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## Contents

**Conference Issue: Volume 45 | Issue 4**

### Innovative Educational Delivery

5  **A Brave New Campus — Marysville Getchell High School Campus 2011 MacConnell Award Winner**

By Amy Yurko with support from Craig Mason

### Sustainable Communities

9  **Genius Loci: MacConnell Award Projects + Ewan McIntosh’s Seven Spaces**

By Rebecca Baibak, Karina Ruiz, Ross Parker & Edward J. Peters

12  **Transcendent Schools for the 21st Century**

By Greg Monberg, George Kacan & Riyadh Bannourah

16  **Students Designing Their Learning?**

By Gareth Long

19  **STEM for All**

By Paul Hutton & Todd VandenBurg

24  **Lighting Up Students with Technology and Progressive 21st Century Learning Strategies**

By Dr. Ronda Frueauff, Tony Wall, Ron Essley & Michael Hall

32  **LearnSpace Facility Engages! Enlightens! And Envisions!**

By Neil Logue

### High Performance Schools

38  **Engaging with Energy Star®**

By Hanna Grene

52  **Place-based Learning**

By Alec Holser & Michael Becker

59  **Safe, High-Performance, Sustainable Precast School Design**

By Peter I. Finsen

### Planning Perspectives

67  **Improving the Places Where Students Learn**

By Cynthia L. Uline, Ph.D.

### Facilities Research

30  **What’s New in Facilities at the U.S. Department of Education?**

By Andrea Suarez Falken

35  **Systemic Approach to Building 21st Century Schools**

By Steven B. Bingler, William M. Kaneko & Alan M. Oshima

41  **Atascocita Springs Elementary School**

By Irene Nigaglioni & Deborah Yocham

48  **Lighting Up Students with Technology and Progressive 21st Century Learning Strategies**

By Dr. Ronda Frueauff, Tony Wall, Ron Essley & Michael Hall

### Facilities Research

55  **CEFPI Celebrates 2011 Planning & Design Awards**

57  **James D. MacConnell Award Finalists**
INNOVATIVE EDUCATIONAL DELIVERY

A Brave New Campus — Marysville Getchell High School Campus 2011 MacConnell Award Winner

By Amy Yurko with support from Craig Mason

I’ll never forget my amazement when my favorite jazz vocalist, also my teacher, revealed that even as a veteran musician, she still gets nervous on the stage. “Nervous energy encourages me to take chances” she said, emphasizing that taking chances is key to the musical improvisation for which she is known to this day. I enjoy finding opportunities to quote or otherwise thank a teacher who has had such profound impact on my life and my work, like my music teacher, and I look for opportunities to apply these valuable insights to new situations and in new ways. The Marysville School District was a client who requested – demanded – these particular words of wisdom: be brave, take chances. It was a great fit.

In short, the success of the new Marysville Getchell High School Campus can be attributed to the bold and fearless attitudes of those who envisioned it and those who made it a reality. Following the first successful bond issue in fifteen years, the district and community rallied under the courageous leadership of a newly appointed superintendent to redirect community energies toward positive change focused on student learning. Five years later, Marysville can boast a 27% increase in graduation rates and having one of the most innovative and award-winning campuses in the nation.

In the Beginning...

Through in-depth explorations of exemplary learning programs across the nation, a quest for discovering new ways to engage learners, and the courageous commitment to keeping an open mind throughout the process, the district spent nearly two years formulating bold principles which would serve to guide the redefinition of high school education in Marysville.

Under the leadership of Architects of Achievement and together with programming and planning specialists, staff, students, and community members, the set of five guiding principles detail the values and concepts central to student success. The five Board-approved Guiding Principles include: Relationships at the Center, Focused Learning, Identity-Purpose,
Community, and Accountability. Each principle includes additional detail that was instrumental in maintaining focus on the shared vision throughout the subsequent design of the new campus.

Conversations among all participants challenged each other to keep our eyes on the goal by continuously asking “what would it look like if we really meant it?” During both the charrettes and throughout the project’s development, potential solutions were assessed on how well, how purely, they supported the guiding principles. The design team was forced to rethink our typical project development process by blending together the typically independent programming and design phases. Together we stepped outside our comfort zones to deliberately leave behind traditional concepts of educational delivery and the spaces that typically accompany them.

Communities of Learners

The district began formulating a strategy for organizing students into communities of learners as a means to achieve these guiding principles. Concurrently, the planning and design team began exploring ways for the school itself to support them. Together we were creating an entirely new educational system enabled by four independent interest-based buildings for 400 students each with equal access to a shared community commons.

Taking Chances

In a typical project, the specific needs of educational environments are informed, if not driven, by the anticipated curriculum, programs and teaching strategies. While the district was quite clear that distinct and purposeful learning communities would be their strongest strategy, the specific curricular focus for each of these communities was not yet decided. So we were challenged instead to create spaces that could support whatever curricula the district decided to develop for their learning communities. While it would have been understandable for these circumstances to have made us nervous, instead they encouraged us to take chances.

Start with the Learner

We began with the learner, identifying various fundamental activities, groupings and supports (spaces, equipment, lighting, technology, etc.) necessary for learning, regardless of subject matter. We engaged students with a wide variety of perspectives, from star performers to drop-outs as well as students with varying physical abilities, to help us understand their needs. They identified a desire for self-selecting their settings from a range of options - from large and open to quiet and small, from soothing and supportive to stimulating and challenging, from structured to natural. They identified a range of ways for working with others - from independent yet simultaneous work to collaborative teaming to large group presentations, and on and on.

“...the architects really wanted to hear what I had to say for accessibility and universal design from a student’s perspective. So I met with them and gave them a few ideas, and now I am touring the new campus and I saw a couple of things and thought ‘that was my idea, that’s so cool!’ It’s kind of a legacy; I can say I helped design this building.” Shelby Hintz, former Marysville student

A key issue for many students was to have adults recognize their differences, instead of simply focusing on their similarities, when determining groupings, activities, environments, and even curriculum to meet their personal learning needs. We saw that each of these students seemed to have an innate desire to do his or her best, and that the structured environments of traditional schools had discouraged some students from finding opportunities to prove it.

Being Brave

We addressed the challenge of planning and designing a campus which had not yet determined its intended educational programs armed with this wealth of learner insights and the adopted Guiding Principles. The challenge was bravely transformed into an opportunity to see the campus as a living environment, one that would – and should – evolve to support any curriculum that would engage students both on opening day and throughout the life of the facility. What would it look like if we really meant that?

Scenario Planning

Cognizant that technologies, interests, and priorities change so quickly
that school campuses can be obsolete on the day they open, the team critically reexamined the core functionality of educational spaces to design a relevant, flexible, and adaptable campus. How? Scenario planning.

Imagine a space planning exercise that is focused on learners instead of spaces. An activity that typically uses blocks or drawn bubbles to represent spaces, instead uses buttons or dots to represent students and staff. Say you have 400 of these buttons or dots. Arrange them into clusters of activities, both formal and informal, based on student and teacher insights and in support of the guiding principles. Pretend there is a curriculum defined, and that the students are engaging in activity-based learning. Now, use string or drawn lines to both distinguish and connect the various activities. Pretend some lines are stationary walls, others are movable, some are made from furniture and still others are simple changes in floor patterns. Now repeat this exercise several more times using different curricular themes each time and be sure to take photos or otherwise capture the results. Next, compare the schemes from each exercise. Discuss possible reasons for the commonalities and differences among each idea. Brainstorm a single solution which can support all of your findings. The result is a truly learner-focused plan, able to transcend curriculum and offer the range of environments to support nearly any curriculum of today, and many of those which do not yet exist. Now, celebrate the fact that none of your buttons has “dropped out”!

Environments for Teaching and Learning

With commonalities of learning activities, groupings and supports defined, the Marysville Getchell team defined a series of essential learning spaces, which in combination could serve various curricular themes. In addition, settings for support of basic administrative and operational needs were included. The following settings were defined for each of the four learning communities:

- **Welcome Center** – a prominent entrance which identifies each building and includes easy access to administration and student services
- **Social Commons** – informal gathering space with direct connections to the outdoors, is large enough to bring the entire learning community together, can also be used for dining, student presentations and other large group functions
- **Learning Commons** – dispersed resources, with the atmosphere of a bookstore instead of a traditional centralized library

“The library at Marysville Getchell is not a place. It is distributed resources so students have access to the same kind of resources as a traditional library, but in real time,” said Gail Miller, Assistant Superintendent of Marysville School District. “Students can access materials wherever, whenever. They don’t have to schedule time to go to the library.”

Expansive views toward the surrounding community and landscape from campus.

Photo courtesy of Kelley Tanner
When you’re in your own SLC, you have everything that you need right there. The way that it is so open makes it feel united, and to be able to easily find the teacher you need to talk to, and you never feel alone.” Melissa Jones, MGHSC School for the Entrepreneur

Shell-and-Core Approach

The four learning community buildings are designed using a “shell and core” concept which locates the classroom and load-bearing steel structure and most plumbing out to the exterior walls, routes electrical and HVAC through floor and ceiling, and allows interior walls to be easily reconfigured over time to adapt to changes in educational program. The addition of interior windows, movable walls, furniture on wheels, and ubiquitous technology, the design allows learning spaces to be reconfigured to meet any instructional model now and in the future.

Midway through the design of the campus, Marysville School District determined the identities of each of the small schools, and the design team led by DLR Group planned for the opening of each community including specific equipment, graphics, color schemes and finishes to support each theme. The shell and core theory was reinforced when late in the construction process the team learned that one of the theme-based schools was unsubscribed. No problem! The building was quickly readapted for its replacement curriculum.

The final four theme-based buildings include:

- Academy of Construction and Engineering
- Bio-Med Academy
- International School of Communications
- School for the Entrepreneur

A New Type of High School

Imagine a school without hallways; a school where every single space is used for education. Imagine a school where student learning, starting with literacy, drives all decisions related to instruction and construction. Imagine a school not as a school, but as a retreat for learning. Students are offered the engaging and supportive spaces they deserve, with the rigorous and relationship-based instruction they crave, and with opportunities to connect with the world around them. Exhilarating “aha moments” are now filling their days. They are astonishing us with their focus, impressing us with their accomplishments, and appreciating us for our bravery.

Amy Yurko, AIA is founder of BrainSpaces Inc, a Chicago-based consulting firm that offers programming, planning and design services for schools. Named Planner of the Year at the 2011 Annual World Conference of the Council of Educational Facility Planners, she led the planning efforts for two of the year’s MacConnell award finalists. Visit her website at www.BrainSpaces.com.

Craig Mason, AIA, LEED AP is a principal, national education designer and the Pacific Northwest Education Sector leader for DLR Group. Based in Seattle, Craig’s outstanding and innovative work with educational facilities has established him as one of the most creative educational architects practicing today. Craig led the design of Marysville Getchell High School Campus. For more information, visit dlrgroup.com.
Traditionally, schools have served as places for information finding, project creating, publishing and presenting student work. They have evolved into places to support technological tools and the performance and display of student work. They also serve as real-world spaces for interpersonal interaction, from purely social interactions to structured collaborative learning. But with the emergence of more mobile, more affordable technology, the distinction between the virtual and real-world places where we learn has blurred. What does this mean for the design of physical learning spaces themselves?

Ewan McIntosh, in his article “CLICKS AND BRICKS: How School Buildings Influence Future Practice and Technology Adoption,” presents a framework he has used in the construction of digital spaces, demonstrating how the Seven Spaces of technology are critical, not only for powerful learning but also for those constructing tomorrow’s places of learning. These spaces include Secret Spaces, Group Spaces, Publishing Spaces, Performing Spaces, Participation Spaces, and Watching Spaces. As architects, designers and planners we often take “spaces” to mean literal physical place, but as one explores these ideas it becomes apparent that one place can provide a variety of spaces based on the occupant’s goal, posture, others utilizing the space, furniture, time of day and desire. This adaptability of place is an exciting aspect in facilities today, particularly as communities grapple with maintenance and operation costs and declining resources. How do we do more with less?

Understanding Ewan’s approach to space, while reflecting on some recent award winning projects, allows us to ask some probing questions for the future. He explained that Secret Spaces reflects how our body language indicates which type of mental “space” we are in and whether we are to be disturbed or not, in lieu of the traditional signal of a closed door. What can we integrate into facilities to allow for the individual interactions with devices and the mental exploration that can occur through that personal interaction?

Group Spaces can be virtual interactions as in Facebook or Twitter, but in creating a sense of place they provide environments for interaction that allows students the opportunity to “flex” their needs based on occurrences and interact with students around a table, through informal seating areas that provide that gathering around the “hearth” feeling.

The surge of technology use in the 21st Century is providing an opportunity for school facilities to reevaluate the value and definition of educational place. As we reflect on our past work, we ask these important questions – what are the defining characteristics of schools of the future…what do we need them to do?
Performing Spaces allow people to be something or someone they are not, thus the allure of on-line gaming and virtual avatars’ of oneself. Educational environments can provide that opportunity to test one’s desire to discover “what if” they lived a certain life or lived in another time. This immersion into a subject matter for 6 weeks or so, then switching to another to further enhance one’s learning of a subject matter can be highly successful for many learning styles. How would the facility need to respond to allow for this conversion and immersion?

Participation Spaces are often thought of as “staged environments” with planned interactions for a day—i.e. setting up an experiment in a science lab. Ewan McIntosh challenges designers and planners to think differently and fully integrate the idea of “life long learning”, considering every aspect of a school as a learning opportunity. These items might include how a building is maintained, how food is served, or present the opportunity to create “mini-environments” to fully immerse oneself in a topic. For those trekkies out there...it’s easy to imagine a future in which a “hollodeck” creates a computer-generated environment that is so life-like that users can fully explore ideas and experiences right at home.

Watching Spaces are spaces that we often see in today’s schools. Ewan’s review of this type of space offers a challenge to strip away the traditional front of an educational space and allow the speaker to be the focus, both to limit distraction and to allow the opportunity for a variety of presentation styles. He cites the simplicity of the TED talks as one in which the lecturer is allowed to shine due to the simplicity of the backdrop. As the role of the teacher shifts from that of the presenter to one that is a link and guide to information, how do we provide spaces that allow this evolution, or are they already there?

As we reflect on ten MacConnell Award projects from the Pacific Northwest through the lens of the Seven Spaces, it’s interesting to see how, over the past 14 years, design teams created places that allowed for many of the spaces Ewan discusses. This testing of...
how facilities evolve and adapt is now possible as we experience the infiltration of technology into all aspects of our lives. The question remains – what is the next step? How do we truly provide those shelters that engage communities and foster all aspects of life? As we see this shift from the traditional instructional pattern, one also begins to ponder if learning does occur everywhere with the definition of so many different learning styles. What is the role of the school facility? What can a school provide that a public library, bookstore, coffee shop or living room cannot?

Edward J. Peters, capital projects director, has overseen the Edmonds School District’s capital construction program since 1999, including the new Meadowdale Middle School and Lynnwood High School projects. The latter project received the James D. MacConnell Award for school facilities planning from the Council of Educational Facilities Planners International. He chairs the Oversight Committee for Seattle Public Schools Building Excellence construction program. He is Governor, a past-president and an Al Beck Award winner for the Washington State Chapter of CEFPI and has served on a number of State-wide committees involved in creating and implementing sustainable development standards for public school construction projects in Washington State.

Rebecca Baibak P., AIA, LEED AP, REFP is a principal at Integris Architecture and is a leader in the firm’s Education Sector. With nearly 20 years of experience, she has led complex projects and multi-disciplinary teams on a variety of projects from new construction through highly complex phased construction projects. Rebecca’s role extends beyond projects to include active participation in professional organizations such as the American Institute of Architects Committee on Architecture for Education (CAE) and Committee on the Environment (COTE). In addition, she’s utilized her leadership skills on the Council of Educational Facility Planners International (CEFPI), where she has chaired several committees. Rebecca holds a Master’s of Architecture degree from the University of Detroit Mercy, and a degree in Business Administration from Aquinas College in Michigan.

R. Ross Parker, AIA, an associate at Bassetti Architects has been practicing architecture for 25 years in Canada, the UK, Texas and Washington State. His emphasis has been on public-sector work, including schools, universities, a legislature, and Native tribal facilities, with projects located in settings ranging from small rural communities to dense urban environments. With a dozen school projects in his portfolio, two have been recognized by CEFPI’s James D. MacDonnell Award: The Academy of Irving ISD, a 2004 finalist (Powell/PSP Architects); and Lynnwood High School, the 2010 winner (Bassetti Architects). His most recent major project has been Washington State’s largest school project, the $80 million Chief Sealth International High School / Denny International Middle School span school facility. He has participated in CEFPI conferences as a seminar presenter at both the regional and national levels.

Karina Ruiz, AIA, LEED BD+C is an associate principal at Dull Olson Weokes Architects. With over 16 years of experience in the design and construction of educational facilities, Karina believes passionately in the importance of this work to shape the future of this world. This passion drives Karina to work diligently to ensure that her client’s goals and guiding principles are at the forefront of all decision making and to ensure that projects are delivered on time and within budget. As a senior project manager, Karina has directed design and construction activities for projects totaling over $400 million, including the 2009 James D. MacConnell Award winner Rosa Parks Elementary School. She is also responsible for leading DOWA’s Healthcare and Higher Education pursuits.

As we reflect on our past work, we ask these important questions – what are the defining characteristics of schools of the future…what do we need them to do?

