Six Elements of Educational Facility Design

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SUMMARY

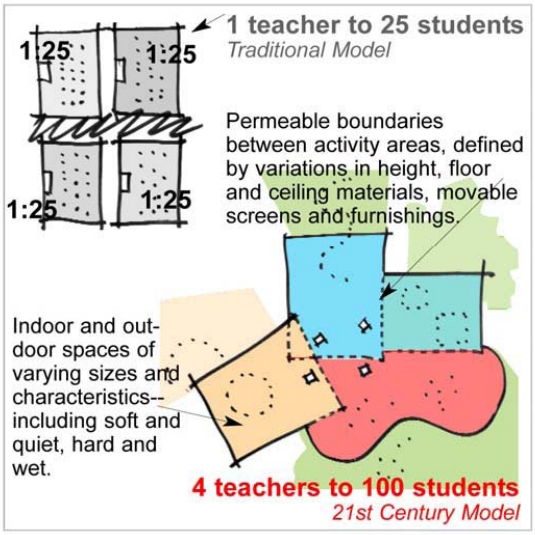
Until recently, educators and architects have lacked clear criteria to evaluate architecture for education. Planning teams have struggled to find or invent effective models without a common language of design. Fortunately, a substantial, readily accessible database of educational architecture over the last decade has resulted in a language of best practices for planning and designing 21st-century schools.

The rapidly emerging language of educational design supports both the foundational skills of literacy and numeracy and the demands of a global economy, which require that learners be curious, self-directed, and able to work across platforms. Six essential elements support the requirements of any contemporary educational framework.

1. SUPPORT TEACHING AND LEARNING

The old paradigm of one classroom and one teacher for 25 students brings to mind isolated Middle Ages fiefdoms. Rather than classrooms designed as "turf-centric" castle walls and moats, a new paradigm of four teachers to 100 students in a more fluidly designed, collaborative, and interdisciplinary environment creates new learning opportunities:

- *Quieter spaces* for individual reflective study
- *"Watering holes"* to stimulate collaborative projects and social learning
- *Flexible studios* with access to water, walls open to outside project areas, and inventive, experimental project spaces
- *Outdoor learning areas* with adjustable sun filtering elements, rain protection, exterior storage, and electrical power
- *Mobile furniture*, including storage elements, student and teacher presentation lecterns, easel-marker boards, and media carts
- *Flexible screens* and acoustically absorptive, partial-height walls
- *Display and presentation surfaces* that students can access and reconfigure daily



How school design may evolve when the student-teacher ratio changes from 1:25 to 4:100

Graphic: Design Patterns for 21st Century Schools

At Western Heights Secondary College (grades 7–12) in Geelong, Australia, corridors and classroom walls were removed and reconfigured to create flexible, 100-student team areas for the 7th-grade class. With minimal structural and finish changes, the design emphasizes direct access to outside spaces and ample natural light. Student surveys showed improved student morale—from 17 percent for students in the older, individual classroom to 80 percent in the newly configured areas. Teacher effectiveness jumped from 20 percent to 87 percent, and connectedness to peers from 20 percent to 85 percent. The bottom line: Even rapidly developed renovations can have a profound effect on learning with *measurable outcomes*.

2. MAXIMIZE PHYSICAL COMFORT AND WELL-BEING

Shelter from the extremes of cold, heat, and humidity as well as access to fresh air are baseline requirements in any school design, generating these newer criteria:

- *Daylighting* in all appropriate learning spaces

- *Windows with minimum 50-foot vistas* to landscapes, streetscapes, or activities
- *View windows scaled to student ages and sizes*
- *Operable windows*, allowing for control of ventilation and fresh air
- *Access to food and beverages all day*
- *Comfortable seating and reflective spaces*

A hierarchy of spaces and group sizes is a vital element of comfort and security. Architectural elements can foster each of the criteria noted above. Window seats, niches, alcoves, lowered ceiling heights, movable screens, and changes in floor textures all serve to define individual and small-group spaces. Differing qualities of light, acoustically hard and soft spaces, orientation to vistas, and openings to landscaped areas further distinguish one space from another.

