study was intended to formalize our design firm's practice of pre/post-occupancy evaluations, we are now able to replicate this process in the future and continue to grow our knowledge-expertise and share our thought-leadership with others in the industry.

Read the full [Perkins Eastman](#) report.

NEURAL CORRELATES OF NATURE STIMULI: AN FMRI STUDY

[Sky Factory, Inc.](#) and [Texas Tech University](#)

Research team: Debajyoti Pati, Michael O'Boyle, Cherif M. Amor, William Witherspoon, David A. Navarrete, Jiancheng (Richie) Hou, Shabboo Valipoor, Dan Fang

The objective of this investigation was to explore brain activation patterns in healthy adults when viewing specifically designed images of the sky (images used to create a more complex visual phenomenon—illusory views of open space) as compared to other types of images, including nature images.

The study was designed to identify areas of the brain uniquely activated by photographic sky compositions specifically designed to evoke a familiar spatial reference frame based on a universal multi-sensory experience (the experience of looking up at the sky from a secure vantage point under foliage) as compared to other general positive, negative, and neutral images. These specifically designed Open Sky Compositions are produced by a fine art design studio of illusions of sky (simulated views to open sky staged to look like real skylights).

Prior to this study, there was no conclusive evidence that verified the experience of patients who reported a sensation of expansion when viewing specifically designed sky imagery. A substantial body of research has used behavioral and physiological indicators to measure the positive impact of nature exposure on health and well-being. However, the exact neural mechanism underlying these positive influences has so far eluded environmental design researchers and practitioners. Understanding these mechanisms is of both scholarly and professional importance.

From a scholarly perspective, the use of neuroscience theories and techniques offers the expansion of environmental design into empirically driven objective studies that will supplement the (mostly) subjective methods used currently. It creates an additional avenue for triangulation within environmental design research, and greater granularity in understanding the associations between the built environment and its occupants. This methodology also shed light on the neuroarchitecture of perception, confirming that an alternate experience of interior space is possible when imagery is designed to evoke a familiar spatial reference—spatial relationships that our memory readily recognizes—over ad hoc representational scenes.

From a design practice perspective, because all design disciplines essentially manipulate visual stimuli, understanding neural responses to positive and negative environmental stimuli (and the relative magnitudes associated with different design options including those involving nature scenes) could eventually enhance evidence-based design decision making.

Read the full [FMRI Study](#) report.

ON-STAGE/OFF-STAGE CLINIC DESIGN: IMPLICATIONS FOR OPERATIONAL EFFICIENCIES, STAFF COLLABORATION, AND PRIVACY

[HGA Architects and Engineers](#)

Research team: Kara Freihoefer, Len Kaiser, Dennis Vonasek, Sara Bayramzadeh

The purpose of this study was to understand how two different ambulatory care centers (ACC) designed modules—on/off-stage and linear—impact the amount of time clinic staff spent communicating with other clinic staff; operational efficiency of clinic staff (as measured by distance and time spent traveling, and patient throughput); and patient perception of privacy. It is hypothesized that on/off-stage modules improve operational efficiency, patient throughput, staff collaboration, and patient privacy. In effect, the on/off-stage module is expected to become more popular in the coming years (Cadenhead & Anderson, 2010); however, to date no study exists to support these assumptions.

Delivery of healthcare is greatly shifting to ambulatory settings because of preventative care and reimbursements incentives under the Affordable Care Act. It is anticipated that outpatient services will grow roughly 15 to 23 percent within the next ten years (Sg2, 2016). Nonetheless, there is limited research that evaluates how the built environment impacts care delivery and patient outcomes.

This was a cross-sectional, mixed-method study that included shadowing clinic staff, and observing and surveying patients. The linear module had shared corridors and publicly exposed workstations; whereas, the on/off-stage module separates patient/visitors from staff with dedicated patient corridors leading to exam rooms (on-stage) and enclosed staff work cores (off-stage). Roughly 35 hours of clinic staff shadowing and 55 hours of patient observations occurred. A total of 269 questionnaires were completed by patients/visitors.

The results demonstrate that the on/off-stage module significantly improved operational efficiencies such as reduced time spent and distance traveled. Findings also indicate face-to-face communication among clinic staff did not change, but a majority of these interactions occurred in the private off-stage core. This helps prevent the likelihood of private patient information being overheard by others. However, patients' perception of privacy did not change among the two modules. Furthermore, patient throughput times had significantly decreased in the on/off-stage module. A majority of the reduction was attributed to shorter wait times in the waiting area and in the exam room.

Compared to a linear module, the on/off-stage design demonstrates promising evidence that optimizes operational efficiencies, staff workflow, and patient throughput. These particular measures are imperative to justify the added construction cost of an on/off-stage module. For example, quicker throughput times allow physicians to see more patients throughout the day, increasing potential revenue.

Read the full [Implications for Operational Efficiencies, Staff Collaboration and Privacy](#) report.

REVITALIZING UNDERUTILIZED SOCIAL-STUDY AREAS IN A STUDENT RESIDENCE HALL

[TreanorHL](#)

Research team: Sharmin Kader, Nadia Zhiri, Kent Spreckelmeyer, Malia Bucher, Joellen Tipton

Social interaction and a sense of community among students in a residence hall play a vital role in student well-being and academic success. Thus, social-study areas in a residence hall play a significant role in providing places where students can unload their experiences and stress with their peers. But in today's residence halls, the interactions between hall-mates have significantly reduced due to several reasons: availability of more semi-private suites, in which students are spending more time in their private rooms, and their dependency on internet-based virtual world. Also, the traditional design concepts have a gap in addressing the current needs and have ended up creating underutilized spaces.

The need to identify innovative design solutions that invite students for more utilization is evident. To fulfill this goal, the study considered experimentation with various design interventions to create an attractive environment for students such as adding privacy—curtains, providing comfortable furniture, and creating a living-room or café style arrangement.

A quasi-experimental research design with a mixed method of data collection was considered. Data collection included interviews, observations, and surveys. A 300-bed residence hall which has six similar underutilized study areas was selected for this investigation. Among these six areas, five were changed per the research plan during the spring break. Data were collected twice: before changes and after changes.

The results show that students utilize study areas almost twice as much if the environment is attractive and comfortable to them. Most of the interventions increased the student utilization rate, satisfaction rate, social interaction, and a sense of community. Some new and interesting findings were revealed. For example, a good number of students reported that they do not like having daylight or a window view in their study areas because these features are distracting to them during study. Students also like a variety of style in study areas instead of similar ones on each floor. These diversities also increased social interactions among students from different floors.

In summary, a list of significant design criteria has been recommended: create an intimate and warm environment; provide comfortable, attractive, and flexible furniture to create multiple desirable arrangements; design semi-privacy with enough sense of enclosure and having a visual connection with circulation; provide a stimulating factor such as TV, or white board; create a focal point (e.g., a hearth) to encourage intimate gathering; promote tangible traditions such as artwork of school spirit; and allow natural light and views with a control system. The study also suggests three different types of layouts. This study carries great significance for the designer and housing professionals to create a new hall or renovate an old one.

Read the full [Student Residence Hall](#) report.