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Educational Facility Planner | Volume 45: Issue 4

INNOVATIVE EDUCATIONAL DELIVERY

Transcendent Schools for the 21st Century

By Greg Monberg, George Kacan and Riyad Bannourah

Amidst the debate over funding cuts, an increased focus on teacher effectiveness, and the move toward e-learning, many question the importance of quality educational facilities. But an examination of developmental and psychological theory suggests that exceptional schools have an exciting and crucial role to play in 21st century education.

“We don’t want a Taj Mahal School.”
“We need a Chevy school, not a Cadillac.”
“Buildings don’t matter; kids can learn in tents.”

Anyone involved in the planning and design of school facilities has almost certainly heard one, or all, of these statements. At their core, these sentiments call into question the role of the learning environment in the educational process. In these economic times—when funding for education is increasingly limited and budget cuts are the norm—is it more important to spend our money on teachers than on facilities? Can the quality of a teacher transcend a subpar environment?

Put another way, “Do school facilities matter?”

This question is in no way new. For years, educational theorists, psychologists and economists have tried to identify the specific factors which impact a person’s development. Their findings not only suggest that schools do indeed matter, but that they have an important new role to play in the educational process—one that is focused on inspiring achievement rather than limiting obstacles to education.

A Tale of Two Communities

To highlight the difference that school facilities can make, it is helpful to examine two very different learning communities.

In 2008, the American Institute of Architects’ Committee on Architecture for Education held its annual conference in Helsinki, Finland. The theme of the conference was “Schools in a Flat World: Global Perspectives in Pedagogy and the Built Environment,” and part of its purpose was to expose attendees to Helsinki’s schools, which are widely acknowledged to be among the best and most sophisticated in the world.

Contrast this with a 2010 trip to Haiti sponsored by Schools for Children of the World (SCW). Organized in response to the devastating earthquake, the purpose of the trip was to help rebuild the nation’s schools. Upon arriving in Léogâne, one of the hardest hit regions of Haiti, the SCW team found students learning in tents that served as makeshift schools. It was not a rare occurrence to see goats grazing inside the “classrooms.”

The juxtaposition of these very different learning environments raises an interesting question: What role do schools play in the quality of education in Helsinki and Haiti? Historically, Haiti has one of the lowest literacy rates of any of the Latin American and Caribbean countries, while Finland has some of the highest literacy rates in the world. Obviously, there are many social, economic and political factors which lead to these results. But if you removed Helsinki’s students and teachers from their modern schools and placed them in the tents of Léogâne, what would be the effect on student achievement?

Can you get great results teaching in a tent?

Development Theory and Environmental Impacts

For hundreds of years, humans have wrestled with the issue of our relationship to the surrounding environment. In 1935, the psychologist Kurt Lewin published his famous equation B=f(PE), in which he stated that behavior (B) is a result of a person’s (P) interaction with their environment (E). This theory was intended to equalize the role of nature and nurture, stating that behavior was a product of the dynamic interaction between the two forces. Of equal importance was the emphasis that Lewin’s equation placed on an individual’s current conditions as opposed to their past experiences.

In 1992, Urie Bronfenbrenner, another noted psychologist and the co-founder of the Head Start program, suggested a substitution to Lewin’s theory, stating that a person’s development is the product of their interaction with the surrounding environment. This equation is presented as D=f(PE), and explains how emotional, social and cognitive development occurs in context. (Bronfenbrenner, 2004)
The work of these two eminent psychologists was ahead of its time. Both recognized the impact of the environment on human development, and both lamented the lack of focus in general psychology on an individual’s physical environment, in particular.

Throughout the 20th century, the educational community displayed a similar reluctance to address the link between student achievement and school facilities. Then, in 1970, Eric Hanushek, an expert on educational policy, published a theory in which he stated that educational outputs are a function of innate abilities (I), family inputs (B), peer influences (P) and school inputs (S). This was expressed as an equation: \( A_{it} = f(I_{it}, B_{it}, P_{it}, S_{it}) \).

Hanushek’s equation does acknowledge that the school environment is a significant factor in educational success. However, a closer look reveals that three of the four inputs – innate abilities, family, and peer influences – primarily occur outside school walls. This observation is further borne out by Dan Goldhaber, who, in a 2002 article in Education Next, cited research revealing that 60 percent of the difference in student test scores can be explained by factors outside the school itself. (Goldhaber, 2002)

The implications are obvious for the student of Haiti and Helsinki. Hanushek and Goldhaber’s research suggests that, tents or no tents, the students of Haiti are hamstrung by their social and economic limitations. By the same token, the students of Helsinki—with their strong social structure and, by-and-large, privileged backgrounds—should be able to thrive in nearly any learning environment.

In the model of the school planning and design that defined the 20th century, the previous statement may be true. However, by taking a new approach to K-12 school planning and design, we can give school facilities renewed relevance in the 21st century.

The Deficit and Humanistic Models of Educational Facility Planning

In the mid-20th century, Abraham Maslow forever changed the field of psychology. Up until that time, psychologists viewed patients as a “bag of symptoms,” made up only of diseases to be cured. (Hoffman, 1988) Maslow reversed this view, choosing instead to focus on the qualities of an exceptional person. From this revelatory change in emphasis came the famed Hierarchy of Needs.

To ensure that school facilities have a positive impact on education in the 21st century, there must be the same shift in focus. The 20th century approach to K-12 school planning and design viewed facilities as problems to be solved. How do we provide an adequate amount of space within the existing site? How do we meet the budget while accommodating the educational program? How do we remove barriers to learning?

By merely focusing on removing barriers to learning, we engage in a
20th century, or Deficit Model, of educational planning and design. In this approach, a school has little chance to impact the 60 percent of factors which exist mainly beyond the boundaries of the campus. However, to meet the challenges of the 21st century, the educational community must adopt a Humanistic Model of educational facility planning, in which the physical environment acts as a catalyst for raising the quality all of these inputs.

The difference between the two approaches can be summed up by a quote attributed to W.B. Yeats: “Education is Not the Filling of a Pail, but the Lighting of a Fire.” In the Humanistic Model of educational facility planning, the learning environment serves to enhance each of the factors that influence educational outcomes. It is flexible enough to accommodate the innate abilities of each student. It encourages parental involvement by establishing the school as a community center. It enhances peer-to-peer relationships through the integration of project-based learning environments and through physical and technological connectivity.

In short, in the Humanistic Model, a school is more than a vessel for the learning process; it becomes an integrated tool for enhancing education.

A Hierarchy of Needs for 21st Century Schools

Much like Abraham Maslow used a Hierarchy of Needs to explain what makes certain individuals so successful, we can use a Hierarchy of Needs to assist in the planning and design of school facilities. In such a hierarchy, transcendent schools would satisfy all, or most, of the following needs:

- **Level 1 – Facility Needs**: The school is safe, secure, weather-tight and code-compliant.
- **Level 2 – Program Needs**: The school has space appropriate to the curriculum and pedagogical approach.
- **Level 3 – Student-Centered Needs**: The school is optimized to meet the ideal environmental needs of students, reducing stress and increasing choice.
- **Level 4 – Community Needs**: The school is reflective of neighborhood values and meets esteem and community service needs.
- **Level 5 – Facility Actualization**: The school is a fully-integrated teaching and learning tool.
- **Level 6 – Transcendence**: The school inspires other communities to achieve similar results.

As in Maslow’s Hierarchy of Needs, one level is not necessarily more important than the others, but each lower level must be achieved before the next can be reached. For example, if students do not feel safe in their classroom, or if the learning environment is not arranged to effectively support the current curriculum, it does not matter how much daylighting you have or if you employ the latest technology. Each level of the hierarchy builds upon the next, and school districts must address all needs to create a truly transcendent school.

In the same way, the higher you go on the Hierarchy of Needs, the easier it is to achieve the next step. This suggests that in educational facility planning, the majority of the available resources should be spent addressing lower order needs. A school only achieves transcendence when it first lays the groundwork by providing a safe, educationally-appropriate learning environment. In fact, once a level
The Future of Transcendent Schools

So, what does a transcendent school look like? Boiled down to its simplest terms, it is about creating connectivity among students and their surroundings. The traditional classroom model filters information through a primary source, “the sage on the stage.” In an integrated classroom, all students are connected and can learn from one another. The teacher then becomes the “guide on the side.”

The ubiquity of digital information is another important aspect for a transcendent school. Although technological change is rapid and seemingly unpredictable, the direction of change is apparent – towards lower cost and increased connectivity, mobility and speed. This requires school districts and their planning and design consultants to have a clear understanding of technology and its influence on curriculum delivery. Cloud computing, thin clients, virtualization – each of these developments are changing how students and teachers interact. In the future, the classroom will not be as we know it today. However, by following the Hierarchy of Needs, we can ensure that the school – in whatever form it takes – will be a relevant and powerful tool for intellectual, social and emotional growth.

It is this commitment to growth and change that is the most exciting for school districts, educational planners and architects. In the previously referenced 2008 trip to Finland, two members of the AIA Committee on Architecture for Education spent time exploring nearby Estonia. There they found the Adolphi Gustav School, which was established in the 1600s by the King of Sweden and is housed in an 800-year-old building that originally served as a nunnery. But rather than touring an old and outdated structure, the architects were treated to a high-tech learning environment, complete with LCD images projected onto centuries-old stone walls and interactive whiteboards being used to teach students about the work of Frank Lloyd Wright.

Located a world away in an 800-year-old building, these Estonian students were taking a virtual tour of Frank Lloyd Wright’s Falling Water. This scene typifies the educational landscape of the 21st century – a world that is rich with opportunity. As educators, educational planners and architects, it is our job to ensure that these opportunities are met with relevant, functional and inspiring school facilities. It is our job to do more than “fill the pail”, we must transcend what we thought was possible just decades ago and “light the fire” by creating dynamic learning environments that allow students to meet the challenges of an increasingly complex, connected and wondrous world. ■

Greg Monberg, AIA, REFP, LEED AP BD+C, is a principal with Fanning Howey and has focused on school design for more than 17 years. He is an active member of CEFPI, and recently volunteered for the Haiti Relief Task Force sponsored by CEFPI and Schools for Children of the World. In 2008, Greg participated in the AIA-CAE “Schools in a Flat World” Conference in Helsinki. His recent projects include the award-winning Harding Elementary School in Hammond, Indiana, and the new Greater Gentilly High School, one of five “Quick Start” schools constructed as part of the rebuilding efforts in New Orleans.

George Kacan’s, AIA, REFP, LEED AP, experience as a school architect spans the country, ranging from Washington, D.C. to Detroit, Michigan, to the state of Washington. As a member of the American Institute of Architects’ Committee on Architecture for Education, George participated in the AIA-CAE “Schools in a Flat World” Conference in Helsinki. During the course of his career, he has focused specifically on the need to restore our nation’s aging buildings and equip them to serve the students of tomorrow. His experience in this area includes the award-winning modernization of Phelps Architecture, Construction and Engineering High School in Washington, DC.

Riyad Bannourah served as technology designer for the Multimedia Broadcast Academy. He has more than 30 years experience in the technology design industry, with the last 14 spent focusing solely on school facilities. Riyad has presented new trends in technology design at conferences for CEFPI, the Michigan Institute for Educational Management, and for E-School in Washington, DC, and has contributed to multiple articles on safety and security issues in schools. Recently, Riyad directed technology design for the new V. Sue Cleveland High School in Rio Rancho, New Mexico, a 2010 James D. MacConnell Award Finalist.
Students Designing Their Learning?

By Gareth Long

Young people know and understand that more traditional group teaching in formal layouts is necessary at times, but these are moments and should not be the whole approach. “If you create a system where initiative and creativity is valued and rewarded, then you’ll get change from the bottom up,” Paul Pastorek, The Third Teacher

It always amazes me that so many people are surprised when they talk to and actually listen to students talking about their approaches to learning. But how often does this happen? Many adults say they talk to students, teachers teach them and talk to them, but they frequently don’t really listen to them or really get to understand each person’s individual approach to learning. Education is too often done to groups in exactly the same way, the learning experience shaped by the adult, regardless of student skills or aptitudes. This is often called the factory or industrial approach to learning. There is no evidence that “one size fits all” brings about effective change to students. Listening to them instead would help influence the way of working, the use of technology and the spaces that they learn in.

Student & teacher groups participate in focus group events, talking to peers about strategies for learning, but often it is a “one off” disconnected event. This results in some students not fully comprehending what is trying to be achieved, raising issues that may not have been considered before. Their questions relating to how, where and when they learn best can produce responses that are superficial. If no one has asked them before, most responses will relate to direct everyday experience rather than reflecting on personal preferences. The absolute certainty they know is that they go to school each day and usually prefer some lessons to others. Frequently, they never ask themselves why this is or consider their role in making it better. They usually blame the teacher. This “one of” approach cannot be right. If they have never thought about this topic they would probably prefer time to think, discuss, reflect and develop their response.

There are other groups of schools and staff that don’t want students to think about their learning. They prefer that students simply arrive and be receptors of knowledge. This works on the principal of it worked for me x generations ago, we know the best way to impart knowledge and we’ve always done it this way no matter what changes in society have taken place. Their view may have had some validity until recently. What really
is different from a decade or longer ago, is the massive and increasingly rapid advance in technology.

Doing the same thing in the same way to a group of people of the same age at the same time, in the same room, and expecting the same result is not based in reality in today’s society. The whole approach needs rethinking – but few are brave enough to start the conversation.

Education today is not just about “learning knowledge” – knowledge is instantly accessible, anywhere simply at the click of a mouse button. Learning now has to be much more about developing a range of skills for life and work, thinking creatively, learning where to access knowledge, verify it and apply it to the particular tasks. Admittedly there is balance to be struck – I am not advocating zero teaching of knowledge.

As part of my work I talk a lot to students. Many have never begun to think how they learn most effectively. Getting them to really think, understand and discuss how they learn as an individual happens over time. When they get it, they really demonstrate insight, perception and awareness.

Young people understand they learn in different ways for alternate types of work, they know they learn differently from their friends and they know they like working in different environments. Even talking in a group about how they work most effectively on a difficult project at home produces a myriad of answers such as: Sitting at a table; in my room alone lying on the bed; on the sofa with people around me; with music; with my friends; totally alone in absolute silence; with the television on; working while online so I can talk about it with my friend; and outside or in the library because there is nowhere to work inside.

Many agree that they work in different ways on work that requires complex thought rather than one they consider really easy or don’t value. Explore it further, and they demonstrate real awareness of the environment they want to work in for particular pieces of work.

Many students also prefer longer learning periods – they dislike moving every forty minutes or so simply because they have to, moving to another identical room next door for a totally different subject. “We just really get into our work and concentrate and we have to stop, move class and start something else – it’s really annoying.” They do have lots to say… if we listen.

All this is before we mention technology to support learning. Many students assume that the majority of their teachers are luddites or just plain technically illiterate. This may be true for some, but the picture is changing.

A simple truth is that students simply expect to use technology as part of their learning, as they expect to do when they enter higher education or the world of work. They are often frustrated when they are prevented from doing so – technology should not just be a home based learning activity. Student comments heard recently include: “We learn at school, despite the lack of technology, but we could learn so much more using it.”

Mobile devices, including cell phones, are powerful, efficient, user-friendly and getting more so. Not utilizing them is a massive waste of a powerful resource. The wider concern and issue around cell phones in schools is a strategic one, but
one that will have to be managed. Currently many schools are avoiding this issue. Cell phones will not be going away and massively increasing software means that almost anything can be done using them anytime, anywhere. Not using them in schools will make less and less sense. Students are very pragmatic. They know that there are times when using technology is not appropriate.

Students I speak to usually blame not using technology on staff that are afraid to use the technology, are afraid to admit that students can use it better than they can, or are afraid of it being misused.

What really infuriates students is that their teachers do not utilize the technology capacity available and make them perform tasks they feel are totally pointless. These tasks include recording assignment work or copying notes. Over five years ago, a panel of high school students spoke to over three hundred teachers and stressed this point. Back then the comment was “Why should we just have to copy down things from the board? Why don’t you just blue tooth it to us?” Unfortunately, there was a total lack of comprehension by some of the assembled. Move that forward five years, then the message is even more compelling.

Students argue that technology is an important part of their education in preparing them for the world of work. Ask a student to list jobs where they will write with pen and paper as a job requirement – they quickly struggle after journalist and waiter. Former CEFPI keynote speaker Professor Stephen Heppell is frequently quoted as saying, “a switched off device is a switched off student.”

So how does all this contribute to the design of learning spaces? We know that almost all their learning now occurs in a traditional classroom sitting on uncomfortable chairs or in rigid groups of round tables facing the front of the room. We realise that students understand that they:

- Work in a variety of uniquely different ways,
- Can select a range of different environments,
- Choose when to/when not to use technology.

Why on earth don’t we let students help design the full range of agile learning environments that allows them to move and reconfigure spaces suited to the work at hand?

“Young people know and understand that more traditional group teaching in formal layouts is necessary at times, but these are moments and should not be the whole approach. If you create a system where initiative and creativity is valued and rewarded, then you’ll get change from the bottom up,” Paul Pastorek noted in “The Third Teacher”.

The usual cries that “some students would fool around” or “do no work” do not really hold water. We shouldn’t condemn all students, regardless of learning styles and aptitudes, to one set position for the sake of a few.