Because traditional school design has often overlooked primal needs, many students tune out school while tuning into environments and systems outside of our influence. The engaged learners of the future must be able to answer the following key questoins affirmatively:

- "Do I fit in?"
- "Do I have any friends?"
- "Do people care about me?"
- "Are there adults in my life that I can trust?"

In surveys with many school districts that Fielding Nair International (FNI) is working with today, the data on student well-being and engagement measures only a dismal 25 percent against expected norms. Thoughtful site and facility design enhances the sense of belonging by providing spaces for a layered hierarchy of groups:

- *Individual-scale spaces,* from a rocking chair or cubby storage space for a pre-kindergartener to a personal workstation for a middle- or senior-school student
- *"Family or extended family" scale spaces,* accommodating advisory groups, home units, or project teams of 10, 15, or 20
- *Small learning communities* of 100 to 150
- *Neighborhoods* of two or more small learning communities
- *Multiple small learning communities and neighborhoods* across campus

3. DEMONSTRATE ENVIRONMENTAL RESPONSIBILITY

At the Morris Center in Long Island, N.Y., elementary students tell the story of the "Three Sisters," a Native American tale about the interdependence of corn, pumpkins, and beans. In a student-built teepee, students explain how corn supports the twining bean vines, beans fix nitrogen for the corn and pumpkins, and pumpkins cover the ground to prevent weeds. Students plant, water, and harvest all three vegetables in an organic vegetable garden adjacent to the teepee. They learn about photosynthesis, counting and measuring, history, and storytelling while they observe firsthand the key principles of ecology and interdependence.

The teepee, garden, and story offer a seamless integration of learning and sustainable systems. Schools have countless opportunities to integrate ecology into building design, among them:

- *Harvest rainwater* from roofs and site runoff, using cisterns with visible gauges, to illustrate connections between rain and water supply
- *Nurture "kitchen gardens"* adjacent to teaching kitchens and cafes
- *Use water-pumping windmills* from low points on the site to eco-ponds
- *Harness solar collectors* attached to light posts with gauges illustrating the kilowatt gains per hour based on weather patterns

Mawson Lakes Center for Lifelong Learning

In Mawson Lakes, South Australia, 10-year old students can monitor classroom and building temperatures on laptops, adjust temperatures remotely by activating motorized windows, and turn on solar-panel ventilation fans, which form signature towers over the school. Students can tell you at any time how much electricity is being generated by the solar panels, how much is used to power the school, and how much is being sold back to the grid.

4. SERVE THE COMMUNITY

Tomorrow's citizen belongs to communities of lifelong learners, encompassing both richly textured local relationships and technically enhanced global connections. For many adults and students today, shopping malls provide the most vibrant connection outside the home. Less structured than a museum, church, or library, a mall offers an opportunity to read while sipping coffee in a bookstore, experiment with the latest technology at an Apple Store, or hang out with friends at the food court.

Can we create learning communities with built-in spaces that compete with shopping malls? Absolutely! In fact, we can plan our schools to become part of a learning community that is healthier, more fun, better for our urban and town streetscapes, and accessible to all. Here are five steps to create schools that surpass the shopping-mall model:

- *Upgrade libraries to Global Learning Centers.* Provide community access to technology, public cafés, display spaces for student and professional work, and community meeting spaces.
- *Provide "incubator" shops/classrooms/studios* managed by partnerships with local and national businesses and organizations.
- *Create outdoor amphitheaters* for student and community events.
- *Provide colorful landscapes* with local trees and planting, flanked by walking, running, and biking trails with stopping places for exercise equipment, water fountains, benches, and outdoor lighting.
- *Take down fences surrounding our schools.* Within small learning communities, the sense of ownership and care of immediate surroundings provide greater security than a fence.

