Evidence-Based Design and Eco-Effective Design: Removing the Barriers to Integration

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Eco-effective design and evidence-based design are significant trends currently shaping healthcare architecture (Shepley, Baum, Ginsberg, & Rostenberg, in review). Eco-effective design refers to the design and operation of buildings to support improved ecological health and indoor environmental quality (MBDC, 2008). Evidence-based design refers to the design and operation of buildings to support positive health outcomes in hospitals through a growing collection of solutions informed by research and practical knowledge (Hamilton, 2003). Although both trends have had a significant impact on recent healthcare architecture (Klein, 2007), they are generally executed separately and are considered by some to be at odds with one another (e.g. Harvie, 2006; Teske & Mann, 2007). The principal investigators consider both evidence-based design (EBD) and eco-effective design (EED) to be highly relevant to healthcare design today, as both strive to attain positive outcomes in human and/or environmental health. As such, the purpose of this study is to better understand if and how these two design goals and strategies intersect, and to remove barriers to integration by identifying real and perceived conflicts and synergies.

RESEARCH METHOD

The research was approached through a series of phases in which the outcomes from each phase provided input for subsequent phases. (See Addendum 2 for an elaborated discussion of the research methods.) In Phase 1, researchers used advisory groups of experts on EBD and EED to provide direction on the facilities to be used for the Phase 2 survey and the content of the Phase 3 survey questions. In Phase 2, researchers emailed a list of “centers of excellence” in EBD and EED to national experts in EBD and EED; the national experts selected the facilities that represent best practice in each area. In Phase 3, the researchers sent a survey on the relationships between EBD and EED to one

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1 William McDonough and Michael Braungart coined the term “eco-effective” in and define it as “The strategy for designing human industry that is safe, profitable, and regenerative, producing economic, ecological, and social value” (MBDC, 2008). See Addendum 1: Discussion of Language for additional discussion.
healthcare administrator at each facility identified in Phase 2. In Phase 4, researchers conducted a literature review on each facility for which an administrator responded to the Phase 3 survey.

KEY FINDINGS

From the results of the Phase 2 survey, the researchers identified 9 EED and 9 EBD best practice facilities to be surveyed in Phase 3. Of the 18 administrators surveyed, 16 responses were received: 8 from EBD facilities and 8 from EED facilities.

The Phase 4 survey results suggest that EBD and EED are mostly compatible, but that some specific strategies of one conflict with the goals of the other. About half of the administrators at each set of facilities said that EBD and EED are mutually supportive. About 10% said that EBD and EED conflict with one another. The remaining 40% said that the two design practices bore no relationship to one another, or that the relationship was not applicable to their facility. (See Addendum 3, Figure 1.)

Overall, healthcare administrators said that EBD is playing a larger role than EED is in clinical/administrative decisions at both sets of facilities and in the design of EBD facilities. Also, both EBD and EED play a more significant role in the design process than they do in clinical/administrative decision making. (See Addendum 3, Figure 2.)

While strategies related to indoor environmental quality overlap, most other EBD and EED issues bear no relation to one another or, in a few cases, are in conflict. Healthcare administrators found the strategies “connection between building occupants and nature,” “use of healthy building materials,” and “daylight/views in staff/patient spaces” to be synergistic between EBD and EED. Two EBD measures
were identified as being in conflict with EED: “staff supportive design” and “appropriate acoustics and lighting.” Three EED strategies identified as being in conflict with EBD: “sustainable landscape and/or stormwater design,” “improved water efficiency,” “reuse of rainwater or graywater” and “mechanical system and ventilation design for improved indoor air quality.” (See Addendum 3, Figure 3.)

The literature review confirmed the majority of these findings. Most articles that directly covered both EBD and EED address them separately, either in separate sections or sidebars (e.g. Eagle, 2005, Klein, 2007). Some articles discuss relationships between specific EBD and EED concepts or strategies, without direct reference to the larger design approaches. In these instances, almost all of the synergistic strategies and some of the conflicting discussed in the articles reviewed are similar to those identified by the Phase 4 survey (e.g. Schwartz, 2007, Guenther and Hall, 2007).

CONCLUSIONS

This pilot research project suggests that most healthcare administrators in EBD and EED “centers of excellence” consider EBD and EED to either be synergistic or not in conflict. Of the conflicts that the administrators identified, some are real. For example, some building codes do not allow for the reuse of graywater inside of hospitals. However, some conflicts identified may be based on perception rather than fact. For example, good acoustics supports good indoor environmental quality – a fundamental goal of EED\(^2\). It is critical for design teams interested in implementing both EBD and EED to dig deeply, beyond immediate perception, into the relationships of the strategies, and to do so early in the design process. In addition, those interested in implementing EED might consider tying it to synergies with EBD, as EBD is perceived to have a more significant role in facility design than EED has.

