

# Integrating Sustainability as a Learning Tool

By Steven M. Shiver and John R. Dale

*The Renton Secondary Learning Center is a highly flexible and environmentally sensitive educational facility that will serve as a teaching tool about environmental responsibility for students, faculty and the community at large - providing an integrated, project-based learning environment in which staff will be working as a team to identify each student's unique needs and students will be empowered to grow and mature.*

With more than a decade of LEED, CHPS and similar green school initiatives, we really have made an impact on the educational environments we design and, more importantly, on the students and teachers that use these buildings every day. Yet, so many LEED and CHPS certified schools don't live up to expectations with respect to their impact on the environment and energy use. Walk into many daylit schools and you will find the blinds closed and lights on. It's no wonder they are not achieving the predicted energy savings.

In addition to incorporating sustainable design into virtually every school project that we work on, we must educate building users on the benefits and opportunities presented through truly integrated design. We have found that, when the opportunity is presented, students do care about how their buildings are designed and operated. They want to learn about building systems, energy use and how they can develop programs that will not only benefit themselves, but the community at large.

To that end, many design firms and school districts have begun to implement policies that are designed to educate end users on the benefits of green design. We have named this

"End User Commissioning." As we develop a design, we look for opportunities to communicate the intent of each building component, from rain water harvesting to integrated day-lighting to displacement ventilation, and how each benefits the buildings inhabitants as well as the environment as a whole.

Implementation of user interfaces designed to explain sustainable practices and provide opportunities for integration into curriculum include the new Renton Secondary Learning Center near Seattle, Washington and the Mothers' Club Family Learning Center in Pasadena, California.

The **Renton Secondary Learning Center (RSLC)** builds upon a

"Continuum of Services" to expand offerings and opportunities for students in alternative educational programs that are currently housed in separate and deteriorating buildings. Designed to support a variety of learning modalities, RSLC is a highly flexible and environmentally sensitive educational facility that will serve as a teaching tool about environmental responsibility for students, faculty and the community at large - providing an integrated, project-based learning environment in which staff will be working as a team to identify each student's unique needs, empowering students to grow and mature.

Because the school district had a goal of creating a physical plant repre-



**Renton Exterior Entry:** Rendering of the exterior looking at the building entry. A colored LED bar at the entry changes color based on the total energy used in the school.



**Renton Shared Learning:** In the shared learning space LED accent lighting changes color based on the total energy used in the school. Separate accent lighting at classroom entries change color based on energy used in each building zone.

sentative of what a 21st century school could be, the RSLC incorporates an impressive variety of environmentally sensitive strategies that enhance energy performance, as well as serve as teaching tools. Roof runoff is channeled to a cistern, where water is harvested and stored for reuse in toilet fixtures. When the cistern is full, overflow is channeled to a waterfall that provides water for plantings on the site. A ground source heat exchange system (made up of 140, 200-foot deep wells), a displacement ventilation system and radiant heating for large volume spaces provide a combination of indoor air comfort and quality. A five-kilowatt demonstration photovoltaic cell array provides further educational and energy performance opportunities.

Building performance is monitored throughout and communicated to individual learning areas and to the building at large through a system of accent lighting built into walls and ceilings. Light displays cycle from red to yellow to green to blue as power utilization changes, providing a visual indication to staff and students in each learning center of how well they are utilizing power as they open blinds, turn lights off and open windows. Lighting displays situated along the

central spine and exterior are visible to occupants and from the building exterior, reflecting how well the entire building is performing. Thus occupants are able to continually monitor how various environmental conditions, as well as their own actions, affect energy performance.

Signage throughout the building communicates sustainable features and opportunities to incorporate those features in the curriculum of the school. Energy saving strategies, including the photovoltaic panel array, provide opportunities to learn about electricity, power systems and other alternative types of power generation. Solar hot water heating gives students the ability to learn how climate and other local natural attributes affect system performance. Students can trace overall building power usage and the effects of daylighting on overall energy efficiency.

Relative to indoor air quality and comfort strategies, signage documents the ground source heat pump, displacement ventilation, radiant floors and hybrid natural ventilation systems. Student learning opportunities could include exposure to the concepts of heating and cooling (both natural and induced) as well as heating and

cooling systems including heat transfer, concepts in the movements of gases and air via natural convection and building systems and configurations designed to support natural convection.

