MOVING SCHOOLS FORWARD

A design recipe for health: Buckingham County primary & secondary school, Dillwyn, VA

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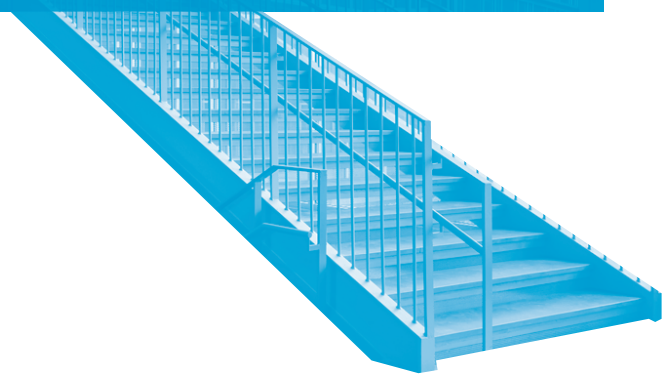

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> "Our bodies, our health, and buildings are forever connected. The links between architecture and well-being are richer than merely avoiding safety from injury; buildings can be, should be, agents of health—physical, mental, and social health." *—Richard J Jackson, MD, MPH, FAAP*

Background

Many have argued that partnership between architecture, urban planning and public health is critical to assess and direct the impact of physical environments on community health (Shoskes & Adler, 2009; Lopez, 2009; Northridge, Sclar & Biswas, 2003). Persistent public health problems such as obesity and chronic disease have been resistant to traditional treatment and individual-level prevention approaches, and there is broad interest in addressing social and environmental determinants of health. Achieving "healthy and safe community environments" is a major strategic direction of the National Prevention Strategy, which focuses on transforming community settings to make healthy choices the "easy" choices. National Prevention Strategy recommendations include the integration of health criteria into decision-making across sectors, including the building industry (2010).

A number of efforts have brought attention to health from the perspective of architecture. For example, the New York City Department of Health and Mental Hygiene (DoHMH) and the New York City Chapter of the American Institute of Architects (AIANY) partnered to host the conference *Fit-City: Promoting Physical Activity through Design* in 2006. The agenda included joint efforts to build and enhance connections between the design and public health professions, and to form supporting voluntary policy and regulatory initiatives (AIANY, 2006). The City of New York's subsequent publication of *Active Design Guidelines: Promoting Physical Activity and Health in Design* (City of New York, 2010; Lee, 2012) articulated the interrelationships between health, environment, and design via specific design strategies intended for professional use across projects at a variety of scales. These foundational initiatives were harbingers of increasing momentum of the health movement across multiple sectors. It has become clear that designing for health is now a strategic imperative for architecture. However, much remains to be learned as to how architects can respond to health drivers (Pollack, 2012).

The following case study describes some of our recent work in the design and health arena.

Schools and Obesity Prevention

Childhood obesity is a particularly pernicious health problem. In the U.S., the prevalence of childhood obesity began in the early 1980s and tripled by the year 2000 (Benjamin, 2010). More than one-third of U.S. youth were obese or overweight by 2010 (Ogden et al., 2012). During this time, the nutritional quality of children's diets decreased and their sedentary time increased. Improving children's healthy eating and physical activity at school has become a national priority to address childhood obesity (Institute of Medicine [IOM], 2012; IOM, 2013). Creating school environments that specifically facilitate healthy eating and physical activity among children is now a national strategy to prevent and reduce childhood obesity.

