The Biophilic Clinic

Biophilic Design Guidelines for Improving Patient Health Outcomes in Dialysis Clinics

Jamie Ho, MSBPD Thesis Project 3-430

2 in every 1000 residents in the US have kidney failure each year, resulting in four-hour treatments in a dialysis clinic every other day for the rest of their lives. One missed dialysis session is considered dangerous and two consecutive missed dialysis sessions become life threatening. In collaboration with a dialysis organization and architecture firm in Washington State, this thesis develops a taxonomy of biophilic design scalars and investigates the relationship to patient and staff outcomes. Through an online survey, the biophilic design scalars were scored and ranked by dialysis patients, medical staff and experts in healthcare design. 20 dialysis clinics were then evaluated with the scalars to support statistical analysis of reported patient health outcomes, including patient absenteeism and hospitalization rates. A toolkit with the range of biophilic design strategies can incentivize the investment in biophilic clinics for improving patient health outcomes and working conditions.

The Biophilic School

A Toolkit of Biophilic Interventions for Schools to Enhance Student and Faculty Health and Performance

Kari Leif, MSBPD Thesis Project 3-430

School designs have a direct impact on both student and faculty outcomes, yet the current lack of funding for school facilities challenges both health and performance. Biophilic design is a growing field of design that offers significant opportunity to improve existing school environments with benefits for both students and faculty. Through case study research, this thesis proposes a toolkit of 42 biophilic retrofits for existing schools through a set of stakeholder cards that illustrate precedent, known impacts and relevance to high performance schools. A stakeholder card sorting study was conducted to establish perceived viability and impact. A toolkit of biophilic interventions for schools is critically needed to improve student and faculty conditions.
The Power of Data Analytics with Building Advanced Meter Data to Identify Significant Electricity Savings

Haipei Bie, Yinan Wu and Jinzhao Tian, MSBPD Thesis Projects (1-230)

Advanced meters offer deep insights into energy use in commercial buildings, revealing time of day, day of the week, month, season, and year-over-year changes in energy demands. This thesis uses machine learning and other data analytic tools to develop graphic explorations of base loads, peak loads, seasonal shifts, and start-up/shut-down times. After intensive database development and data cleaning efforts for a federal portfolio of 290 buildings with time series data from 2018, the graphic and statistical exploration of interval electricity use of individual buildings and portfolios of buildings supported the identification of goals and mentor buildings within the portfolio that would ensure significant electricity and carbon savings.

Day
Nation-wide average loads for occupied and unoccupied periods highlight buildings that use more than two times the average electricity use in seasons, primed for action.

Week
In the same climate zone and outdoor temperature band (5-10°C), “mentor” buildings can set goals for major portfolio electricity savings.

Year
LEAN Analysis reveals electricity demand rises with temperatures, as well as significant opportunities to learn efficiency from others in the same climate zone.