\(^2\) Though the strategy may be an EBD-EED synergy, the problem with acoustics in green buildings is real. Despite the fact that it impacts indoor environmental quality, many “green” buildings perform worse acoustically than their non-green counterparts (Abbaszadeh, 2006).
ADDENDUM 1: DISCUSSION OF LANGUAGE

This research stemmed from a need to understand the intersections between evidence-based design and sustainability, as Anshen+Allen Architects was an early adopter of both design practices in healthcare projects. The concept of eco-effective design was more recently introduced into the firm’s practice through a project teaming with William McDonough + Partners. William McDonough and Michael Braungart coined the term “eco-effective” and defines it as "the strategy for designing human industry that is safe, profitable, and regenerative, producing economic, ecological, and social value" (MBDC, 2008). Simply put, the focus of “eco-effective,” in contrast to that of “eco-efficient,” focuses on the creation of more good impacts of buildings rather than reducing negative impacts.

The philosophy of sustainable design, on the other hand, is driven by the need to address problematic outcomes resulting from standard construction practices during and following the industrial revolution. Sustainable development is defined in the 1987 Brundtland Report as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (United Nations, 1987). In other words, sustainable development is development that doesn’t cause problems for the future.

The principal investigators at Anshen+Allen Architects consider the eco-effective design concept of creating positive environmental impacts to have a stronger relationship with the goals of healthcare architecture than do the goals of sustainability. Eco-effective design and evidence-based design both strive to create increased positive outcomes, not fewer negative ones.
Given the philosophical alignment between eco-effective design and evidence-based design, the principal investigators chose to use eco-effective design over sustainable design for this research. However, the language of sustainability and sustainable design is prevalent outside of the profession of architecture, whereas the language of eco-effective design is less so. For the purpose of surveying healthcare administrators, the principal investigators used the term “sustainable design” when explaining eco-effective design. The survey was structured such that the use of one phrase over the other would not alter the survey results.
ADDENDUM 2: DISCUSSION OF METHODS

The research was approached through a series of phases in which the outcomes from each phase provided input for subsequent phases. (See Addendum 2 for additional discussion of the research methods.)

Phase 1: Advisory Groups. In the first phase, researchers convened advisory groups made up of experts on evidence-based design and eco-effective design with Anshen + Allen Architects. The advisory groups provided direction on the critical questions on the relationship between EBD and EED that would be addressed in the EBD-EED Survey. The advisory groups also identified names of built healthcare projects that they considered to represent “centers of excellence” in EBD and/or EED. The principal investigators augmented these lists of facilities with additional projects identified through a literature review.

Phase 2: Best Practice Facility Survey. In the second phase, researchers surveyed national experts in EBD and EED to identify the best of the EBD and EED centers of excellence. Twenty-six experts in each area were emailed a list of projects identified in the first phase. The national experts were asked to identify the top 10 facilities representing best practice in either EBD or EED hospitals. EED experts were only asked to consider EED projects, and EBD experts were only asked to consider EBD projects. The researchers used the results of this survey to identify best practice facilities to be surveyed in Phase 3.

Phase 3: EED-EBD Survey. In the third phase, the researchers surveyed healthcare administrators at the facilities identified in Phase 2. The administrators had been involved with or aware of the design
process and are currently involved with the operation of the facilities. The administrators were emailed a survey and had the option of responding either by email, phone or fax.

Phase 4: Literature Review. In the fourth phase, researchers conducted a literature review on each of the facilities whose administrators responded to the Phase 3 survey. The literature review focused on discussion by the design team and hospital administrators on the relationships between issues or strategies associated with EBD and EED. The majority of the articles were not peer-reviewed; as such, they only suggest the quantity and quality of knowledge available to design professionals engaged in healthcare architecture.
Figure 1. Support for EBD and EED.
Figure 2. Role of EBD and EED in building design and operation.
Figure 3. Impact of EBD and EED issues.
ADDENDUM 4: REFERENCES


ADDENDUM 5: BIBLIOGRAPHY


Phelps, A. *Enhancing the Performance of Healthcare Facilities Through Improved Building Envelope Design and Construction.*


ADDENDUM 6: ACKNOWLEDGEMENTS

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ADDENDUM 7: FORTHCOMING PUBLICATIONS

The research prompted the writing of a draft publication that has been submitted to a peer-reviewed journal for consideration. One of the principal investigators discussed the project at Healthcare Design 08, the annual Center for Health Design conference, on November 10, 2008 in Washington D.C., and a second principal investigator will be discussing it at Greenbuild, the annual US Green Building Council conference, on November 21, 2008 in Boston. Additional publications and presentations are expected to follow.
ADDENDUM 8: CONTACT INFORMATION

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