There is far more discussion about this in enlightened circles. We see learning environments started in all sorts of new venues – shopping malls, office spaces, church halls and so on. What is certain is that the majority of ideas behind these alternative spaces do not want to try and replicate the past, but rather consider the future and produce dynamic innovative environments that engage the learners and reflect their learning styles.

Surely all schools should be reflecting this thinking now if we are really going to get the best out of our young people.

There is much work to do and many willing to continue the conversation. But until we actually do something different and not just talk about it, nothing will change.

Gareth Long is an internationally recognized independent education consultant with a wide range of experience including serving as a secondary school head teacher turning around several failing secondary schools. As senior advisor to the former Minister of Education, Cayman Islands, Gareth played a major role in the design of transformational new schools and received the Spirit of Excellence Award. Acting as education lead for one of the UK’s biggest building contractors, Gareth provides education recommendations on the design of numerous new schools across the UK.
STEM for All

By Paul Hutton and Todd VandenBurg

The Challenge

President Obama said in his 2011 State of the Union address that the United States is experiencing a second “Sputnik Moment,” implying that we are challenged to keep up with our international competitors in training scientists and engineers. A recent review of academic performance rated the United States 17th in reading, 23rd in science, and 30th in math. Such poor performance may lead to further decline in our economic standing in the world.

As a result, the National Governors Association has made the following recommendations regarding Science, Technology, Engineering and Math, known widely as STEM:

• Align K-12 STEM expectations with readiness for all post-secondary pathways.
• Align STEM expectations to create a coherent K-12 system.
• Support promising new models of recruiting and preparing STEM teachers.
• Create STEM Centers to support improved teaching and learning across each state.

President Obama also said we need to “out-innovate” our competitors, and that “In America, innovation doesn’t just change our lives. It is how we make our living.” One of those innovations is the emergence of STEM as a driver of education reform. STEM has become a favorite term of educators, yet there is little consensus as to what that means or how it should be implemented. The recommendations above include the creation of STEM Centers, but there are no guidelines to design them. In this article, the authors will share their insights into the proper role of and implementation for STEM within the K-12 sector.

STEM School Models

STEM takes many forms within the K-12 sector, adapted to the needs of each district, community and student body. A few of the more typical STEM configurations are described below.

Public Magnet School – Many districts have created STEM schools that function as magnets for an entire district or portion of a district. These magnets frequently have admissions criteria and limited space and are, therefore, not available to all students.

Charter STEM School – Several charter schools have adopted STEM themed curriculum in whole or in part. Charter schools are still public schools and do not charge admission. Unfortunately, due to disparities in charter school building funding, charters rarely have facilities that allow for high-level science and technology instruction.

Private STEM Schools – Many independent schools have high-level science programs. A few even have STEM centers. Depending on available funding, STEM instruction may be basic or advanced, but it is not unknown for these institutions to include electron microscopes and genetic engineering labs at the K-12 level.

Vocational STEM – In some districts, STEM has been used to reinvigorate and modernize vocational-technical education. This is an appropriate recognition that technology has fundamentally changed basic professions such as auto mechanics and construction. These fields can be made more attractive to students by incorporating STEM principles and modern equipment.

STEM for All – We use this term to denote a public STEM school that is neither magnet nor charter, but is a fundamental part of a single feeder system. With this approach, every student has access to, and will participate in, some STEM education. And for those students who wish to focus on STEM, there are none of the typical barriers, such as a lottery or admissions tests.

Program and Curriculum Development

A STEM program should start by working with the local community,
businesses, and post-secondary destinations to identify the desired outcomes. Examples of outcomes might be:

- Students create Career Plans specific to STEM fields;
- Success during the first year of college or post-secondary training with no remediation;
- Successful graduation from college or post-secondary training.

Typical secondary schools are organized around departments such as Math, Science, English, and History, with individual departments further subdivided, as in the case of Science having Biology, Chemistry, and Physics. STEM programs may be organized around specific themes rather than departments, with these themes driving curriculum and building layout.

Many of these themes are inherently inter-disciplinary and relate to specific career paths. Once the themes have been established, a next step would be to outline potential careers within each of the themes. Career paths may be as quasi-vocational as electrician or they may be as esoteric as astronaut. There may be as many as 40-50 career pathways that will be partly influenced by the local community. Having defined Themes and Career Paths, it is possible to develop a matrix outlining which courses should be taken to prepare a student for each, and in which year that course would ideally be taken. This matrix might be labeled Career Pathway Elective Options.

**Lab Function and Layout**

Labs are the heart of any STEM center. They should be spaces that encourage collaboration, experimentation, exploration and even wonder. Whereas traditional secondary school science labs have been dedicated to the specific disciplines of biology, chemistry, and physics, STEM labs may exhibit both higher levels of specialization and more variety. Examples of specialization would be genetic engineering and organic chemistry, while examples of greater variety would be robotics and avionics.

One frequently overlooked aspect of lab design is simply providing adequate space. We strongly believe in the standards promoted by the National Science Teachers Association (NSTA). It is important that the proper sizing of lab spaces be included in the programming phase, and protected throughout design and document development. These standards suggest a minimum of 60 square feet per student in secondary school and 45 square feet per student in primary school.

Project based learning has significant impact on the design of lab spaces. Incorporation of extra storage for projects underway is critical. Because one constant in education is change, we strive to make labs as flexible as possible. One obvious manifestation of this approach is that we rarely utilize fixed islands with utilities. We also rely heavily on movable and re-configurable furnishings. We understand that labs for different disciplines have very different needs. We therefore design each lab individually, and avoid repeating one lab design/layout for multiple spaces.

Specifics of the plans include exterior work stations which frame group learning areas that can be configured in a variety of ways, all viewable by the teacher; teaching space around the fume hood; and additional storage behind the teaching wall.

**Developing Partnerships**

Many successful STEM programs have nurtured relationships with local...
institutions and businesses. On the institutional side, community colleges, four-year colleges and other technical career centers benefit from formalized relationships with K-12 STEM centers. These institutions currently spend billions of dollars annually on remedial education for recent high school graduates and appreciate that excellent STEM education can reduce this burden. Partnership results include offering college-level courses to STEM students, guaranteeing admissions to STEM graduates under certain pre-defined conditions and identifying scholarship opportunities for STEM students.

On the business side, companies welcome the opportunity to provide input on the attributes they seek in the future workforce. Benefits of corporate partnerships include internships, externships, provision of teaching resources and donation of equipment.

STEM for Young Students

As the STEM movement has expanded to include more districts and more schools, it has also expanded into a broader range of grade levels. We believe this is critical to the success of the STEM movement. Children have an innate sense of wonder about nature, and encouraging this sense rather than ignoring it can only have positive benefits as those students grow older. Science/Math instruction at the elementary level is all too often weak and uneven, especially in comparison with other industrial countries. It may be difficult to introduce STEM into elementary schools, but an alternative is to take elementary school students, at least on an occasional basis by younger students. In larger K-8 schools, we have designed specialized STEM labs for use only by grades K-5. This approach offers the opportunity to custom design the STEM lab to accommodate the size of K-5 students and equip it with safe and appropriate equipment.

Sustainable STEM Buildings

Two of the most prominent movements in K-12 education today are STEM and Green Schools. Fortunately, these two movements have much in common and can be readily combined in a single school building. In fact, many aspects of sustainable or “Green” design lend themselves to incorporation in a STEM facility. Students today are generally quite knowledgeable about environmental issues and many of them care deeply about the state of the world. Students will not respect the building they are placed in if that building does not in turn respect the larger environment through low energy use and responsible stewardship of resources. And their attitude toward the building will reflect upon their attitude toward the program itself.

We typically establish clear energy and sustainable goals at the beginning of every educational project and STEM centers are no exception. What may be different at STEM facilities is that these goals may be even more ambitious, and energy use and sustainability are put on display even more prominently. In establishing energy goals for a K-12 STEM center it is important to realize that STEM buildings tend to use more energy than typical schools due to the lab spaces. The typical K-12 school building in the U.S. today uses approximately 79 kBTU/square foot/year. New schools are averaging significantly less than that, thanks to more demanding energy codes and voluntary programs such as LEED and CHPS. Whatever the energy target established, STEM Centers may use up to 10 kBTU/sf/year more than their non-STEM counterparts.

Buildings as Sustainable Teaching Tools

As important as it is for STEM buildings to be examples of energy efficiency and sustainability, it is even more important for STEM buildings to become teaching tools about the importance of sustainability. It should be possible for STEM students to readily grasp the primary energy conserving features of their building and to monitor actual real-time performance of those features and the building as a whole. When this capability is provided, teachers will find ways to utilize that information in their lessons.

Energy dashboards have been used for a few years to display energy and other resource usage to building occupants. Although these can be effective, we find that most often they are quickly forgotten. We have therefore instituted new measures to arm students with the kind of information they need to change human behavior. In a recent STEM school, we equipped all eight of the basic labs with E-mons energy monitors. These are mounted on the wall adjacent to the main entrance door, and can be seen by every student on their way in and out of the Lab. These E-mons are set up in a most unusual way; rather than only monitoring and recording power used by outlets in the room, they also monitor all the electric lighting in the lab as well. In this way, each of the E-mons records all electrical energy usage in the room. Students from any lab can compare their electrical energy use to all the other labs and they can chart their own energy use over time.

If there are photovoltaic panels at a STEM center, they should be connected to a Building Automation System that allows students to access output data in real time and to study the interface between that output and overall building performance. Another method of using the building as a sustainable teaching tool is to make many of the environmental control systems available for student viewing. At a recent STEM center, we have detailed a pathway through the accessible basement,
from which most of the critical HVAC equipment may be observed.

Buildings Teaching Science and Math
Science buildings have long incorporated science themes, but these banal graphics are quickly ignored by the occupants of those buildings. A typical example is depiction of the periodic table in floor or ceiling tiles of a Chemistry Lab. We believe that STEM buildings can incorporate scientific and mathematical themes on a deeper level. Occasionally such design elements may even lie undiscovered by building occupants for a long time.

We find that teachers will incorporate these into their lesson plans, and we frequently encounter students busily measuring or recording building features as part of an assignment.

The History and Personalities of Science
Math instruction in the U.S. has generally failed to hold student interest for a variety of reasons. Some theorists have questioned student motivation, and others have looked into cultural biases. There may be validity to these and other issues, but we believe that one area of pedagogical failure has been the insistence on making these subjects “objective” and in the process depersonalizing, even dehumanizing them. No wonder students lose interest.

The scientific method seeks objectivity, but it is still conducted and advanced by very real people. We believe that STEM should be taught in conjunction with an awareness of those personalities who have contributed most to its advancement through history. To do otherwise would be akin to teaching English as grammar without literature.

For this reason, we seek ways to introduce humanity back into STEM. An example is the use of visually rich murals about a wide variety of scientists, mathematicians, technologists and other creative individuals. One of the important lessons from such a depiction is the incredible inter-connectedness among disciplines and across time. STEM is all about making connections, and seeing them where others had not.

Information Technology
As Clayton Christensen has observed in his influential book “Disrupting Education,” Information Technology (IT) has already changed education, and it will change education even more in the future. Smartboards and similar technologies are already ubiquitous throughout STEM centers and schools in general. Videoteleconference facilities are another staple, allowing content to be generated off site and made available locally. A valid question is whether IT in STEM buildings or STEM portions of buildings should be any different than other classrooms. We believe there are subtle differences in the integration of IT in STEM centers.

The world of IT is ever changing. This is exemplified by innovations in tablet PC’s that have challenged the role of lap top and desk top PC’s. Touch screens and touch pads are another innovation that is challenging our perception of how we interface with computers. Voice recognition technology is also improving rapidly. There are many new technologies and new markets developing at an alarming rate. In IT, “Change” is the one common
characteristic. STEM classrooms must be planned to adapt to technological change.

STEM instructors are innovators and quite often first adapters of new technology - they must have classrooms that can be scaled to their needs. In IT, these needs translate to access to data over a network. Dependent on the amount of data they are pushing and/or their need for mobility and convenience, they may require access to a network by wifi and/or hard wire connection. To accommodate this need for flexibility, both methods of connecting should be provided in all teaching spaces.

One perspective on the need for wireless and hard wire connection is that as the ability for wireless transmitters to transfer larger amounts of data increases, so does the size of the files that are being developed for programs that run on computers that operate at faster speeds. In many cases, such as intense graphics, wireless speeds are not fast enough for the larger data thru-put. In addition to wifi, STEM classrooms should have an array of floor data connections to allow for possible connection of equipment so that advanced programs that push large amounts of data can be used.

From the FF&E perspective, new computer hardware must be purchased on a regular basis. Likewise, budgeting for equipment replacement must be done on a regular basis. From the facilities design and construction perspective, the infrastructure must be robust, redundant and scalable. It is recommended to have redundant wireless coverage to prevent dead spots. It is also recommended that rooms be equipped with multiple floor and wall network connection points.

STEM classrooms should have the network infrastructure to allow for flexibility in furniture configuration for wired network connections. They should also be equipped with wireless connection points to allow for portability and convenience. Where possible, these connections and wireless transmitters should be part of a clearly organized labeled network of cables in accessible ceilings, chase spaces, oversized conduits and cable trays. IT systems must be planned with change in mind in order to be adaptable to new technologies.

Conclusion
As we implement more and more STEM centers in our K-12 schools, we will no doubt see ever greater variety of approach and design. This is appropriate as the STEM concept adapts to many different communities, circumstances and budgets. But, we sincerely hope all of them will retain certain basic features, including:

- Focus on desired outcomes;
- Emphasis on sustainability;
- Integration, rather than isolation, of disciplines;
- Inclusion of human aspects of STEM;
- Thoughtful planning of progressive IT.

Paul Hutton, AIA, CAE, LEED AP is the founding principal of Hutton Architecture Studio, in Denver, Colorado. From its origin more than 20 years ago the firm has been dedicated to creating high performance, daylighted, environments for learning. Paul has conducted research, lectured, and written extensively about daylighting schools for nearly 30 years. He developed and still teaches the daylighting and sustainability course at the University of Colorado at Denver College of Architecture. The firm’s Aspen Middle School was Colorado’s first completed LEED NC Gold school building. Since early 2009, Hutton Architecture Studio has partnered with the Governors Energy Office to administer the state’s High Performance Building Program. Paul lives on a sustainable ranch south of Denver, where he is actively pursuing the goal of living at zero net energy.

Todd VandenBurg, AIA, LEED BD+C is an associate at Hutton Architecture Studio with 20 years of experience while working on many of the firm’s signature projects. Todd’s intuitive design abilities and implementation of technology in Architectural Design have resulted in successful projects recognized for their excellence by educators, contractors and architects. As the managing architect for the Institute of Science and Technology (IST), Cherry Creek Schools new Science, Technology, Engineering and Mathematics building, Todd worked closely with the Cherry Creek District Administration and Curriculum Team. Hutton Architecture Studio which designs environments for learning and promotes sustainability in architecture is recognized regionally as an innovator in daylighting and sustainable solutions. Fundamental to all of the firm’s work is the harvesting of daylight to improve occupant performance and increase energy-efficiency.
Colonel Smith Middle School Complex will be one of the country’s most progressive examples of collaborative and technology-based learning for Science, Technology, Engineering and Math Curriculum (STEM). The school will house 450 students in grades 6-8 and an additional 150 in a proposed charter high school. STEM programming will be appropriately differentiated for each grade level. Instructional delivery methods will put heavy emphasis on project based, interdisciplinary instruction that stresses real world problem-solving and experimentation in a collaborative environment. This innovative facility will enable students to utilize hand-held technology such as: tablet computers, electronic workbooks, laptops as learning tools within a fully functional cloud computing environment. All spaces inside and outside will be spaces for learning. The entry to the school, school site and all areas of the complex create interest, curiosity and learning opportunities. CSMS reflects environmental awareness and learning opportunities to students through its day-to-day operation. In total, the New Colonel Smith Middle School Complex will be a secure, student-centered school that champions student achievement using strategies and technologies that will change the language and essence of school design for generations to come.

The Fort Huachuca School District is committed to creating highly engaging and technologically advanced programs for the 1,100 K-8 military dependents served by the school district. The district finished building two new elementary schools during the past five years and has begun the planning and designing process for a new middle school with the opportunity to charter a small specialized high school with a curricular focus on Science, Technology, Engineering and Mathematics.

The governing board of the district is purposeful in its pursuit of research based, technologically enhanced rigorous educational programs for the students attending the district schools. The way this is being accomplished is through placing technology integration specialists at each school. These specialists create building action plans for utilization of new technology into the instruction design and delivery
process. Their role is to coax, coach and model implementation of interactive boards, hand held student devices, student response systems and technology based instructional programs. This job-embedded professional development component provides teachers with the necessary support for radically changing day to day instruction.

This foundation is preparing the teachers for the creation of a new school design developed with external and internal collaborative, adaptive and flexible learning environments. In 2012-2013, middle school students will move into this high tech state of the art new school. Shortly after this school is open, the district will phase in a new secondary option for the students enrolled in the middle school. The plan is to begin the phase in the 2013-2014 school year. The school design process has involved engineers, architects and school construction experts who have envisioned, engaged and innovated to create a truly revolutionizing education facility.

Language was changed to embrace Dr. Ronda Frueauff’s vision. Examples include changing classrooms to Extended Learning Areas, extended learning areas to a Student Collaboration Area, science labs to STEM Labs and library to Research Commons.

