



Green and Healthy School Buildings

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CHOICE ARCHITECTURE

This term refers to the science of using environmental design, including building architecture and interior design, to “nudge” the choices we make and to help establish healthy default behaviors.



Manassas Park Elementary School,
VMDO Architects

The significant influence of school and classroom micro-environmental design on learning and social behaviors is well established and an area of ongoing education research.

In recent years, the green building industry has become increasingly interested in encouraging “green schools.” The impetus is to create school buildings that consume less energy and water, leave a smaller environmental footprint, and also take advantage of opportunities to foster social norms of environmental stewardship among children.

Recent advances such as Active Design Guidelines, which focus on building-scale features that can

help promote daily physical activity among occupants, highlight a parallel and potentially synergistic opportunity to optimize school architecture and interior design to help shape health-oriented attitudes and behaviors.

SESSION 2 of the workshop highlighted three examples of recent innovations in building-scale environmental design focused on promoting physical activity and healthy eating:

- Application of behavioral economics research (often popularized as “nudging”) to optimize food choice behavior through small-scale changes in school cafeteria design (Adam Brumberg, *Cornell University Food and Brand Lab*).

- Review of evidence related to the impact of classroom and other school interior design on learning performance and health outcomes (Caren Martin, *University of Minnesota*).
- Case study of Buckingham Elementary School, designed by VMDO architects in collaboration with a health research team (University of Nebraska Medical Center, University of Virginia); the project focuses on providing a theory-based healthy food environment and includes a robust prospective evaluation plan (Steve Davis and Dina Sorensen, *VMDO Architects*; Terry Huang, *University of Nebraska Medical Center*).

BEHAVIORAL ECONOMICS IN SCHOOL LUNCHROOMS: EXPLORING THE POTENTIAL OF “CHOICE ARCHITECTURE” TO INFLUENCE HEALTHY EATING CHOICES

One approach to influencing social norms and behaviors through changes in the design of the school micro-environments is exemplified by the work of the Cornell Center for Behavioral Economics in Child Nutrition Programs. Using research on human behavior and the tools of psychology, the Center conducts behavioral economics research focused on “choice architecture,” or changing the design of school lunchrooms to help “nudge” children to make healthy food choices.

Choice architecture relies on the developmental fact that the rational

Behavior Economics & School Cafeteria Design

KEY POINTS

- Behavioral economics research has particular relevance and potential for guiding health-oriented school design, particularly with regard to school spaces such as cafeterias.
- Children's food choice behaviors are less rational than adults, making spatial and visual presentation of healthy items frequently more important than characteristics such as price or nutritional value.
- Continued development of environmental design research focused on how behavioral economics techniques can help nudge children toward healthy food choices is needed.

side of decision-making is not fully developed in children. They make food choices based on factors such as taste, convenience, and visual effect rather than on price, healthfulness, or logic. Fortunately, most children can find some healthy foods to be appealing and acceptable. The trick is to make slight alterations in the school lunchroom environment so that healthy foods are prominently available and unhealthy foods are less available and less convenient. A second key principle is to allow children to feel they are making the choice, not that they are being told what to choose.

Behavioral economics research has many clear applications for helping architects address healthy food environments as part of the school design process. Many choice architecture changes related to the environmental design of school cafeterias and graphic displays are simple and inexpensive, yet proven to be effective:

- Put healthy items within reach or in areas of high traffic.
- Create speedy “healthy express” checkout lines for children who are not buying desserts or chips. (These express lines are a desirable alternative given the limited time children have for lunch.)
- Retain the use of trays. (Children who don't use trays tend to leave

the salad behind because their entre and drink fill up both hands.)

- Provide choices between healthy items (carrots AND celery, not carrots only).
- Move the salad bar so that it is next to the cash registers.

DESIGNING SCHOOL INTERIORS FOR LEARNING AND HEALTH

Interior design focuses on planning and designing interior spaces to meet people's physical and aesthetic needs, and takes into account health and safety concerns, among other considerations. It is a collaborative activity that works with landscape architecture, architecture, urban planning, land surveying, engineering, and graphic design. It also is an integral component of the human ecosystem model, which considers all the external factors that influence human behavior and health.

Interior design can play a role in childhood obesity prevention in a number of important ways:

- Physical elements, such as circulation hallways, well ventilated and naturally lit classrooms and gyms, and plentiful open gathering spaces, can provide increased opportunities for physical activity.



CASE STUDY

SCHOOL BUILDING AS A CATALYST FOR CHANGE: BUCKINGHAM ELEMENTARY SCHOOL (BUCKINGHAM, VA)

Buckingham County, Virginia, is located in the center of the state, approximately 63 miles from Richmond and 45 miles from Charlottesville. The Buckingham County School Board has joined forces with VMDO Architects and health researchers from the University of Virginia and the University of Nebraska Medical Center to renovate and expand two adjacent elementary schools to provide an optimal school environment for healthy, “food-smart” children. The project will be completed in Spring 2012.