5. LEVERAGE BEST PRACTICES

Establish design principles that make buildings work better, last longer, cost less to renovate and maintain, and inspire and adapt to changing needs

Thomas Edison, the prolific inventor who harnessed electricity, said, "To have a good idea, have a lot of them." He identified a profound truth about innovation: Exploring many ideas makes for better solutions. Fortunately, we don't need to reinvent every idea; they are all around us. Best-practice solutions in school design are already accessible in the following ways:

- *Ask "What works, and what can we use in our school?"* when taking field trips to other learning environments, including museums, ecological parks, and public plazas.
- *Analyze published case studies.* More than 400 detailed case studies include educator narratives, floor and site plans, and photos at www.designshare.com.
- *Develop ideas through cross-pollination with other disciplines.* Barnes & Noble bookstores, with their cafes and soft, informal seating areas, have inspired radical changes in public, university, and school libraries. Formal "quiet" areas, where librarians once "shushed" students, are morphing into centers of inquiry and collaboration.

Leonardo da Vinci is one of the most powerful sources of best-practice inspiration for the FNI team. The 15th-century artist, engineer, and scientist defined seven principles about invention and learning that can serve as the foundation for a contemporary education framework, including "Curiosita," "Dimostrazione" (testing knowledge), and "Sensazione" (refinement of the senses).

Leonardo's model of interdisciplinary learning inspired development of the da Vinci Studio, which breaks down the boundaries between the traditional science, art, and shop classrooms. (Along with the da Vinci Studio, schools in four countries are developing Einstein and Jamie Oliver Studios. For background information, read "Master Classroom" in the June 2006 issue of *Edutopia* magazine (www.edutopia.org/magazine).

6. APPLY OPEN, TRANSPARENT, COLLABORATIVE PROCESSES

Developing these processes and following through as a team allows the school and community to assume ownership of planning and design.

Fast-track design schedules often minimize time for community participation. A clearly defined, inclusive process is critical, however, to support 21st-century educational frameworks. Some of the following processes, such as a site walk, can be completed in a half-day or less:

- *Develop a vision* linking pedagogy and facilities
- *Visit diverse learning environments,* including businesses, museums, ecological parks, artist studios, and scientific labs

- *Design pattern workshops* to diagram learning activities and spaces with educators, administrators, and students
- *Offer stakeholder site walks* to experience the opportunities and constraints of the site collectively
- *Offer reading and discussion groups* on both facility design and pedagogy
- *Offer educational commissioning*, including workshops with staff on how to use their facility and postoccupancy evaluations to guide continual improvement in its use

INNOVATIVE DESIGN TODAY SUPPORTS GLOBAL LEARNING TOMORROW

Is your schedule and budget too restricted to allow for these six elements of best practice? Is the focus of your school or project limited to literacy and numeracy—too narrow to merit such a broad-ranging approach? Or is your community *ready* to embrace a new global understanding of learning and our school environments?

Well-crafted educational frameworks require learning environments that support curiosity as well as literacy and numeracy. Our learners must be curious, self-directed, and able to work across platforms to succeed in tomorrow's global context. Likewise, our schools must integrate a new understanding of learning for the 21st century that extends beyond traditional building solutions. Given this understanding, all six elements of best practice are essential to the creation and maintenance of innovative educational facilities.

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RESOURCES

The following AIA Best Practices provide additional information related to this topic:

16.01.03 Resource Review: *Green Guide for Health Care™*

16.01.02 Green Roof Design

16.02.01 Energy Design Guidelines for High Performance Schools

For More Information on This Topic

See also "Selecting Environmentally Preferable Products" by Nadav Malin, LEED AP, *The Architect's Handbook of Professional Practice,* 13th edition, *Update 2005*, page 81.

See also the 14th edition of the *Handbook*, which can be ordered from the AIA Bookstore by calling 800-242-3837 (option 4) or by email at bookstore@aia.org.

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Key Terms

- Design
- Buildings
- Buildings by function
- Educational facilities
- Schools
- Sustainability