Rethinking what sustainability means, the team incorporated space that is rapidly reconfigurable. Flexibility allows teacher and student educational delivery needs to be met at any point during the school day. With very little effort, space can be created and re-created that works with building systems allowing students to participate in an effective and exciting educational delivery process.

From the very beginning the design team had a major goal to reduce building energy. We have done this using an integrated design process focusing on:

- Orientation and shape of the building
- Site design
- Lighting, day lighting & electricity
- Ventilation
- Heating and cooling
- Material selection
- Envelope design and quality assurance

Day lighting in this context is the careful introduction of natural lighting throughout the majority of the school so the need for electric lighting is reduced to a very few hours per day. Skylights, clerestory windows and high-performance window-wall glazing systems create a layered approach to control of glare, solar heat gain and uniformity of luminescence throughout educational spaces.

The resultant effect is Colonel Smith Middle School Complex, an educational complex that generates more energy than it consumes on an annual basis. Such a building is called a “Net Zero Energy Building” (NZEB). After the initial energy demand of the school is reduced by almost 50%, remaining energy requirements will be met utilizing a 250 kW photovoltaic site produced electrical energy system, solar potable water heating and 5 wind machines which are part of the educational delivery system.

In the past seven years of the 21st century, the number of people entering science and engineering jobs grew at the smallest rate since the National Science Foundation began tracking the data in the 1950s. Twenty-five percent of all college-educated workers in science and engineering jobs in 2003 were born abroad.

A child starting school today won’t leave until 2023 by which point, who knows what technology will be commonplace? Schooling must become more flexible and therefore more
Engaging and interesting. Classrooms worldwide remain largely traditional, and technology is usually prescriptive. It is clear that bold action is required to improve STEM education if we are to maintain our place of prominence in the global economy.

The vision for this learning environment was strengthened by research from the National Science Foundation, the Science Foundation of Arizona, the 21st Century Partnership, the International Society of Technology, the Science and Technology Network, the National Academies, the Arizona K-12 Center, the National Diffusion Network, the Center for Innovation in Engineering and Science Education, and the National Assessment of Educational Progress.

For an informative video showing images of the project along with discussions of the learning environment, please go to “Tapestry for Learning: Interwoven Instructional Design Components” at http://www.youtube.com/watch?v=laodF_GwEjE

Dr. Ronda Frueauff has directed programs and districts since 1989, and is currently the superintendent of the Ft. Huachuca Accommodation District in Sierra Vista, which serves the children of military personnel at the Ft. Huachuca U.S. Army Base. Her field studies include Instructional Strategies Impact, Effective Schools Impact, and Leadership Impact Studies for Ohio school districts. She received a Bachelor of Science in Elementary Education/Special Education from Miami University (Oxford, Ohio), a Masters Degree in Learning Disabilities/Behavior Disorders (Xavier University, Ohio), a Masters Degree in Educational Administration (University of Akron, Ohio), and an Educational Doctorate in Educational Administration and Supervision with research emphasis in Organizational Development (Arizona State University).

Tony Wall, 3W Management, has served as a school administrator, and is the former Executive Director/CEO of The Council of Educational Facility Planners International. In the private sector, he has experience as a successful general contractor, real estate developer and owner’s representative, giving him an unparalleled background to assist school districts across the country. His hands-on approach and broad perspective leads teams to successful development of unique and sophisticated projects.

Ron Essley, AIA, NCARB, REFP, Emc2 Group Architects Planners, PC, has been actively involved in design and construction of 52 new schools including 25 elementary, 17 middle/K-8 and 11 high schools throughout Arizona. He has a Masters of Architecture and Urban Planning from Washington University (St. Louis, Missouri), and a Bachelor of Architecture from Arizona State University.

Michael Hall, AIA, REFP, Fanning Howey, serves as K-12 group director and chief marketing officer for Fanning Howey, a 200-person architecture/engineering firm with 10 regional offices. Under Michael’s direction, Fanning Howey has worked with educational communities in 36 states, the District of Columbia, and the Philippines. He has also helped lead the firm’s sustainable design initiative, which has resulted in Fanning Howey being named a “Top 100 Green Design Firm” by Engineering News-Record.
The dedication plaque at the entry of the Hammond Area Career Center in Hammond, Ind., displays this quote from Benjamin Franklin – “He that hath a trade hath an estate.” Published in 1758, this famous dictum was made at a time when career training was very different. An apprentice could learn his trade under the tutelage of a master in the guild system. In such an environment, workers developed highly specialized skills which guaranteed a profitable career and an “estate.”

When the Hammond Area Career Center opened in 1950 – then named the Hammond Technical-Vocational High School – career training had undergone a dramatic transformation. The birth of the Industrial Revolution and the explosion of factory jobs that followed greatly decreased the skills needed to be a productive worker. Just after World War II, Hammond students were training to work in the robust job market fueled by steel production in northwestern Indiana. While this provided a secure way to provide for one’s family, these jobs were largely based on the assembly line model, requiring a high amount of repetition and, too often, a relatively low skill level.

But in the 1970s and 1980s, the Rust Belt economy underwent a dramatic shift. Driven by advances in technology and automation, combined with lower labor costs in developing countries, many factory jobs disappeared or were rendered obsolete. The shift in the local job market could be most readily seen in the fate of Hammond Technical-Vocational High School, which was closed in 1981 and transformed into the Hammond Area Career Center, a vocational training facility serving 10 area high schools.

More than a decade into the 21st century, a new program housed in the Hammond Area Career Center is attempting to once again redefine what it means to “hath a trade” and “hath an estate.” Opened in 2010, the school’s Multimedia Broadcast Academy is providing students with the skills they need to grow and thrive in the new economy. This rapidly-growing program represents a new approach to career training within the district – one that is based on a different way of thinking about what it means to be a productive worker in the 21st century.

A New Way of Planning

This specialized learning environment required a unique approach to school planning, especially in light of the Academy’s surroundings. The program is housed in a former automobile engine and auto body repair workshop within the Career Center. To effectively transform the space, the
planning and design team had to undertake an extensive review of cutting-edge Career-Technical trends, as well as an investigation into the qualities of an effective 21st century learning environment.

The process began with the visits to other radio, television and multimedia programs across the region. After the district and its planning team clearly defined the program and approach, several potential spaces within the Career Center were analyzed for their ability to accommodate a flexible, project-based learning environment.

During the analysis, members of the planning team placed a specific emphasis on those factors which have the greatest impact on teaching and learning. Far from being an exercise in implementing standard best practices, this process interrogated many existing assumptions related to research into effective instructional environments.

For example, while daylighting has become the pet strategy of many planners and architects – thanks to the success of the Heschong Mahone report – Hammond’s team drew from the research of Dr. Lance Roberts of the University of Manitoba to reprioritize environmental issues. In a presentation given to the International Union of Architects at the CEFPI World Conference in Toronto, Dr. Roberts stated that four factors that impact student achievement are, in rank order:

1. Thermal comfort
2. Indoor air quality
3. Visual comfort
4. Acoustics (Roberts, 2007)

Using these criteria as a template for the evaluation of existing spaces, the team was able to identify the automobile engine and auto body repair workshop as the ideal candidate for adaptive reuse.

In the same way, the development of the academy’s educational offerings ignored some long-held, yet erroneous, theories – mainly, the Learning Pyramid. Many a presentation has used the famous chart, which shows the information retention rates associated with different forms of instruction. The Pyramid states that lecture-style instruction results in a five percent information retention rate, the act of reading results in a 10 percent retention rate, etc. The Pyramid progresses all the way to the act of teaching others, which supposedly results in a 90 percent information retention rate.

However, while the Learning Pyramid has gained widespread notoriety, there is no evidence to support these findings. Even the NTL Institute, the organization to which this study is dedicated, admits that it has no record of any published studies that support the Learning Pyramid.

Through their own research, educational facility planners understand that there is not one best way to teach students, but that learning environments should support a variety of teaching methods. This understanding helped to guide the planning of the Hammond Multimedia Broadcast Academy.

Planning and Design for Multimedia Environments

While the planning process addressed a variety of broad topics related to educational best practices, there was also a specific focus on issues directly related to the Academy’s unique multimedia environment. Unlike those who make the case that environment does not matter, citing “glorified anecdotes” such as the Hawthorne Effect (Kolata, 1998), the planning team understood that many issues associated with multimedia learning environments have a very specific impact on student performance.

For example, acoustics is extremely important when sensitive radio and television production equipment is involved. As part of the analysis of potential space within the Hammond Area Career Center, an acoustical consultant performed a series of extensive studies. The district’s first choice was quickly ruled out, as it was located below a print shop and binding equipment.

The auto body workshop, which was ultimately selected as the home for the Multimedia Broadcast Academy, also presented several challenges. A nearby electrical sub-station was causing significant vibrations in the structure. In addition, its electromagnetic output would impair the performance of the equipment in the radio lab, which would share a wall with the sub-station room.

To solve these problems, the planning and design team recommended cutting a construction movement joint separating the second-floor mezzanine from the radio lab. In addition, the team added a lead-lined wall in the radio lab to protect the equipment from the impact of the electromagnetic signals and used LED lights rather than fluorescent lights, which would negatively impact radio signals.


In his 2006 book, “A Whole New Mind,” Daniel Pink identified six senses that he believes will guide our lives and shape our 21st century world: Design, Story, Symphony, Empathy, Play, and Meaning. Of these six senses he writes, “Many of you no doubt welcome such a change. But to some of you, this vision might seem dreadful… Fear not. The high-concept, high-touch abilities that now matter most are fundamentally human attributes.” (Pink, 2006)

The curriculum found in the Hammond Multimedia Broadcast Academy uses Pink’s six senses as it basis for educational delivery. Students are immersed in a project-based learning environment focused on the editing and production skills
needed to produce television and radio broadcasts as well as Internet and interactive media for webcasts, podcasts and digital productions.

To help students hone their skills in design and storytelling, the Broadcast Academy uses the latest multimedia editing and production equipment, including a TV studio with high-definition digital cameras and a professional-quality control room. Instructor Robert Love praised the tools that students have at their disposal. “It has the overhead projectors. It has the big widescreen TVs. It has the radio room that is probably better than most radio stations in America,” he said. “The television studio itself—the lighting system that we have here is what Oprah uses in her studio. I teach the students how to use the lighting equipment here and they have the opportunity for employment at that level.”

Developed as a highly flexible learning environment, the Academy encourages students to engage each other in the “play” of ideas and to develop empathy and respect for their peers’ talents. One of the highlights of the space is a central project room called a LearnLab. The LearnLab’s X-shaped table configuration and triangulation of projection removes the need for the typical lecture-style approach to instruction. Students can sit in small groups and see each other’s faces, while also viewing whatever material is projected on the screen.

A first-year teacher who came to Hammond Multimedia Broadcast Academy after more than 25 years as a videographer for a local affiliate of CBS News, Mr. Love credits the flexible environment with easing his transition. “The building is laid out so well for me to teach in,” he said. “And as a first year teacher, it made it easier for me to instruct these students.”

Other highlights of the Academy include an open and transparent floor plan with a central seating area for group discussions. A project room, renamed the “War Room,” includes a Steelcase® media:scape system. The system allows students to display projects and share control of information presented with multiple classmates. In this way, students learn from one another, growing together in a symphony of shared exploration.

As one of their first assignments in the 2010-2011 School Year, students took video footage of the tragic shooting in Tucson, Arizona, and created their own newscast chronicling the events. In this environment, students are not envisioning their future as cogs in an assembly line process. Instead, they are becoming modern day storytellers, focused on creating original content that shapes the world around them.

From the 1940s to the 21st Century

When the Academy opened for the 2010-2011 School Year, the former 70-year-old vocational learning environment had been transformed into a modern facility for project-based instruction. The reaction among students and teachers was immediate.

“I wish I would have had my camera set up on the first day and watched the students’ faces as they walked into the classroom,” says Robert Love. “They were all saying, ‘Wow, Mr. Love. We never expected anything like this. I’m going to tell my friends so they’ll come here too.’ They were really excited...this was something special to them.”

In its first year of operation, the new program attracted more than 20 students. As the Hammond Multimedia Broadcast Academy enters its second year, that number has already doubled. In fact, the Career Center is already placing students on a waiting list due to an overwhelming level of interest.

The success of the program suggests a different way to think about education in America. Taking a cue from the documents prepared by our Founding Fathers, we must provide students with new tools for the development of life, liberty and the pursuit of happiness.

But perhaps this viewpoint is not so new. More than 200 years before Daniel Pink published “A Whole New Mind,” John Adams echoed similar sentiments regarding the importance of higher level thinking skills in the continually-evolving realm of education. In a letter to his wife Abigail Adams, he wrote, “I must study politics and war that my sons may have liberty to study mathematics and philosophy. My sons ought to study mathematics and philosophy...in order to give their children a right to study painting, poetry, music, architecture, statuary, tapestry, and porcelain.”

Greg Monberg
AIA, REFP, LEED AP BD+C
Greg Monberg served as project designer for the Multimedia Broadcast Academy. He is a principal with Fanning Howey and has focused on school design for more than 17 years. Greg is an active member of CEFPI, and recently volunteered for the Haiti Relief Task Force sponsored by CEFPI and Schools for Children of the World. His recent projects include the award-winning Harding Elementary School in Hammond, Indiana, and the new Greater Gentilly High School, one of five “Quick Start” schools constructed as part of the rebuilding efforts in New Orleans.

Riyad Bannourah
served as technology designer for the Multimedia Broadcast Academy. He has more than 30 years experience in the technology design industry, with the last 14 spent focusing solely on school facilities. Riyad has presented new trends in technology design at conferences for CEFPI, the Michigan Institute for Educational Management, and for E-School in Washington, DC, and has contributed to multiple articles on safety and security issues in schools. Recently, Riyad directed technology design for the new V. Sue Cleveland High School in Rio Rancho, New Mexico, a 2010 James D. MacConnell Award Finalist.
The ground-breaking award acknowledges the work of schools in reaching high levels of achievement under three areas: 1) Environmental impact and energy efficiency; 2) Healthy environment; and 3) Environmental literacy. Put another way, ED-GRS considers: 1) Schools’ and their occupants’ impact on the environment; 2) Schools’ environmental and behavioral impact on occupants; and 3) How schools teach students about the environment and sustainability to prepare them for citizenship and employment in the 21st century.

What ED-GRS Does

The recognition award aims to incent state education authorities and school communities to inform themselves as to energy and resource conservation measures that provide opportunities for cost savings; environmental and behavioral changes to promote health and productivity among students, staff and other occupants; and the use of environmental and sustainability education to support students’ preparedness for some of the nation’s fastest growing employment sectors.

The encouragement that the recognition award provides to schools, school districts and states to employ pertinent existing metrics and resources, and meet high standards in three key areas reinforces broader efforts to increase the nation’s energy security; reduce our environmental impact; improve students’ health, productivity, and career readiness; and, ultimately, increase the nation’s economic competitiveness.

How ED-GRS Came About

The Green Ribbon Schools initiative came from a public request to the Environmental Protection Agency (EPA), ED and the White House Council on Environmental Quality (CEQ). This led to a concept launch of the pilot program with heads of EPA, ED and CEQ in April, including plans to name a cohort of Green Ribbon Schools in the spring of 2012. ED spent the summer developing award criteria and nomination infrastructure, consulting with associations, states, national and local NGOs, school communities, technical experts, the public, and numerous federal partners.

What’s New in Facilities at the U.S. Department of Education?

By Andrea Suarez Falken

As you may have heard, it’s been an exciting summer at the U.S. Department of Education (ED). ED has been hard at work developing criteria and award infrastructure for U.S. Department of Education Green Ribbon Schools (ED-GRS), the first comprehensive and coordinated federal policy in the three institutional roles of schools related to environment, health and education.

How ED-GRS Works

Green Ribbon recognizes schools that meet a variety of existing standards, implementing and employing numerous complementary federal policies and resources. ED-GRS is a recognition award, not a grant. Recognition awards incent change by communicating high standards and recognizing the most exemplary schools or individuals according to specified criteria. Among the long-standing recognition awards are U.S. Presidential Scholars Program and Blue Ribbon Schools Program.

State education authorities will serve as the first line of application in the school selection process for Green Ribbon Schools. State education authorities will be asked to evaluate schools based on their facilities’ environmental impact and health and environmental education, as well as their compliance with federal civil rights and federal, state and local health, safety and environmental statutory and regulatory requirements. Based on the evaluation, authorities will select nominees to send to ED.

ED-GRS is a 50,000 foot mechanism designed for existing state and local programs and policies to glide into, regardless of their situation. This is in response to states and schools’ input that they are at different points on the path to the three areas (“Pillars”) of green schools, and need some flexibility as to how they select nominees to present to ED. ED-GRS is not federally
heavy, but instead designed to build policy infrastructure at the state, local and school level, with the assistance of existing resources to address environmental impact, health and education.

**Timeframe for Pilot Year**

By the end of September, ED will post finalized award criteria, including details on eligibility, requirements and nominating authorities, as well as a brief video of the Secretary inviting states and schools to apply for 2011-2012 year awards. This will include sufficient application and nomination infrastructure for state education authorities to prepare for the application process. Following Office of Management and Budget approval, additional information with a deadline for presentation of nominees to ED in the pilot year will be provided to nominating authorities.