The design for the school renovation was developed using novel theory-based guidelines created collaboratively by the design and health research teams. The design focuses on:

- Promoting fresh and healthy food choices.
- Engaging the school community in food production.
- Nudging the school community toward healthy eating behaviors.
- Promoting awareness of healthy and sustainable food through signage and links to the curriculum.

- Articulating school spaces as community assets (such as by creating a community garden or holding a farmer's market on school grounds).

The project involves renovating and connecting the two schools, built in 1954 and 1962. The new configuration will consist of one school, Dillwyn Elementary School, with two buildings (K-2 and 3-5) that have separate identities but shared resources. The center of the new school community is an inviting gateway to the landscape beyond. In addition, the buildings include a variety of elements that encourage physical activity and healthy food choices, incorporate nutrition and physical activity into the curriculum and all aspects of the children's lives at school, and invite the surrounding community to share in this learning. Elements of the new school include:

- A public plaza in front of the school that provides space for community and 4H activities (connecting parents and the community with the school).
- A community room inside the school that can be used for a variety of activities, from lectures to

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CASE STUDY
**SCHOOL BUILDING AS A CATALYST FOR CHANGE:
BUCKINGHAM ELEMENTARY SCHOOL (BUCKINGHAM, VA)**

- yoga sessions (providing space for a wide range of learning experiences and shared activities with the community).
- A Food Lab Lounge next to the cafeteria that can be used for small group learning sessions around food (allowing children to discuss and learn about what they are seeing and experiencing directly).
- A teaching kitchen next to the cafeteria kitchen (creating opportunities for hands-on learning about the full life cycle of food, from planting, tending, and harvesting to preparing and serving).
- A kitchen with a bakery and open serving area so that children can see staff working inside, and a food tray drop that incorporates a composting element (elevating kitchen staff to teacher status and increasing communication and awareness between children and staff).
- An eating area with large windows looking out to the garden, calm colors, acoustic ceiling baffles that reduce sound and reinforce the orientation of the room to the outside, and ergonomic furniture (creating a fun and relaxing space that sparks imagination and facilitates learning).
- An outside two-level terrace near herb and vegetable gardens (providing opportunities to integrate the school curriculum with the children's eating and food experiences).

A rigorous quasi-experimental mixed methods evaluation (quantitative and qualitative) has been built into the project. Investigators are examining the impact of the school redesign on the adoption

of school policies, programs, and practices that promote healthy eating; school personnel's attitudes and practices toward healthy eating; and students' behaviors, knowledge, attitudes, self-efficacy, and intentions toward healthy eating. Investigators are using a mixture of quantitative and qualitative methods, including audits, surveys, focus groups and other qualitative methods, and cafeteria purchase data to collect data about the effects of the redesign. Data from Dillwyn will be compared with demographically similar elementary schools in the same district.

This prospective assessment of architectural features thought to promote healthy eating is innovative because the study elements were incorporated at the outset of the redesign process. It also is one of the first studies to integrate an examination of environmental sustainability and obesity prevention. Its results will have significant policy implications in terms of establishing possible future criteria for LEED certification and providing evidence that adding healthy design does not necessarily increase costs. Given the large number of schools being renovated or built across the country, results from this study also have great potential to inform new standards for school design.

This project recognizes the need for leadership and political will as well as community buy-in. In addition, study personnel have learned to recognize and work within the realities of construction schedules, and this has been a challenge at times. To maximize the impact of the study and the project, study staff are carefully considering ways to disseminate results to the school and community and to the wider community of design and public health practitioners.



- Specific features, such as school gyms with cushioned floors, properly positioned computer monitors, and standing desks, can significantly improve physical activity rates as well as reduce sedentary time.
- Sensory attributes and aesthetic qualities highlighted through interior design can enhance the enthusiasm, curiosity, and spirit of adventure of children and school staff and act to promote more active and engaged use of the building spaces.

Designing interior spaces for schools to promote health and encourage physical activity face a number of challenges, both human and

environmental. Such spaces must meet the needs of all children, no matter their physical, cognitive, behavioral, and social abilities, and they must employ universal design principles. Interactive spaces that promote physical activity require more space and may be more costly than is desirable or available, and it may be difficult to meet the green design principles challenge of a zero carbon footprint by 2030.

Meeting these challenges involves partnering and including all stakeholders, respecting human and environmental needs, and meeting the triple bottom line of people, planet, and profit.

**Designing Healthy School
Food Environments**
KEY POINTS

- Designing healthy school environments requires consideration of spaces at multiple scales, including school interiors.
- Interior design features can have a dramatic impact on behavior patterns within a building, from the traffic flow and circulation of people using the building to the overall engagement of inhabitants with building spaces.
- Research focused on health-oriented interior design is needed to characterize best practices and to promote physical activity and healthy eating for all building users, including children and adults with disabilities.

PRESENTERS

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