There is growing momentum toward re-establishing schools as a context for health by identifying the physical features and aesthetic characteristics of schools and understanding how they influence school-level policies and practices pertaining to both health and

Food Lab Lounge for small group food-based projects.
(Source: Alan Karchmer)

learning outcomes. Concepts presented in the 2007 paper, "Designer Schools: The Role of School Space and Architecture in Obesity Prevention" (Gorman et al., 2007) established an interdisciplinary theoretical framework for the role of school design in obesity prevention. The aim of the paper was to integrate ideas from architecture, education, and health promotion toward innovative designs promoting healthy eating and physical activity. The paper identified five school environmental domains that play a role in shaping health outcomes: physical, legal, policy, social and cultural dimensions. It thus expanded program- and policy-based concepts of school food and physical activity environments to include school architecture and design as integrative health catalysts. Numerous documented associations pertaining to physical activity, good nutrition, school nutrition and activity programs, academic performance, and aspects of school facilities point to opportunities for systematic approaches to improve outcomes for children and youth via interrelationships between school settings, policies, and practices (Huang et al., 2009; Huang et al., 2013; Trowbridge & Schmid, 2013; Brittin et al., 2013; IOM, 2013).

Buckingham County, Virginia

The geographical heart of Virginia is in Buckingham County. Among a little over 17,000 people across 580 square miles, the children of Buckingham County are served by one public high school, one middle school, one elementary (Grades 3-5) and one primary (Grades K-2) school. Despite the natural resources of ample green space and pine-oak forests across the county, the low-density setting and rural economy have had an impact on the health of this community. Many adverse indicators are higher in the county vs. the state overall, such as the prevalence of adult obesity (31% vs. 28% for Virginia) and physical inactivity (29% vs. 23% for Virginia) (University of Wisconsin Population Health Institute, 2014). In addition, analyses indicate limitations in access to healthy foods and food insecurity affecting many individuals and families in the county (University of Wisconsin Population Health Institute, 2014). In this rural setting, the majority of children cannot feasibly walk or ride bicycles to school, thus minimizing potential health benefits of active transportation strategies. Among adults, 80% drive alone to work.

In 2009, the Buckingham County School community decided to do something about these community health concerns for the future of their youngest learners and educators. Having passed legislation to fund a new primary and elementary school, the stakeholders prioritized health and well-being as a design imperative. It was clear that a vibrant, active, inspirational 21st century school would require health-enhancing design solutions.

Our Transdisciplinary Partnership

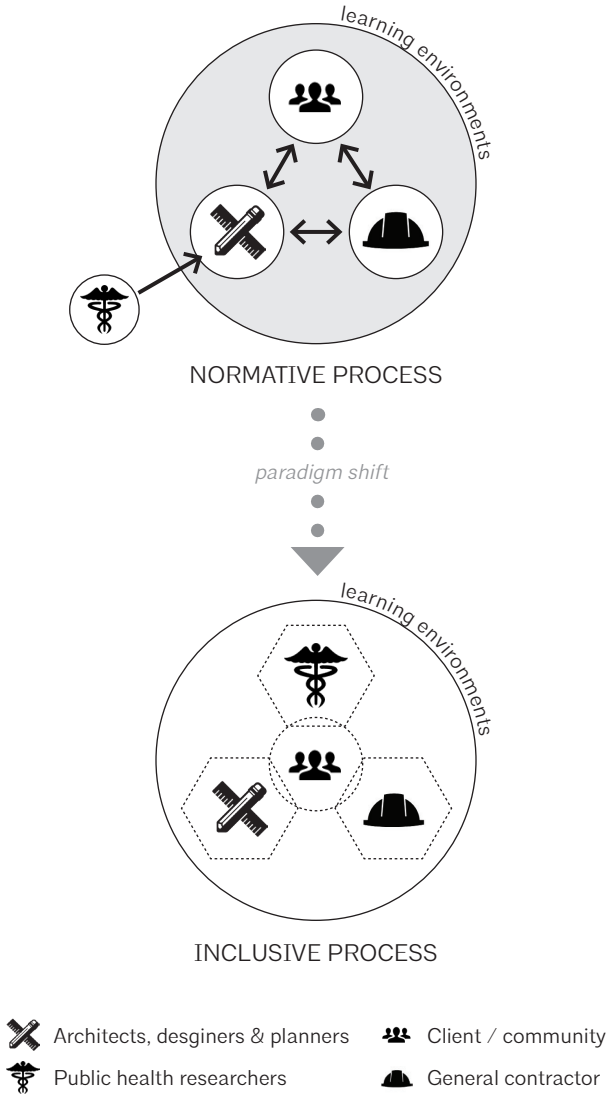
In January 2010, we initiated a unique, multi-year collaboration that took advantage of this opportunity to develop and evaluate school-based architectural health interventions. Key initial partners included Terry Huang, PhD, MPH, CPH (School of Public Health, City University of New York and University of Nebraska Medical Center, College of Public Health), Matthew Trowbridge, MD, MPH (University of Virginia School of Medicine), VMDO Architects (Buckingham Design Team), and the Buckingham County Public School community stakeholders (led by Dr. Gary Blair, PhD, former school superintendent). Our team developed core principles, including facilitating the incorporation of fresh, healthy food choices in the school environment; engaging the school community in food production and preparation; applying behavioral science to "nudge" students toward healthy eating and default physical activity; using building and landscape features to promote awareness of healthy, sustainable food practices; conceiving of school spaces as community assets to multiply the benefits of school-based initiatives; considering school spaces and features as opportunities to promote children's natural inclination to move, play, and explore; and leveraging inherent synergies with current trends in sustainable and universal design.