**What Does ‘Pilot Year’ Mean?**

The aim of the first year of a recognition award is to stand up an exemplary first cohort to which other states and school communities can aspire, and incent change among as many applicants as possible. ED has taken several actions to lessen the burden on state nominating authorities and schools in the pilot year of the recognition award. These pilot year measures ensure that the maximum number of states and schools attempt the recognition award and, in doing so, give due consideration to related environmental, health and education policies. While ED seeks to incent as many states and school communities to create infrastructure to address these matters, ED will award only the most exemplary schools.

**Where to Find Additional Information**

More information on Green Ribbon Schools can be found at http://www2.ed.gov/programs/green-ribbon-schools/index.html.


Additional questions can be addressed to: green.ribbon.schools@ed.gov.

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**Andrea Suarez Falken**, special assistant/acting program manager, U.S. Department of Education Green Ribbon Schools, has worked on special projects for the Department – including initiatives for American Indian and LGBT students – since coming to the U.S. Department of Education in February 2011. Since the April concept launch of the Green Ribbon Schools, she has been the sole ED staffer working full-time on the development of the initiative, engaging federal, state and local; non-profit and private sector; and public input to devise award selection infrastructure. Andrea serves as Green Ribbon’s acting program manager in the pilot year of the recognition award, and will coordinate the application and awards process. In her spare time, she executes other writing, editing and translating projects for the Department. Before coming to ED, Andrea worked at the Department of Homeland Security, where she served as an intelligence analyst and Presidential Management Fellow. While at the Office of Intelligence and Analysis, her intelligence work appeared regularly in Secretary of Homeland Security Janet Napolitano’s Daily Intelligence Book, also distributed to the heads of DHS operational components.
INNOVATIVE EDUCATIONAL DELIVERY

LearnSpace Facility Engages! Enlightens! And Envisions!
LearnSpace, a Space Where We ALL Belong and Have a Voice

By Neil Logue

LearnSpace demonstrates the power of a range of professionals working together in a dynamic way that shows that learning can take place in a variety of spaces and places. What is more important is that it is about deeds, not words to follow in the tradition that we see colleagues demonstrating, that their vision turns into a reality, to have impact for both teachers and learners.

The UK in 2008 had the largest school building program in the world called the Building Schools of the Future (“BSF”). The vision of the Labour government was to spend £50 billion pounds ($90 billion) rebuilding the entire secondary (high school) estate of 4,000 schools over a 15 year period.

A combination of the global financial crisis of 2008 heralded in a new age of austerity and the age of plenty had ended! A new government was elected in 2009 and found that there were no monies to continue the BSF program. The circumstances and political masters had changed, but the problem of effective learning spaces in an old and crumbling school estate still existed.

The political posturing began as to what was good and what was bad within BSF and how in the age of austerity an affordable educational model for the 21st Century could be developed.

The challenge has therefore remained as strong as ever to raise standards and improve learning outcomes for all students, but to ensure that all educational facilities can deliver even more to local learning communities and contribute to economic wellbeing and local regeneration. The UK has a strong tradition of community education and there is no better time to re-establish the school or any learning facility as a potential hub or resource for its local learning community.
LearnSpace demonstrates the power of a range of professionals working together in a dynamic way that shows that learning can take place in a variety of spaces and places. What is more important is that it is about deeds, not words, to follow in the tradition that we see colleagues demonstrating that their vision turns into a reality, to have impact for both teachers and learners.

LearnSpace is about convergence and whilst I have been the initiator/convener of the concept, I have been influenced by the professionals who have gone before me, the current thinkers and the future learners within the school and community. It is through this collective community involvement that the fulfillment of the LearnSpace will be achieved. This is very much a journey of life-long learning.

Without Good Direction, people lose their way

The Vision for LearnSpace is to establish a world-class facility in the UK that explores the convergence between innovative learning, teaching, pedagogy and design can flourish. To design with, rather than simply for, the education client and to disseminate lessons learned to the broadest spectrum of the design and education communities are key to our vision.

Making effective use of space

LearnSpace is based in a refurbished warehouse building situated on an industrial estate in Corby, Northamptonshire. It takes as its starting point a low value building not specifically designed for education. Through appropriate conversion, a number of spaces have been created to offer flexible rearrangements to model potential design alternatives. And it is in offering this engagement with end users that we can test preconceptions and seek new innovations.

Activities to inspire

LearnSpace inspires confidence that refurbished spaces, with imagination and creativity, can offer appropriate environments for 21st Century learning.

At early project design phases, schools and Learning Academies are asked to provide direction for designers to establish the framework or ‘design brief’ for the design process. Not surprisingly, stakeholders are rarely equipped with the necessary experience to respond to the technical, spatial and organising queries which are asked of them – it simply is not part of their everyday experience.

Stakeholders will therefore be empowered to develop a design philosophy that suits their own school’s needs. They may also encounter new ideas and new possibilities for learning, teaching and school organisation that were not thought possible before. Rather than traditionally perceived requirements, LearnSpace will assist schools in identifying future educational needs and the corresponding spatial requirements for these needs.

The possibilities offered by the space will appeal to a broad spectrum of education professionals: local authorities could bring teaching staff of the same subject discipline from a range of schools; a head teacher or subject leader could work with a team of their own staff in the space; teachers could arrive with a group of their students.

The LearnSpace setting is a safe environment outside the school where the conditions are ripe for experimentation. It contains leading-edge ICT equipment across the zones, integrated with flexible furniture and equipment. The use, application and appropriateness of technologies can be evaluated in classroom settings and outcomes measured in their support of curricular activities.

As a research base, evidence collection is a critical driver for LearnSpace, with a focus on developing better outcomes for learners, staff and schools. Evidence of the impact and outcomes of space, furniture, equipment and variations in pedagogy is crucial in order to prove the efficacy of various products and approaches.

Learning Opportunities

- Orientating & lecturing in space to accommodate up to 100 students;
- Reflecting space focused on internal and external courtyards and quiet corners;
- Mentoring one-to-one in unique and varied locations;
- Writing & researching through wireless connectivity;
- Planning & generating in group working around layout tables and display walls;
- Experimenting & creating in well serviced wet areas;
- Presenting & performing in large or small group arenas;
- Immersing experience with virtual simulations and video walls;
- Discussing & socialising around free flowing informal spaces;
- Celebrating work in temporary and permanent displays;
- Assessing performance through monitoring technologies.

Engaging Technology and Equipment

The LearnSpace setting has all the attributes of an ICT-rich environment, and as such, will have a robust infrastructure providing users with the capability to work statically or roam wirelessly indoors and out. Drawing on cloud-based solution will enable activities to be unlimited by the physical space. Users have access to media-rich resources with the capability to edit, manipulate, assemble and publish in a range of ways, locally or online.

Effective ICT is a key element of LearnSpace’s approach to stakeholder engagement, where it will promote the use of ICT as a tool to create opportunities to inspire different and innovative ways of thinking, enhance and extend pedagogy, and encourage new ways of learning.
LearnSpace is enhanced by fully furnished bespoke fittings and equipment with the opportunity to showcase new products and classroom formations that are flexible, space efficient and effective in their design. Where the desk and chair have been the furnishings of choice for book and writing based learning, LearnSpace now looks to provide a VISION based on an integrated approach to technology, space and furniture.

It is a privilege to share our LearnSpace vision with CEFPI, whose members over the last 88 years have held true to CEFPI’s overall mission of improving educational environments for all learners.

We can look forward to new learning patterns, socialization and teacher/learner relationships through engaging and enlightening settings.

Opening in September 2011, LearnSpace welcomes all those interested in the development of new places to learn.

Working with education partnerships for research, industry, academia, teacher training, events, conferences and workshops.

Neil Logue is the founder of Education for All Charitable Trust. A chartered accountant by profession he has maintained a career supporting educational business and social enterprises. As CEO of Thorpe Kilworth Group he led the delivery of many BSF projects through manufacturing and supply of furniture, fittings and equipment. Alongside LearnSpace is soon to be launching ‘Bring IT Home’ to support parent and student engagement through home based technologies.

Marc Davies is the senior design officer at the Counties Furniture Group, a Local Authority not-for-profit company with eighty Local Authority members across the UK. It designs and procures furniture for its members and their schools from six contracted manufacturers. The Group has design as its core function and the organisation is concerned, not only with product design and public contracting for the supply of its products, but also in the research, development and adoption of good quality education furniture standards throughout the UK.

Daniel Plunkett is a director of Kilworth Studio Ltd. He is a chartered architect with varied experience within the education and retail sectors with clients as diverse as IKEA and Oxford University. His passion is the psychological value of space in supporting human motivation and behaviours - translating retail and place branding into education communities.
School districts throughout the country are suffering from aging schools, repair and maintenance backlogs, and budget short-falls. The result is insufficient government resources to ensure that students are provided adequate classrooms and facilities to enhance learning and student achievement. In Hawaii, the repair and maintenance backlog for 2010 was approximately $392 million for the Hawaii Department of Education’s (DOE) 260 public schools statewide.\(^{1}\) Coupled with Hawaii State government addressing a $1.3 billion deficit, deep cuts to government operations and services are currently being implemented, leaving minimal funding for school repair and maintenance, let alone needed facilities upgrades to meet the demands of 21st century learning.

Recognizing that public funds are severely limited, in 2009, the Hawaii Institute for Public Affairs (HIPA) initiated a research- and community-based effort to develop an innovative, systemic and practicable approach to school facilities upgrades, management and development. The process, best practices, and challenges experienced in the Aloha state could be used as a national model for building 21st century schools.

What is a 21st Century School?

A 21st century school includes a full complement of the people, programs and places that support a wide range of personal learning styles and instructional modalities. More recent models for educational delivery include innovative and effective practices like differentiated instruction, cooperative and project-based learning, multiple pathways and other educational strategies. These new strategies call for school designs that include some significant modifications, like more flexible and adaptable floor plan layouts, more advanced technology, improved daylighting and more. These design changes are all part of a new era of twenty-first century school facilities.\(^{2}\)

In Hawaii, most public schools are single-story, horizontal school campuses which consume large quantities of land, and are not aligned with 21st century learning. Hawaii law actually quantifies the historical average acres and enrollments required for elementary, middle, and high school as 12.5 acres (800 students), 16.5 acres (1,500 students), and 49 acres (1,600 students), respectively.\(^{3}\) Such school configurations are not necessarily compatible with modern school facilities which could be more compact and vertical, enabling efficiencies in technology, security and grounds maintenance, let alone more effective use of land. Most of Hawaii’s oldest schools are within the urban core, where the Urban Land Institute predicts that growth will begin to shift in the coming decades.

Elements of a Strategic Approach to Building 21st Century Schools Utilizing Vacant or Underutilized Public School Lands

Hawaii’s 260 public schools occupy about 3,978 acres of land and 19 million square feet of building space. Many school campuses are situated in valuable areas like the financial district of downtown Honolulu, near Waikiki Beach and downtown Lahaina – collectively worth billions of dollars if developed appropriately.

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\(^{1}\) Loren Moreno, Honolulu Star Advertiser, Hawaii Public Schools’ Repair Backlog Chopped 50 percent, May 10, 2010.

\(^{2}\) S. Bingler, et al., Concordia LLC, Hawaii: Nexus Community Planning and Engagement (Project Report to the Hawaii Institute for Public Affairs), July 1, 2011.

The essence of this approach to building 21st Century Schools is to leverage underutilized or vacant public school lands that are consistent with the educational and community needs of the school, teachers and its students. Joint-use, lease-backs, land swaps and other use of public school lands provide unique opportunities to maximize the value of public school lands. For example:

- Public school lands can be leased at minimal cost to Developer X for commercial or other purposes that are compatible with the school and surrounding community. In return, Developer X builds a new 21st century school and provides a portion of its lease proceeds for the duration of the lease to the DOE for further development of 21st century schools throughout the state.

- Developer Z builds a new vertically-designed 21st century school at no or minimal cost to the DOE, and occupies a portion of the premises for commercial, residential or other compatible uses.

Encouraging Public-Private Partnerships

Encouraging and incentivizing public-private partnerships are therefore critical. No longer can public education be solely financed and supported by government. The private sector, with its resources and expertise, can play an integral part in enhancing public education, while providing profitable opportunities for their respective companies.

The U.S. Department of Defense (DOD), for example, has pioneered these efforts in engaging in public-private partnerships in Hawaii and throughout the country. In 1996, Congress established the Military Housing Privatization Initiative (MHPI) as a means to develop and improve housing for U.S. service members. Under the MHPI, DOD works with the private sector to revitalize military family housing through a variety of financial tools-direct loans, loan guarantees, equity investments, conveyance or leasing of land and/or housing and other facilities. A similar approach to building and maintaining public schools can also be applied by leveraging public lands as well as public and private financing mechanisms.

Legal and Policy Reform

In order for the DOE to facilitate such land transactions, land management and title reform was required. HIPA developed a policy framework which was used as basis for legislation introduced as Senate Bill 1385 in the 2011 Hawaii State Legislature. A key element of SB1385 was transferring land title and facilities management authorities from DLNR and the DOE to a new governmental authority - the Public School Land Trust (PSLT). Unlike other western states, Hawaii does not have a dedicated educational land trust where proceeds generated from public schools lands can be used to build and finance 21st century schools. In summary, SB1385 included:

- Creation of a land trust to hold title to public school lands and revenues generated from the sale, lease or joint-use of its holdings;
- Formation of a public schools lands trust Commission to plan, construct and develop 21st Century schools;
- Funding mechanisms to build schools, including authority to issue special purpose revenue bonds and enter into a joint development agreement with private entities.

Simultaneously, Senate Bill 1555 was introduced in the Hawaii State Legislature. SB1555 similarly proposed the creation of a Public Lands Authority. The bill was much broader in scope than SB1385, and provided opportunities to utilize all public lands, rather than just public school lands. Ultimately, SB1555 was adopted by the Legislature, and signed by the Governor as Act 55 (SLH 2011). Act 55 now provides greater flexibility to utilize public lands, including public schools lands, for public-private initiatives as recommended in HIPA’s conceptual framework.6

Engaging Students, Stakeholders and the Community

A community-based policy and planning approach is essential to ensure that 21st century schools and any related commercial, residential or other development is compatible with the surrounding community. Teachers, students, community residents and stakeholders need to play a meaningful role in the planning, design and continued partnership between school and community. Short of that, there may be a disconnect between the school and the community. More so, opportunities to integrate learning, community support and partnerships for students could be lost. As part of HIPA’s efforts to develop model legislation and this systemic approach, we engaged, consulted and convened a wide range of key government, business, labor and community leaders.

Sustainable Financing Mechanism

Another basic element of HIPA’s systemic plan is to develop a sustained funding mechanism. Without a viable financing scheme, the plan will fail. Careful attention and emphasis must be placed on the development of a financing scheme that utilizes a wide array of funding mechanisms – taxes, business incentives, municipal bonds, etc.

5 While SB1555 was adopted, it is still unclear as to how proceeds from revenues generated from public school lands will be handled. Amendments to Act 55 may be required to ensure the proceeds from public school lands are used for public education purposes.
loan guarantees, etc — that maximize opportunities created by leveraging public assets and utilizing public-private partnerships.

Generally, in Hawaii, public school facilities are funded by State income and corporate taxes, augmented by federal funding for special and grant programs. As part of this systemic plan, the following concepts are being considered:

- Review and evaluate revenue and debt measures which impact public education;
- Leverage the value and use of vacant and underutilized land as part of a financial model;
- Monetize annual CIP appropriations for issuance of larger-scale municipal bonds;
- Identify school parcels with high value and development potential that can be used as a long-term revenue stream for public education.

These alternatives can vary based on the location of the school. Whatever the case, a comprehensive financial strategy is required. Piece-meal funding is not a viable approach to ensuring quality facilities for Hawaii’s students.

A Comprehensive Systemic Plan is Required

In order to integrate the above-referenced activities and requirements, a comprehensive plan is necessary. HIPA believes that the DOE must adopt a statewide plan to ensure that Hawaii’s students are adequately provided with quality facilities which advance student learning and achievement. While spending money on repair and maintenance is necessary to some extent, a systemic plan to build 21st century schools is the essence of this plan.

Furthermore, a comprehensive plan addresses important equity issues of any statewide schools system. School improvements must be looked at in totality to ensure that a fair and rationale approach is applied. For example, urban schools may provide better commercial opportunities for joint-development of school facilities with private entities. Therefore, how does the DOE deal with improving rural schools? Do development proceeds from one school get distributed to just that school, or are they distributed or allocated to other areas? These issues and more need to be addressed in a statewide plan.

Steven Bingler, REFP, received his architectural training at the University of Virginia. In 1983 he founded Concordia, a community-based planning and architecture firm, to pursue systemic and collaborative design practices. Concord - which means harmony among things and agreement between people - is the firm’s one word mission statement. Design projects include the Contemporary Arts Center in New Orleans, where a cooperative partnership with seven sculptors explored visual art and architectural design as a collaborative enterprise; and the Henry Ford Academy in Dearborn, Michigan. In 2006, Concordia coordinated the development of the Unified New Orleans Plan, a comprehensive strategy for the redevelopment of the city of New Orleans after Hurricane Katrina. Concordia’s research alliances have included the MIT Media Lab, Harvard University’s Project Zero, the University of New Mexico, the National Aeronautics and Space Administration, the Thornburg Institute, the Appalachian Education Lab and the West Ed Research Lab.