Rainwater harvesting, pervious paving and rain gardens gives students an opportunity to study community water needs, storm water systems, drainage and water utility systems. Curriculum or student-led studies can be designed to address seasonal impacts on recycled water availability and monitor building water usage, comparing it to other schools in the district. View a presentation on this project, along with an environmentally friendly elementary school, at <http://prezi.com/56fshjqpu07b/real-solutions-for-integrating-sustainability-as-a-learning-tool/>.

At the **Mother's Club Family Learning Center** in northeast Pasadena, California, the mission is to help prepare families living in isolation and poverty to succeed in school and in life through two-generation learning. This unique approach engages both mother and child in early education programs, parenting and other adult literacy education. To provide a high-quality learning environment that would support these goals the organization made the decision to relocate from its former residence of 40-plus years (borrowed space in a nearby church facility) to a new "green" building that was designed to meet LEED Gold certification. It is the first preschool nationwide to register for certification at the Gold Level.

An existing 10,000 square foot factory building was completely gutted and renovated. The south wall was punctured, opening the building up to the exterior to create flow between the indoor and outdoor play areas. Emphasis was placed on trying to incorporate as much natural light and natural elements into the design to keep the space open and welcoming. Included in the comprehensive redevelopment of the site was the transformation of half of the asphalt parking lot into a safe and colorful play area.



**Mother's Club Interior:** Interior view of the Mother's Club Family Learning Center central play atrium. Transparency combined with high bay clerestories bring natural daylight into interior spaces and foster a sense of community within the building.

The front of the building is a sun-filled entry way and office space for the Center's employees, a small library, resting room and large adult classroom that has movable partitions. The design kept the existing, load-bearing, exposed, brick wall in the front room, which gives the entry a warm, inviting feeling. Two kitchens in the center of the building serve adult activities and provide a place to prepare snacks for the children. The main kitchen is spacious and comfortable - the true "heart" of the building - and plays a central role in the adult programs.

The back of the building contains four classrooms designed for children ages one to four, as well as an infants' room. Huge sliding glass doors at the corner of each classroom are designed to blur the boundaries between dedicated instruction, play space for each group and a large communal play area in between. When the doors are

opened, the central space can expand to overlap the surrounding classrooms. When they are closed, the doors still provide clear visibility from classroom to classroom while giving students and staff a connected feeling. At the same time, visitors can move through the space unobtrusively and be aware of what is going on without disturbing activities. Natural light pours into the central space and surrounding classrooms from clerestory windows wrapping around three sides of the column.

The organization made a concerted effort to use the building as a learning tool, explaining the "why" to kids and parents- why they recycle, why green buildings are good and how they can do these same things at home. An example of this is the highly visible placement of the building's vertical/horizontal photovoltaics that provide twenty-five percent of the facility's electricity. A donor wall at the entrance to the building incorporates slide shows of the building and its construction. A permanent graphic near the central kitchen explains how the building achieves its Gold LEED Certification. Not only is the Learning Center a sustainable and healthy place to be, but the design allows inherent flexibility for a variety of activities and programs for different age groups within the same set of spaces, which is something the Center vitally needed to provide a high-quality learning environment. ■

**Steve Shiver**, AIA, LEED AP, NCARB, NCIDQ Principal, NAC|Architecture, Seattle, WA, has spent the last two decades managing the planning, design and construction of more than \$270 million in educational and state facilities. As an experienced and accomplished educational planner, Steve has an international reputation for his thoughts on how integrated sustainable building features can be used as teaching and learning tools. He is particularly gifted in integrating educational delivery goals into educational facility design and regularly speaks at national conferences on educational planning and design. Several of his recent projects were the recipient of multiple national and regional awards. Steve cochairs the American Institute of Architects, Committee on Architecture for Education PK-12 Subcommittee.

**John R. Dale**, FAIA, LEED AP Principal, Harley Ellis Devereaux, Los Angeles, CA, has been involved in the master planning, programming and design of public and private projects for over 20 years. In 2007, he was honored with an AIA Fellowship for his work in school design. Mr. Dale has created high performance pre-school through secondary school environments. By defining small learning communities which boost student achievement, promote sustainability, and galvanize community involvement, he has established widely recognized models of regional and national significance. Mr. Dale has also been a leader in promoting green schools. Building on evidence-based research, he has put in practice the theory that students are healthier and learn more effectively in well-ventilated, acoustically balanced, naturally lit spaces with strong connections to the outdoors—all features of energy-conserving, sustainable design.