FOOD LAB

From the foundation of the core principles, we considered relevant theories and research based on socioecological models, proxemics, environmental psychology, behavioral geography, behavioral economics in development of *Healthy Eating Design Guidelines for School Architecture* (Huang et al., 2013) and *Physical Activity Design Guidelines for School Architecture* (Brittin et al., 2013). These sets of design guidelines delineated specific evidence-supported health-oriented design strategies across multiple school design domains. Just a few examples include prominent access to fresh water in every classroom, lack of any vending machines, strategic visual placement of healthy food, a food composting system, and graphic age-appropriate educational nutritional and physical activity signage throughout the school.

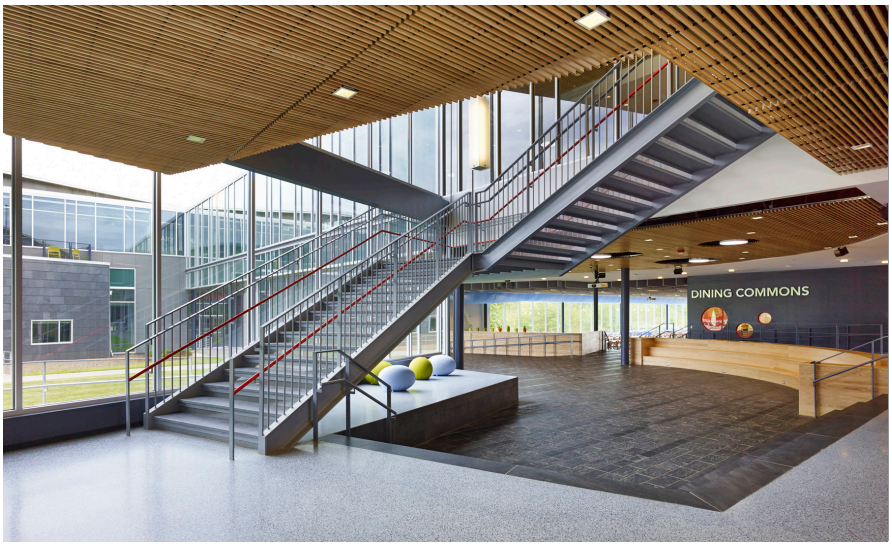
As the team developed these strategies, it became clear that designing for learning environments must consider the pedagogical and curricular capacity of the Dining Commons as an educational space, and must consider the capacity of every space to engage children in physical activity. In addition, the collaborative team during the early design phases thought more holistically about critical linkages between indoors and outdoors to create an ecosystem for smart play and movement throughout the site, and about building massing and orientation to create interconnected interior and exterior educational landscapes for active learning. The layout of the commercial kitchen, serving and dining areas allows the children to interact with food production, and to see first-hand how food is prepared, served, and handled in the seed-to-table life cycle by food service educators and peers. The school gardens, outdoor eating terrace, garden lab, and kitchen lab allow children to plant their own food, harvest, prep and serve from the kitchen lab or food lab lounge. The unique food-oriented learning spaces such as the food lab lounge, kitchen lab, and edible gardens are also used by the public and several local organizations such as Master Gardeners and City Schoolyard Garden, who have offered expertise, labor, and in-kind donations. The Dining Commons and key