Alan Oshima serves on the board of the Hawaii Institute of Public Affairs. Mr. Oshima currently provides strategic business advice as the principal of AMO Consulting LLC in Honolulu. He was a founding partner of a Honolulu law firm before joining Hawaiian Telcom as its senior vice president and general counsel. Upon his retirement from that position in 2008, he continued to serve as a senior advisor and member of Hawaiian Telcom’s board of directors until late 2010. He is also on the board of Hawaiian Electric Company and various Hawaii community service organizations. In April 2005, he received the Hawaii State Bar Association’s Pro Bono Service Award for his countless hours of volunteer legal work in the community, and recognized as one of America’s Best Lawyers in the field of public utility regulation. He serves on the board of the YMCA of Honolulu, and as vice president of Hawaii’s 3Rs, a non-profit organization that facilitates government, business, community and school partnerships to repair, remodel and restore Hawaii’s public schools. He was appointed as one of the four community members on the Hawaii’s Interagency Working Group formed pursuant to Act 51, a bill passed to “reinvent education” in Hawaii. He served as an officer of many Parent Teacher Association boards and as a director of the Hawaii State Bar Association. He also serves on The Learning Coalition, dedicated to assisting Hawaii’s Public School System. He graduated from Northwestern University and the University of California, Hastings College of Law.

William M. Kaneko, Over the past two decades, Mr. Kaneko has served in various public policy, government and legal positions. He was a national recipient of the CORO Foundation Fellowship in Public Affairs, and served on the professional staff of Hawaii Governor John D. Waihee III. He served as national vice president for Public Affairs for the Japanese American Citizens League, the largest Asian Pacific American civil rights organization in the country. He is also an attorney with the Honolulu law form Alston Hunt Floyd & Ing, and was selected by his peers and listed in Best Lawyers in Hawaii. Mr. Kaneko received the Award for Public Service from the U.S. Department of Justice for his work with the department on redress for Japanese Americans unlawfully interned during World War II. He also received the Trailblazers Award from the National Asian Pacific American Bar Association. He received a Bachelor of Arts degree from the University of Puget Sound, a Juris Doctor degree from the Catholic University of America and an honorary Doctor of Laws degree from the University of Puget Sound.

About HIPA

HIPA is Hawaii’s first non-governmental public policy institute in Hawaii. Founded in 2000, HIPA has initiated about twenty policy projects which seek to provide practicable policy recommendations and research on Hawaii issues.
Development of a Consensus Standard for School Equipment: NSF/NSSEA 380

By Ashlee Breitner

For many years, the school supplies and equipment industry has investigated methods to ensure product safety and compliance across all its product categories. In early 2010, NSF International and the National School Supply and Equipment Association (NSSEA) came together to develop quality standards for products and equipment designed for use in schools across the United States.

Why are these standards necessary?
The industries manufacturing products designed for children have undergone much scrutiny over the past five years. With massive recalls in major categories such as toys and children’s jewelry, there have been many legislative changes to ensure safer products. It makes sense to integrate some of these same safety and accountability measures into school supplies and equipment.

Schools are considered by most parents as “safe zones” for their children. They naturally assume that the products and equipment their children will be using in their classroom is safe. Since most US students spend approximately 180 days each year in a classroom, it is essential that we ensure the products and equipment they are exposed to while there are safe.

What are the standards?
NSF is an American National Standards Institute (ANSI) accredited developer of national standards, and currently maintains a library of 52 national standards with ten more currently in development. NSF and NSSEA are developing this standard as an innovative and transparent approach to accomplish product safety and quality throughout the school supplies and equipment supply chain. The standard incorporates mandatory legislative standards along with other testing schemes to assure products are both safe and in compliance.

The standard, NSF/NSSEA 380 is being developed to:
1. Increase the value of school supplies and equipment throughout the supply chain by addressing market demand for safe products;
2. Provide information that enables decision makers to sort out the complex information on safety elements;
3. Educate and instruct all stakeholders in the school supplies and equipment supply chain; and
4. Encourage competition between manufacturers, distributors and their suppliers to seek out or develop more efficient and safer manufacturing processes, practices, power sources, materials and ultimately, products in the marketplace.

What categories are involved?
The scope of this standard includes products and equipment used in the K-12 environment, including, but not limited to: desks, tables, and seating products, visual communication products and audio-visual equipment, flooring products and laboratory equipment.

The standard will encompass such aspects as electrical safety, fire safety, VOC emissions, materials safety and stability and load performance. Products will be evaluated by physical and mechanical testing, chemical analysis and determining volatile organic compositions. Existing standards for these individual performance aspects will be referenced as applicable.

As required in the standards process, a number of task groups have been formed to help gather insight from all industry stakeholders. The task groups are comprised of industry leaders including retailers and manufacturers as well as legislative representatives. Having input from all aspects of the industry helps ensure a consensus-based standard that meets the needs of all stakeholders when complete.

What can you do?
There are several different ways that
your organization can get involved with this important initiative.

Join a Joint Committee:
A joint committee includes representatives from all stakeholders. Joint committee members provide the final vote on the standard to determine if it moves forward and can be published. Generally a single organization can have only one voting representative on a joint committee, and any one interest category cannot account for more than 33% of the committee membership for safety-related standards.

Join a Task Group:
Task groups can involve additional non-voting stakeholders. They are formed to evaluate a specific technical issue for a Joint Committee. They may develop a draft standard, draft revision, or other recommendation for review by the Joint Committee. The task groups will seek to identify what environments in the school and which supplies should be included.

The current task groups for this standard include: emissions, material safety, furniture, carpeting/flooring, A/V equipment, laboratory equipment and visual display. The current status of each task group is listed below:

- **Emissions**
  The primary function of the emissions group is to determine what information is currently available for the classroom or other school environments. They will be consider the existing standards, methodologies and programs recognized in the market; collect and analyze data and compile a list of standards/methods applicable to specific product types.

- **Material Safety**
  The Consumer Product Safety Improvement Act (CPSIA) is the main driver in material safety. The group will develop an initial list of relevant regulations and chemicals of concern, and will include established criteria found in such areas as the CARB rule (formaldehyde), Lead and Chromium VI requirements, BIFMA e3 lists, as well as international criteria like ROHS and REACH among others.

- **Furniture**
  BIFMA (the Business and Industrial Furniture Manufacturers Association) currently has an educational seating standard under development. This task group will analyze how this and other BIFMA standards may apply in an educational environment.

- **Carpeting/Flooring**
  The carpeting/flooring task group will analyze how to use criteria from existing standards: NSF/ANSI 140 Carpeting and NSF/ANSI 332 Resilient Flooring. Materials safety, emissions and product performance criteria are included in these standards. The group will reach out to both hardwood and tile industries for participation in this program.

- **A/V Equipment; Laboratory Equipment; Visual Display**
  The task groups for A/V equipment, laboratory equipment and visual display are currently forming. Contact schoolsupplies@nsf.org if you are interested in participating on one of these groups.

Act as an Observer
Interested parties can attend standards committee meetings (JC or TG) as an observer. As an observer, you may obtain copies of drafts and submit public comment for the Joint Committee’s consideration through NSF workspace at http://standards.nsf.org. You can also review ANSI Standards Action published weekly and available to view at www.ansi.org.

What do these standards mean for the industry?
The goal of these new standards is to establish the basic safety criteria which will enhance confidence in NSSEA products. NSSEA is also hoping to establish mechanisms for recognition of these products within nationwide green and sustainable schools initiatives.

About the Certification Program
An NSF International Certification Program for School Supplies and Equipment will be developed in conjunction with the NSF/NSSEA 380. The certification program will provide an international benchmark for product types, including: seating products, desks and tables, visual communication products, audio-visual equipment and carpets and flooring for products that target the kindergarten through 12th-grade school-setting market. Agreed-upon test methods and certification requirements for product quality, performance and material safety will be specific to consumer use and customized by product category.

The certification assessment criteria for School Supplies and Equipment Manufacturing and Distribution Certification are divided into three categories:

1. **Product Design**
2. **Manufacturing Processes**
3. **Product Testing**

Each of these three criteria will be evaluated by a third party accreditation body. The final results of the evaluation will determine eligibility for NSF Product Certification. Procedures will be in place to regularly monitor and measure continued performance of products to this standard and certification criteria on an annual basis.

Why NSF?
NSF International is well positioned to assist NSSEA with its goal of establishing a consensus-based standard and a health, safety and environmental certification program for K-12 products. NSF’s integrated Toy Safety (Children’s Products) program is designed to walk clients through the entire assessment process, including review of the hazard analysis/risk assessment, audits, testing and certification. The Children’s Products program at NSF offers exceptional customer service by focusing on turn-around times, quality work, premium test reports, all while being cost effective. NSF’s on-site
technicians work with manufacturers daily to determine the needs of their products for the CPSIA. In addition to CPSIA testing NSF works with a large variety of global standards for children’s products on a daily basis to help manufacturers meet requirements. Additionally, a number of NSF standards are already in our schools:

- NSF/ANSI 61 Drinking Water System Components (plumbing and fixtures)
- NSF/ANSI 50 Pool and Spa Equipment (filters and circulation equipment)
- NSF Food Service Equipment Standards – refrigerators, freezers, display/serving
- NSF/ANSI 140 Sustainability Assessment for Carpeting
- NSF/ANSI 332 Sustainability Assessment for Resilient Flooring

NSF International is a not-for-profit, nongovernmental, third-party organization, and has been a leader in standards development, product testing and certification, education and risk management for the protection of public health and safety for more than 65 years. While focusing on food, water, consumer products, and the indoor environment, NSF develops national standards, provides third-party conformity assessment services and provides learning opportunities through its Center for Public Health Education while representing the interests of all stakeholders. NSF is widely recognized for its scientific and technical expertise in health and environmental sciences. Its professional staff includes engineers, chemists, microbiologists, toxicologists and environmental health professionals with broad experience serving the needs of both public and private organizations.

**Conclusion**

NSF/NSSEA 380 will help ensure that safe, high quality products are being used in our schools. Product certification to this standard will show commitment to providing the highest-quality product possible. It is NSF International’s mission to protect public health and safety. Children are some of our most vulnerable assets and it is our goal to develop standards and programs to keep them safe.

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**Ashlee Breitner** is a senior project manager at NSF International in its Consumer Products-Children’s Products division. She has a Bachelor of Science in Child Development from Eastern Michigan University. Her industry technical expertise is used to aide children’s product manufacturers through the regulation process from product testing to product development. Ashlee is leading the program development of the certification program for NSF/NSSEA Standard 380.

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The National School Supply & Equipment Association (NSSEA) promotes an open marketplace for quality educational products and services that lay the foundation for a stimulating environment for teaching and learning. NSSEA’s mission is to serve the educational products marketplace by providing high quality trade shows that increase the productivity of the channel; networking opportunities to build relationships with trading partners; and market information on which to make solid business decisions. For more information, visit www.nssea.org.
Atascocita Springs Elementary School

By Irene Nigaglioni and Deborah Yocham

As the design developed, the building evolved into a facility that is best described as an important and exciting place to learn. Every decision made on the design side was linked to learning and vetted against the three overarching goals for the facility.

With the significant amount of time invested in researching the best techniques for delivering instruction to their students, Humble ISD is always on the forefront of education. From the High Schools of the Future Task Force, which led to the creation of Small Learning Communities in all of their high schools, to the Humble ISD “Go Green” Initiative, where community members participated in months of meetings to determine what the green and sustainability goals for all future projects in the district would be, focusing on the best environments for learning is always the top priority in the district.

Taking the recommendations of their active and vocal community groups, the district embarked in the design of the 26th elementary school, Atascocita Springs Elementary School (ASES). From the onset of design, goals were established that would help form the educational specifications and shape the built environment for the new elementary school. The goals were:

**GOAL 1.** A sustainable, high-performance school that would meet CHPS verified and LEED certified criteria.

**GOAL 2.** A building that would be a learning tool and that would support the district’s established curriculum goals.

**GOAL 3.** A building that would embrace the community’s strong history and rich traditions.

Some of the challenges in achieving each of these goals were:

- Tying the curriculum into the building to ensure the building is a true teaching tool in a manner that is relevant and not superficial. This included discussions with the Children’s Museum of Houston, as well as the district’s science and math curriculum coordinators.

- Achieving the CHPS and LEED goals without adding unnecessary costs. The design team had to evaluate each of the inclusions and ensure a payback of less than five years. Given the humid climate in Houston, this posed some unique challenges, particularly in the mechanical system.

- This part of Humble was all zoned in a very successful and popular elementary school, presenting a challenge in obtaining community buy-in. The large community acknowledged the need for the new school, as the existing elementary was overcrowded and was using several temporary buildings to accommodate the increased capacity. When boundary discussions began, the community was not pleased that they would be divided into two schools, and everyone wanted to be certain they would not be rezoned for attendance at the new school.

Armed with these goals, the design team approached the challenges with an open mind, looking for innovative ways to blend the built environment with instruction. The team took each of the goals and identified possible ways to best respond with the built facility. Initial thoughts and ideas focused on the following:

**GOAL 1.** The design team evaluated the CHPS and LEED criteria and recommended adoption of those items that positively impact learning and would be energy efficient, helping to reduce the operational costs of the facility. Each of the items was evaluated individually and measured for its initial cost and ease of implementation, long-term costs and return on investment, impact on learning and curriculum possibilities. A list was developed that became the road map for meeting the sustainability goals for the facility.

**GOAL 2.** Building on the sustainability goal, the design team worked with...
district instructional team members to identify possibilities for linking instruction to the built facility. The design team carefully studied the state-mandated science and math knowledge and skills requirements, and developed opportunities for the building to provide real-life, actual learning platforms for the students. Utilizing techniques, such as uncovering the inner workings of the building and developing teaching stations related to the operation of the facility, the design team created a menu of items that would be highlighted and incorporated in the facility to provide a seamless connection between learning, construction and sustainability was seamless.

**GOAL 3.** The Humble community is well known for its rich oil and energy history. Settling in the area years ago as they gained employment with Humble Oil, many families have stayed in the area generation after generation. They are strong advocates of this rich heritage and are active participants in district activities. This valued tradition also became embedded in the design solutions for the facility. Tying the sustainability goals and their strong emphasis on energy with the Humble Oil background led to the integration of systems such as solar panels into the facility, which again, are part of the instruction and learning that takes place at ASES.

As the design developed, the building evolved into a facility that is best described as an important and exciting place to learn. Every decision made on the design side was linked to learning and vetted against the three overarching goals for the facility.

Some of the basics of the building are:

- Two-story facility – kindergarten through second grade on the first level; third through fifth grades on the second level.
- Classroom wings face north-south to take advantage of natural light. Every classroom has windows, and there are sun shades on the north side to control glare and allow for light to bounce off the ceiling in the rooms.
- All ceilings in the classroom areas are at 10’, and lighting is provided through direct/indirect pendant light fixtures so that the white ceiling glows, creating bright and sunny classrooms.
- All classroom areas open up to outdoor learning courtyards that include learning tools, such as hundreds charts, rulers and sundials. These areas allow students to learn while moving – there is a direct impact between movement and the brain, so engaged movement that is focused on these learning tools helps students succeed.
- In addition, the wings are teamed vertically, so the outdoor activities are focused on the age group that uses it – kindergarten and third grade; first and fourth grades; second and fifth grades.
- Each classroom wing has a collaboration space that serves as the hub of learning for the wing. This area is lit by natural daylight and includes learning tools such as movable marker boards and tack boards, a marker/projection wall, projector, hundreds charts, rulers and other math and science activities.
- The walls in the classroom wings have tiles that were specifically selected to be proportional – this allows for fractions and proportions to be taught in the classroom hallways. Windows from the classrooms to the hallways allow for monitoring of learning activities that take place outside the classroom.
- Each classroom wing has its own theme and is based on the ecosystems taught at the different grade levels in science. These ecosystems are expressed in the ceiling treatment of the collaboration space, as well as through the use of learning specific magnetic boards at the entry to each wing. Students spend time addressing questions posted on the boards, adding flora and fauna to each lesson at hand, based on the essential science skills.
- A Main Street hallway separates the classroom wings from the commons spaces, such as the gym, cafeteria and library. The Main Street walls are highlighted in Austin natural stone, bringing the outside into the building, and enhancing the goal of a natural, green facility. In addition, natural light permeates this space through the use of clerestories.
- The Main Street ceiling is wood, which again, incorporates natural materials into the heart of the building.
- The gymnasium shares an operable wall with the cafeteria, so a large community space can be created for gatherings.
The stage opens off the gymnasium and has windows to the exterior to bring natural light into the gymnasium when it is not being used as a stage.

The district has a joint use agreement with the YMCA, and the gym and cafeteria are used frequently for children’s camps and activities.

The cafeteria and library also share an outdoor learning courtyard, which includes the following components:

- An arbor with built-in benches for outdoor classes to take place.
- A garden that is maintained by the students and irrigated with water collected from a rainwater harvesting cistern located in this area.
- Fun outdoor learning activities, such as tubes that allow sound to be heard throughout the entire courtyard area.
- Solar panels behind the library are used to power up the computers in the library, serving as a learning tool.
- The library is lit by daylight through a combination of translucent panels and windows. Indirect/direct pendant lights are also provided, but are only needed on rainy days and nights.
- The library’s radial design was highlighted with the inclusion of a solar system that hangs below the ceiling. Again, incorporating the science curriculum helped form a building that is truly a teaching tool.
- All of the library’s shelves are on casters so that they can be easily moved, allowing library to be used for a multitude of purposes.
- The vast majority of the furniture in the school is ‘green’ and therefore contributed to the CHPS and LEED criteria – yet another example of the thought put into every detail of the school.
- The building’s main distribution frame room, or main network room, has windows to the hallway so students can see the inner workings of the technology system in the building.

Interactive displays are located throughout the building and help showcase the building’s systems, energy use and sustainable features. Students can monitor and log solar, water, gas and electrical loads and use, as well as track demands against climate. They are also able to click on the building’s sustainable features and understand what makes the building environmentally-friendly.

The second floor includes two learning bridges where the science curriculum is also integrated. One of the bridges is a magnetic bridge, where metal plates on a grid serve to teach magnetism to students. The second bridge includes racing lanes and different floor materials, so friction, speed and inertia can be studied.

Nooks and niches were incorporated along Main Street in preparation for a finalized agreement with the Children’s Museum of Houston to install manipulatives and learning tools, such as inclined planes and friction plates. These will be provided by the museum and rotated on a regular schedule, highlighting different activities throughout the year. This building will serve as a community facility, so students from other district schools can come and visit either during the school day on scheduled field trips or after school with their family.

The use of natural Austin stone and local masonry ties the exterior of the building to the interior. The building’s exterior color palette is also complementary to the neighborhood where the school is located.

The site includes visitor and parent drop-off areas, as well as a bus loop.

Irrigation is done through the rainwater harvesting system and recycling bins are provided for the community at large.
The challenges posed by building this elementary school were successfully met by the uniqueness of the building, and the thoughtfulness of the composition. As the variety of the building’s features demonstrate, this building truly is a learning tool, inside and out, and addresses the strengthened educational requirements for the math and sciences curriculum. The CHPS- and LEED-inspired incorporation of windows into the hallways, classrooms and library save the school money on lighting costs, and has been proven to be better for learning. The rainwater cistern and solar panels are also relatively inexpensive ways to help reduce the school’s water and energy costs, while teaching the students important lessons about conservation and energy re-use. To obtain community buy-in, the school had to become an integral part of the community. The open and flexible floor plan for the gymnasium and adjacent cafeteria provides a large gathering space, allowing the school to join in a partnership with the YMCA in hosting children’s camps and activities. The partnership with the museum and the installed manipulatives bring the Children’s Museum of Houston to the residents of Humble. Both ventures with the YMCA and the Children’s Museum of Houston are a great way to introduce the school to the entire community and to future students. ■

Irene Nigoglioni, AIA, REFP, offers varied experience in institutional facilities. Her experience in the design of academic facilities ranges from renovation to new construction. As a partner with PBK, Irene is involved in all aspects of a project, including master planning, schematic design, design development, construction documents and contract administration. Irene acts as PBK’s national planning director, as she keeps up with the latest instructional curriculum trends in school design, ensuring PBK’s buildings are designed with student success in mind. She is active in CEFPI and has served as a board member at the International, Regional and Chapter levels. She is also very active in the lecture circuit, presenting at conferences such as CEFPI-International, TASBO, CEFPI-Southern Region, TASA/TASB, TASB Summer Leadership Institute, TCSWE and the Department of Education’s Office of Safe and Drug Free Schools Conference.

Deborah Yocham, a native Houstonian, has been a professional educator for more than 27 years. She received her Masters of Educational Administration from the University of Houston and has worked in several southeast Texas school districts. With teaching experience at both the elementary and middle schools, she has also served as assistant principal and principal at both the elementary and secondary levels in both the public and private sectors of education. Currently the director of facility planning and construction in Humble Independent School District, Deborah relies on a wealth of experiences to lead a fast-growing district through unprecedented facility planning and construction phases. She has worked with the District’s “Go Green” initiative to bring best practices, sustainability and quality learning environments to every Humble ISD student. Recently, Deborah served on the committee to bring TX-CHPS to fruition and has opened the newest school in Humble ISD designed for LEED Certification and TX-CHPS Verification.
The MAYFIELD Project

By Lara Mackintosh

Dr John Mayfield, PhD (Harvard) was a leader in education as a teacher, inspector, administrator, author and instigator of ideas. He was recognised as being visionary and yet realistically practical. He was involved in the planning and governance of public and private schools and in the design, financing and management of education buildings for more than 30 years. During that time he provided inspirational leadership, innovation and the sharing of ideas locally and internationally. John was vitally instrumental in establishing the first Australian chapter of CEFPI in 2000 and he received a special CEFPI International Award for this initiative. Recognizing the importance of investing in our youth, John began a professional development program for younger members, which is now known and supported as the Mayfield Project.

The Council of Educational Facility Planners International (CEFPI) has at its core a wealth of energy and experience that reaches across the disciplines involved in educational facilities. Its membership spans across international borders and generations of practitioners. The MAYFIELD project builds on the opportunities this offers through project based research activities that encourage the sharing of ideas, the researching of theory and the collaboration of minds. It is the aim of this article to locate the MAYFIELD project within current thinking on research and practice as a means of professional development. In doing so it is hoped that future MAYFIELD activities can be developed that promote the learning of the participants and strengthen the meaning of research in architectural, educational and management practice.

In order to discuss the possibilities of learning in practice, and the possibilities afforded by the MAYFIELD project, what is meant by learning must first be considered.

- Learning is a continuous process grounded in experience.
- Learning is a holistic process of adaptation to the world.
- Learning is the process of creating knowledge. (Kolb 1984)

This supports the notion that learning can also occur through practice, and that experience is a valid form of research. For those who are familiar with research and educational theory, this can be seen as action research and experiential learning. It is an approach that is often discussed in curriculum development and design of education for primary and secondary students, yet is one that can easily be applied to a professional learning context. In the MAYFIELD project, the learners are CEFPI members involved in the design and use of learning environments, and the action research is used to inform the design of these spaces and enable designers and users alike to better understand the opportunities, benefits and innovations that are possible. In 1948, Lewin, one of the founders of this way of thinking about research, considered that “research that produces nothing but books will not suffice” (Lewin 1946). He regarded the process of research and knowledge creation as identical to the process of learning and problem solving in everyday situations. For the MAYFIELD participants, research enables the problem solving we face on a day-to-day basis to become an intrinsic part of our continual development and learning as professionals and practitioners. Critical to this process are the four stages of actual (or concrete) experience, reflection and observation, formulation of concepts and theory and testing these concepts in new situations (Zuber-Skerritt 1992). This cyclical process in turn leads to new experiences which can be used to further develop practice, as shown in figure 1 on the next page, and the two research based projects that have been coordinated by CEFPI Australasia can be found within this model.

The Young Professional Project 2006 and the MAYFIELD Project 2010

John Mayfield’s original concept for the Young Professionals Program was to engage younger professionals in a project based program that reflected the diversity of membership, topics
and approaches within CEFPI. It also provided an opportunity to develop mentor/partnerships with experienced professionals internationally. This culminated in the projects presented at the CEFPI Australasia Conference in Adelaide, South Australia in May 2006. The second project built on this framework but in a broader and more dynamic way. The idea was to develop this concept and name it after John Mayfield as a tribute to his contribution to CEFPI and his desire to keep people, especially young people, engaged in a learning process. It was literally on the back of a napkin that the idea of the five themes came up and at the CEFPI Australasia Conference in Perth, Western Australia in May 2010, the MAYFIELD projects were presented. For both programs the project commenced at least one year prior to the conferences, and the participants involved were rarely based in the same cities, or states.

The Young Professionals Project (YPP) had a clearly defined project based design focus and aimed to raise awareness of new ways to plan, design, deliver and manage community services for a life of learning. The participants were asked to investigate the benefits of lifelong learning in a developed Greenfield community and to respond to a specific brief, site and user group. Three groups were formed and over around 12 months, each developed a distinct and innovative approach. These were an interconnected learning centre; an evolving learning community; and a framework with a political focus that support reform in educational delivery at a policy level. Despite their differences each of the projects had tangible outcomes that involved the formulation of theories and the testing of these theories in the given scenario.

The MAYFIELD Project was the cornerstone of the Designing for Difference Conference in 2010. Fifty young professionals, with the assistance of experienced mentors, all from the fields of architecture, education and administration, investigated whether design makes a difference to learning. Their research, undertaken in teams, focused on one of the following topics – the learner; the community; the landscape; the curriculum and the learning environment. The project began in 2009 as the groups found their position within the broader themes, and developed a focus for their research. The aim of the project was to enhance knowledge of educational facility design and allow discussion and debate into future directions. Once again each group developed a distinctly different approach to develop theories within the allocated themes. Most of the research activity focused on their own concrete experiences and reflection which led to the development of concepts and theories. The activities at the conference were framed around this research and demonstrated the application of the concepts and encouraged delegates to reflect upon their own experiences and practices. The diversity of the presentations, which ranged from model...
making, round table discussions, virtual discussion that crossed the globe and a garden of grass and flowers, reflected the variety of approaches to research and the broad approach taken within each of the themes. While the outcomes of these projects were less tangible than in 2006, the focus of sharing of experiences served to encourage all participants to look for opportunities for development in practice.

**Reflections**

It is important to note that both the Young Professional Project and the MAYFIELD project can only be considered as part of this process of experiential learning, and while the role of the research, reflective and conceptual activities is critical, success of the projects depend also on the mode of practices of the participants and their capacity to follow up through everyday situations. As Boud and Pascoe note, experience does not necessarily lead to meaningful learning (Boud and Pascoe 1978). Experience without reflection, generalisation, hypothesis formation and testing does not result in learning (Zuber-Skerritt 1992). This was echoed by participants of the 2010 MAYFIELD project, when asked to comment on their experiences leading up to and at the conference.

Many saw the opportunities for personal and professional development within the experience. As many of the participants were younger members of the professions, the MAYFIELD project offered an opportunity to question and challenge in a context that supports risk talking. This was seen as a critical element of the development of new and innovative theories. In addition, those who were part of the presentations and activities at the conference observed the potential for learning and even change in those who attended.

**Lessons Learned**

The MAYFIELD project, as an experience, achieved many of the aims and in some cases exceeded expectations. However, the response to the MAYFIELD project was at times mixed, and the format challenged delegates. Additionally, the logistics of a 12-18 month long project, which in many cases really took place in the 3-6 months immediately preceding the conference, was difficult. The challenges came mainly from engendering consistent commitment and participation from all members of the groups and providing sufficient guidance while encouraging exploration within the broad themes.

Following up after the conference, encouraging the testing of concepts in practice and continuing the share experiences was also a challenge, more so for the MAYFIELD project than the
Engaging with ENERGY STAR®:
How to Increase Student Involvement in Your Energy Management Plan

Energy Efficiency in K-12 Schools

By Hanna Grene

The U.S. Environmental Protection Agency’s (EPA’s) ENERGY STAR® program has helped thousands of K-12 school districts across the country to improve the energy performance of their facilities, save money and cut greenhouse gas emissions.

It is no secret that school budgets are growing smaller, forcing districts to make tough financial choices. Building operating costs drain a massive portion of most districts’ budgets—school districts in the U.S. currently spend over 8 billion dollars annually on energy, an expenditure second only to faculty and staff budgets, and more than is spent on textbooks and technology combined. As such, energy efficiency is a powerful tool to cut short- and long-term operating costs, and reductions in energy use of at least ten percent are possible with little or no cost through improved energy management. School districts can then use savings from lower energy bills to pay for building upgrades that enhance the health and quality of students’ learning environment.

The U.S. Environmental Protection Agency’s (EPA’s) ENERGY STAR® program has helped thousands of K-12 school districts across the country to improve the energy performance of their facilities, save money and cut greenhouse gas emissions. As of 2010, more than 32,500 K-12 schools have been benchmarked in Portfolio Manager, EPA’s ENERGY STAR measurement and tracking tool, and as of fall 2011, 5,000 K-12 school buildings have earned the ENERGY STAR for superior energy performance. These participating schools see tangible benefits to partnering with EPA: ENERGY STAR certified schools use 35% less energy than typical buildings and cost 50 cents less per square foot in energy costs.

ENERGY STAR: the National Standard for Energy Efficiency

In 1992, EPA introduced ENERGY STAR as a voluntary program designed to identify and promote energy efficiency and protect the environment. Through its partnerships with more than 20,000 private and public-sector organizations, ENERGY STAR provides technical information and tools that organizations and consumers need to choose energy-efficiency solutions and best management practices.

ENERGY STAR has successfully delivered energy and cost savings to businesses, consumers and organizations across the country, saving Americans about 18 billion dollars in 2010 alone. Over the past decade, ENERGY STAR has been a driving force behind the growth in use of such technological innovations as efficient fluorescent lighting, power management systems for office equipment and low standby energy use.

Student Energy Teams create helpful posters and signs to encourage energy efficiency.
K-12 schools that receive a score of 75 or higher are eligible to apply for the ENERGY STAR.

Gain EPA Recognition for Your Schools and Districts
EPA offers several different levels of recognition through the ENERGY STAR program:

- ENERGY STAR certification is given to existing buildings that have achieved an energy performance score of 75 or higher in EPA’s Portfolio Manager tool by entering at least eleven months of their monthly energy consumption data.

- ENERGY STAR partnership offers a unique opportunity to leverage ENERGY STAR. Becoming an ENERGY STAR partner is an easy, cost-free process. Simply fill out an ENERGY STAR Partnership Agreement, found online at www.energystar.gov/partners, and have a high-ranking member of your organization sign the commitment letter.

- ENERGY STAR Leaders recognition is available to organizations that have demonstrated a portfolio-wide improvement. Applying for Leaders recognition is a great opportunity for school districts, which commonly have portfolios of more than two buildings. Leaders recognition is available for ENERGY STAR partners who have demonstrated portfolio-wide improvements of 10%, 20%, 30% or more in normalized energy use, or have an average portfolio-wide score of 75 or better. Partners who meet this goal are recognized as Top Performers.

- ENERGY STAR Partners of the Year are those organizations that have made outstanding contributions to protecting the environment through energy efficiency. To be considered, an organization must meet the specific eligibility requirements in the award application and submit a complete online application package. All organizations participating in the ENERGY STAR program are encouraged to apply for a 2012 ENERGY STAR Award.

Going Beyond Management: The Power of Student Involvement in Energy Efficiency
Students, faculty, and staff members spend the majority of their day in school buildings. Although hands-on learning and co-curricular activities are widely recognized as beneficial to the learning process, the opportunity to use school facilities themselves as learning tools has gone largely unnoticed. Occupant behavior plays a fundamental role in the operation of any facility—engaging students and faculty in energy management is a necessary decision in order to optimize your buildings’ performance. Including students in school-wide energy management efforts teaches them how energy and environment are interconnected and how their behavior in a building has a distinct environmental impact.

Classroom activities incorporating energy management can teach students what energy is, where it comes from, how it is transported and how it affects the world around us. Engaging the student population in any K-12 school and at any grade level will also broaden an energy manager’s reach, through enhanced, school-wide awareness on the effects of turning off lights, powering down computers and identifying drafty hallways and classrooms.

Methods and Campaigns to Engage Your Student Body
Launch an ENERGY STAR Challenge in Your District
ENERGY STAR offers no-cost technical tools and promotional materials to help you engage your student body and make energy efficiency part of your district’s day-to-day operations. One great way to jump-start your energy efficiency action plan is to launch an ENERGY STAR Schools Challenge for your school district. With help from
champion individuals from the administration, faculty, student environmental groups and parent associations, an ENERGY STAR Schools Challenge can energize the entire community to work towards improved energy performance.

To begin the Challenge, be sure to benchmark your facilities in Portfolio Manager to establish a baseline of your facilities’ energy consumption and costs. You can then use this baseline to set reduction goals and a target energy performance score. Use EPA’s no-cost ENERGY STAR Challenge posters, sample press releases, and publication materials to assist your outreach efforts. Some states, such as New Mexico and Wisconsin, have launched an ENERGY STAR Schools Challenge to all K-12 school districts statewide, with impressive results—each state met their target goals in the first year!

Challenges are a great way to focus attention on the issue of energy efficiency and to drive savings as you develop long-term strategies for student involvement and improved efficiency. Districts can leverage the Challenge by providing energy and cost-savings updates through social media, school and district websites, and events to educate the community on energy and environmental conservation. Start your district on the path to launching an ENERGY STAR Schools Challenge today at www.energystar.gov/challenge.

Energy Clubs and Organizations

While many schools may have environmental or recycling clubs at the middle and high-school levels, energy clubs can make a fitting addition to a pre-existing club or as its own extracurricular activity. As students take action to improve their learning environment and protect the climate, they can feel more empowered and learn valuable leadership and citizenship skills. Energy clubs can assist facility managers by teaching peers, other grade levels and even faculty about the importance of energy efficiency and ways in which everyone can play their part. Students acting as teachers in this way learn the concepts of energy and conservation, develop critical public-speaking skills and become ambassadors for positive change in their homes and communities.

Energy in the Classroom

Energy can be integrated into the curriculum at all grade levels. ENERGY STAR Kids materials (www.energystar.gov/kids) include fun facts, games and an interactive bedroom that helps students identify the items in their lives that use energy. Through its partnership with the Seuss foundation, EPA provides Lorax and Horton educational activity books and tip sheets for elementary school students, encouraging a basic understanding of how young students can help protect the environment through energy efficiency.

At the middle and high school levels, energy can be integrated into classroom objectives for social studies, history, science and math. There are a number of useful resources available to help districts, teachers, and students launch energy education in their schools and classrooms. The cost-free resources below will show your students the importance of energy efficiency and the part they can play in meeting conservation goals.