FIGURE 1. Model process shifts



programmatic adjacencies allow for immediate use and future transformation as pedagogy and policies adopted over time prompt cultural shifts in the school community.

As a key component of the overall project, we integrated design with a longitudinal, mixed-methods evaluation plan, including both qualitative and quantitative data collection and analyses. This was an iterative process that required both the design team and the public health researchers to re-think their traditional practice paradigms and silos, and to agree upon a common agenda centered around community engagement and outcomes (Figure 1).



TOP: Open servery and flexible, ergonomic seating.

LEFT: Monumental stair at main entry promotes stair use and physical activity.

(Source: Alan Karchmer)

Preliminary Evaluation Summary

In the fall of 2012, 970+ kindergarteners through fifth graders in Buckingham County began attending a school that from the ground up was designed to promote healthy eating and physical activity behaviors. The mixed-methods evaluation research included data collection from students and staff in the previous school environments (in spring 2012), and at 8- and 12-months post-occupancy of the new facility.

Our collaboration confirmed that such transdisciplinary work is both invaluable and feasible. At the same time, it requires true partnership at project inception, commitment to a shared set of goals, and both flexibility and strong communication throughout the process.

Preliminary findings fall into the following categories:

ORGANIZATIONAL CHANGE The administration and teachers generally have come to recognize and believe that school space is important to children's health and learning outcomes. Several new school practices have been initiated, using the new school environment to promote healthy eating and physical activity.

CHILDREN'S ATTITUDES TOWARD SCHOOL Children are highly enthusiastic about their school, and our observational data reveals many "organic" moments of children engaging actively with the school environment. In addition, we have noted a significant decrease in negative physical activity reinforcement.

CONCEPTION OF NEW SPACE Among children, the conception and impact of new space takes time. At 12 months post-occupancy, children displayed more detailed and meaningful representations of the school space than at 8 months post-occupancy.

NEED FOR SOCIAL INTERVENTION Architectural change (i.e., "hardware") needs to be supported by organizational and social interventions (i.e., "software"). However, physical transformation is both necessary and inspirational to create a climate that is conducive to health-promoting practices and cultures in schools.

More detailed findings will be forthcoming in several peer-reviewed publications.

Conclusion

School architecture and design have transformative potential to support reshaping students' health outcomes for positive, long-lasting impact, reaching young people where they live, learn, and play. Reversing the childhood obesity epidemic requires transdisciplinary partnerships between architects, public health professionals, and educators, using project opportunities to leverage and build upon knowledge as to how school architecture and design contribute to positive student and community outcomes.

Now is the time to take the lead. The architecture and design health agenda is a call to elevate the status of school architecture professionals as leaders in promoting improved health of the national population of children and youth. Fortunately, the LEED system and other efforts are beginning to provide support (Trowbridge et al., 2013). Architecture has the potential to improve the quality of spatial and material aesthetics to embody socio-cultural relevance and meaning to promote healthy eating, physical activity, and engaged learning among children. With our partners in public health, we can address gaps in understanding how to optimize and measure environmental design impact, and we can better design learning environments to improve schools' capabilities to adopt, integrate, and implement policies, curriculum, and community engagement toward healthier children. We hope to see many more case studies that build upon what we are learning.

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