- The National Energy Education Development Project (www.need.org) promotes an energy-conscious and educated society by creating networks of students, educators, and business, government, and community leaders to design and deliver objective, multi-sided energy education programs. NEED offers energy curriculum by grade level and a catalogue of learning kits and materials. All NEED materials meet the National Science Education Content Standards and all state standards.
- The U.S. Department of Energy (DOE), through the Office of Energy Efficiency and Renewable Energy’s (EERE’s) Kids Saving Energy website (www.eere.energy.gov/kids), offers games, information on renewable energy, quizzes, tips, and videos on how kids can save energy.
- EERE’s parent and teacher website (www.eere.energy.gov/education/lessonplans/) includes a database of K-12 lesson plans, labs and activities searchable by grade level, topics, or key words.
- The award-winning Alliance for Climate Education (ACE) (http://www.acespace.org/) works to educate high school students on the science behind climate change and inspire them to take action to curb global warming. ACE gives assemblies to high schools across the country and encourages students to start Action Teams to kick-start carbon-cutting projects at their schools. ACE supports these student-led Action Teams with training on organizational leadership and planning, project ideas and media exposure for successful teams.

Educating Students, Improving Energy Management: Case Studies

ENERGY STAR partner districts have used a variety of creative methods to engage their students and faculty in their energy management plan. The following examples are only a few of the school districts that leverage ENERGY STAR into improved energy performance and student involvement:

Council Rock School District

Council Rock School District in Newtown, Pennsylvania has reaped significant cost savings from their energy efficiency efforts, saving over 7 million dollars in just four years with the help of ENERGY STAR tools and resources. Council Rock earned ENERGY STAR Partner of the Year recognition in 2008 and 2009 for impressive savings of over 40% in total portfolio-wide energy use and won the ENERGY STAR Sustained Excellence Award in 2010. Council Rock involved students, staff members and the community in
their energy management with a “Green Team” of stakeholders that coordinates initiatives and shares updates on the district’s progress. Each year, students compete to design an energy logo to represent Council Rock’s Green District efforts. The winning logo is featured on the school’s Green Calendar, which is shared throughout the district and the greater community.

**Mercer County Schools**

Mercer County Schools has made impressive gains in energy efficiency, receiving the distinction of ENERGY STAR Leader for the district’s 10 percent overall energy reduction from a 2010 baseline. Engaging with ENERGY STAR has provided Mercer with the resources to set achievable goals for energy reduction and build a culture of active participation and innovation throughout the district. Recognizing that occupants play an important role in the operation of a high-performing school, Mercer created School Energy Teams to focus on building assessment, raising awareness and promoting energy conservation strategies in every facility.

A faculty member serves as each Energy Team’s leader and is responsible for recruiting the team and advising the school administration on energy conservation knowledge and activities. Additional team members include students, parents, the school’s Energy Manager, an administrator and the head custodian. The energy manager supports the Energy Teams as a mentor, providing teams with assistance on sustainable solutions for schools. Student team members conduct an audit of their schools, evaluating the habits of building occupants with respect to lighting, plug loads and HVAC systems. Once baseline tracking is complete, the Energy Teams work to raise awareness of energy efficiency in their schools and communities with energy conservation projects, monthly patrols, in-depth lighting and plug-load studies, lessons to younger students about energy efficiency and entries into the Youth Awards Program hosted by the National Energy Education Development Project.

Many more school districts across the nation are leveraging ENERGY STAR tools and resources to save money, improve efficiency and communicate their goals to students, faculty, and administration. Whether you are looking for information and training on benchmarking, establishing a comprehensive energy management program or striving to earn recognition for your success, you can find no-cost, school-specific resources online at www.energystar.gov/k-12.

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**Hanna Grene** has experience in education, business development, community outreach, research, and field work in both Cameroon and the United States. She currently serves as the K-12 task lead for Cadmus’ contract with EPA’s ENERGY STAR® for Commercial Buildings in the public sector. Ms. Grene works closely with K-12 school districts, local governments, and other public sector organizations to evaluate building energy performance and promote climate protection through increased energy efficiency in new and existing buildings.

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1 TJ Poliskie, “Mercer County School Energy Program Guide 2010-2011”
Place-based Learning: Interactive Learning and Net-Zero Design

By Alec Holser and Michael Becker

Food and conservation science curriculum, net-zero design and student-based building performance monitoring have come together in the unique and innovative new Music and Science Building for Oregon’s Hood River Middle School. The school’s Permaculture-based curriculum both informed the building design and was also transformed through the integrated design process. The building both houses the school’s science program and acts as a teaching tool integrated into the curriculum. This project won the first 2030 Challenge Design Award, is one of the first net-zero K-12 projects completed in the country and is currently under review for LEED Platinum certification. It offers a tangible demonstration of how decentralized energy and water systems, aquaculture, biological energy systems, year-round food production and performance monitoring can be incorporated in K-12 design and woven into school curriculum.

Permaculture aims to create stable, productive systems that provide for human needs, where each element supports and feeds other elements, ultimately aiming at systems that are self-sustaining. In keeping with these principles, the site combines native plants and plants to be used for instructional purposes including food production, fiber and building materials and plant-based dye, creating a landscaped area that responds to the natural climate. In the greenhouse, an organic composter that uses waste produced in the cafeteria provides fertilizer for use in the outdoor vegetable garden. A large fish tank in the greenhouse forms the basis for a living machine that processes fish waste that also fertilizes plants grown for food. The students have the opportunity to market and sell their produce at the Gorge Grown Farmer’s Market, hosted at the school every Thursday. Not only does the market complete the cycle of growth from seed to table, it also creates an opportunity to strengthen the community to which the school is inextricably tied by hosting the public on the campus and fostering the social interactions that ensue. The site also features an amphitheater overlooking the greenhouse that can be used as an outdoor classroom, performance space and gathering place.

The concept of Permaculture is brought into the new building through a design that aimed to collect and use resources to ensure that they will have a net-zero impact on the environment. Most buildings consume energy resources that combine to total around 40% of this country’s carbon footprint. At Hood River Middle School, the new building conserves resources with a well insulated building envelope, efficient mechanical systems that include a geothermal heat source, radiant slab heating and displacement ventilation. What energy the building does use is produced by photovoltaic solar panels on the roof.
These systems are integrated into the curriculum in a number of ways. Sections of the wall and floor assemblies for the building remain exposed through glass, so students can see how they were constructed. Students have access from the science classroom to the heart of the building’s geothermal and water system, the pump room, labeled and metered specifically to be used for classroom demonstration and instruction. Part of the science curriculum now includes regular metering and analysis of the building’s energy performance through a real-time building dashboard, tracking actions in order to reduce consumption. The building controls system is set up to allow students to create scientific experiments by changing set points to observe the actual effects.

Passive systems that use natural systems to enhance the quality of the interior environment and make the building function more efficiently were used extensively on the building. Daylight modeling suggested use of well-placed skylights and clerestory windows, ensuring that classrooms were evenly lit and allowing lighting to remain off during many daytime hours. Trellises covered with deciduous vines are placed outside south facing windows to block summer heat gain, but make it available in the winter. A one-foot thick air plenum under some of the solar panels passively pre-heats air before sending it into the ventilation system. Natural ventilation takes advantage of the ‘stack effect’ with low operable windows and roof vents to passively cool or warm the space as required. This system has a ‘red light/green light’ indicator that informs students when the outside air temperatures are appropriate for opening the windows and vents, further promoting student interaction with and awareness of their built environment.

The building and site also incorporate a number of innovative water systems. Rainwater is collected from the roof in a 14,000 gallon tank to be used for toilet flushing and irrigation. Site runoff is treated on site in a bioswale rather than connecting to the municipal sewer and stormwater system. Water from a nearby stream is used to cool the radiant slab. Even a trip to the bathroom can reinforce the concepts of conservation of resources, as students will find low-flow sinks, dual flush toilets and waterless urinals there. The various water systems are also metered on the building dashboard for student analysis and experiment.

Conservation of resources also extended into the building material design of the building envelope sought to achieve the highest degree of thermal efficiency while remaining sensitive to the historic context.
Signage is displayed throughout the facility demonstrating the sustainable design strategies incorporated in the building design.

choices. A large wood framed shed built in the 1940’s that was originally used as a bus barn was deconstructed piece by piece to make room for the new building. Much of the bus barn was reused in the construction of the new building, including joists that were re-milled and pieced together to create the trusses that constitute the building’s exposed roof structure. 98% of the material from the bus barn was reused or recycled. Recycled material was also heavily used throughout the building from the ‘paperstone’ recycled paper countertops to the wall board made from 95% recycled gypsum. These lessons are reinforced to the students with designated areas for recycling bins set up for student use.

The desire to use the building as a teaching-tool to illustrate the concepts of Permaculture inspired the design not only to integrate the building into the curriculum but to attempt to influence the relationship between the building and its users. Hood River Middle School students produced a video about their experiences with energy, water, waste, and food to demonstrate how this program has impacted them.

Alec Holser, AIA, LEED AP, is a founding principal of Opsis Architecture an award-winning architecture firm in Portland, Oregon. Alec brings more than 25 years of experience designing award-winning new and renovated educational facilities. He leads the Opsis K-12 design studio and focuses on designing fluid learning spaces that respond to individual learning styles of students. Alec was the lead designer for the innovative design of the Medford, Oregon Roosevelt and Jackson Elementary schools, winners of the 2010 Innovation in Learning Award presented at CEFPI 2010. Alec brings a highly collaborative design process to each project by involving the full range of building users, greater community and designers in an integrated design process. Alec Holser served as the lead designer and principal in charge for the Hood River Middle School project.

Michael Becker, recipient of the Oregon Middle Level Teacher of the Year award for 2008, has been a public school teacher for 11 years. For the last seven years at HRMS he has been developing the Outdoor Classroom Project, a Permaculture inspired, integrated approach to accelerating through the Oregon State Standards. The new “Green building” is a key piece in the evolution of our program, using, “Transparent Educational Design” to help design systems that teach. Michael has taught multiple classes and workshops for college level students on using Permaculture to design more resilient educational systems and has spoken at numerous conferences on the subject.

The Music and Science Building replaced a 1940s bus storage barn previously located at the site. This structure was carefully deconstructed, and the new building’s wood scissor trusses were created from the materials set aside.
Projects of Distinction awards were presented for outstanding planning and architectural design of high quality learning environments to eight exceptional projects during the Council of Educational Facility Planners International (CEFPI) annual conference in Nashville, Tennessee. Featured in the juried Exhibition of School Planning and Architecture Exhibit, the projects demonstrated satisfaction of the intent of their planning process and design responses with regard to the learning environment, community environment and physical environment.

Projects of Distinction for new construction were awarded to:

- Cincinnati Public Schools Erich Kunzel Center for Arts and Education, Grand County School District
  Cincinnati, Ohio
  Moody-Nolan

- David Saperstein Middle School
  Los Angeles, California
  Harley Ellis Devereaux

- First Peoples House, University of Victoria
  Victoria, BC, Canada
  Alfred Waugh Architects

- Marysville Getchell High School Campus, Marysville School District
  Marysville, Washington
  DLR Group/Architect/Designer/ Educational Planner/Engineer

- St. Michael’s Grammar School Allan Pizdez Building
  St. Kilda, Victoria, Australia
  Architectus

- Su Valley Jr/Sr High School, Matanuska Susitna Borough School District
  Talkeetna, AK
  McCool Carlson Green Architects

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CEFPI Celebrates 2011 Planning & Design Awards
New Awards Debut at CEFPI Annual Conference

Attendees at the CEFPI 88th annual conference were introduced to two new awards – the CEFPI Fellowship Award and the Industry Partner Award. The Fellowship Award is one of the most distinguished honors conferred by the Council to those members who have provided exemplary contributions to CEFPI over their many years of service.

Fellows are long-standing recognized experts in their field who possess the wisdom to carry the industry and the association forward by volunteering for committee assignments and positions of leadership, lending innovation and progressive thinking. As the most respected members of the CEFPI community, they represent the mark of excellence in the industry in which they serve tirelessly and selflessly in support of the association and its vision and mission. In an effort to properly recognize the history of CEFPI, for this inaugural year, the following Charter Members of this Fellowship group were selected:

Paul Abramson, Stanton Leggett & Associates

Julie Barrett, tBP/ Architecture

William S. DeJong, Ph.D., REFP, DeJONG

Tom Ellis, Tandus Flooring

Ronald H. Fanning, AIA, P.Eng., REFP, NCEE, Fanning Howey

Dwayne Gardner, Planning Advocates, Inc.

Edward E. Kirkbride, REFP, Kirkbride Associates

Merle Kirkley, REFP, The Beresford Company

Ron A. McKnight, McKnight Associates

Sue Robertson, REFP, Planning Alliance

Hugh C. Skinner, REFP, MCIP, GHMA

Dr. N. Reginald Teague, REFP

Usherina in the Industry Partner Award, CEFPI recognized VS America as its first award winner as well as Tandus Flooring and FrontRow as runners-up. This newly established award is designed to highlight innovation in materials, technology, products and services that are key elements in defining healthy, high performance schools. New and improved products stimulate the life and growth of our educational facilities. This competition recognizes the results of the efforts and the foresight of the companies whose policies bring new products to the marketplace.

VS America, Inc.’s (VS America) ergonomically-designed high-quality furniture, is produced by VS Vereinigte Spezialmoebelfabriken GmbH & Co. KG (VS) Germany, with a large focus on the educational market for over one hundred years. By following a process-oriented quality management system based on the ISO 9001:2008 standard, VS demonstrates their dedication to consistent quality, rigorous environmental standards, and constant commitment to product development. Drawing from that framework, VS America, Inc. was founded in 2003 with the priority of providing quality ergonomic and environmentally-friendly furniture within the American school marketplace. VS uses raw materials with minimum environmental impact and we follow exclusively safe, environmentally-sound manufacturing processes, including raw material procurement and manufacturing recyclable furniture. Our product lines are safely produced from recyclable materials, are low emitting, and easily meet strict GREENGUARD certification requirements in addition to the worldwide environmental policy, ISO 14001.

Tandus Flooring® provides a unique product line of Powerbond®, modular, broadloom and woven products that work in tandem to provide true “fit-for-purpose” flooring solutions that enhance educational environments. To meet the needs of educators, Tandus Flooring’s Powerbond® is a hybrid resilient sheet flooring that is uniquely suited to the classroom. It has proven more durable than carpet, VCT, linoleum and rubber flooring and is the sole recipient of the Antron® Sustainable Flooring Performance Award all five years. Powerbond® is in a class by itself when compared to classroom flooring products specific to: maintenance, sustainability, acoustics, moisture management, indoor air quality, thermal attributes and economic performance.

With over 45 years in education, FrontRow completes the instructional power of your classroom design. Teachers can use a FrontRow audio system in conjunction with their interactive whiteboard (IWB) to create, save and post time-saving podcasts. Integrate music and other audio with a single one-cable connection to the transmitter, ensuring students hear and comprehend all elements of a lesson. Using FrontRow also encourages peer-to-peer communication and learning – our small, child-friendly pass-around microphone helps make student voices just as clear as the teacher’s. And a FrontRow classroom audio system finally makes interactive video conferencing audible – connect with guest instructors or even classrooms on the other side of the world! ■
James D. MacConnell
Award Finalists

Blue Valley Center for Advanced Professional Studies
Blue Valley Schools
Overland Park, Kansas
Perkins+Will, Planning and Design Architect
NSP architecture

Helen M. Knight Elementary
Grand County School District
Moab, Utah
MHTN Architects

Su Valley Jr/Sr High School
Matanuska
Susatna Borough School District
Talkeetna, Alaska
Mc Cool Carlson Green Architects
BrainSpaces: Educational Planner

Gluteal attraction.

The PantoMove-Soft. Our Verner Panton
classic is now available in a soft upholstered
option with an extra large XL seat shell.
Sure, the patented 3D rocking mechanism
responds to the body’s need to move
forward, backward and side to side. But
now the new soft seat also gives way to
the simple desire for a seat worthy of a
sigh. The new softs – one of many options
and many ways VS keeps it moving.
YPP in 2006. When considering the model for experiential learning, this is not surprising, as the less tangible outcomes of the MAYFIELD project may have made it difficult for delegates and participants alike to test their theories.

However, some people involved had the opportunity to develop the theories further. Earlier this year, an activity similar to that of the Curriculum group was conducted in Singapore, this time involving students as well. The sharing of experiences enriched the discussion and many left with new ideas for current or planned building projects, in which it is hoped they can test their newly developed theories.

Ideas for next time

Plans are currently underway to include the MAYFIELD project in the 2012 CEFPI AUSTRALASIA Conference on the Gold Coast in 2012. Suggestions have been made on how to develop the MAYFIELD project and these are offered here as prompts or opportunities for the future. These reflect the experiential learning cycle, and could serve to continue the development of MAYFIELD in the long term.

“it would be good to not ‘reinvent’ the MAYFIELD project, but to continue where the previous year left off so delegates can be brought back into the buzz of excitement, see what has progressed, what has changed and furthermore, contribute to what they have done over the course of the year.” (PE)

“The challenge is to ensure that [we] don’t focus on the ‘too hards’ but embrace the ‘we can do it/give it a go’ mentality. After all, taking a risk is what we are all striving to do in our professional lives in developing new ways of doing things and learning from our mistakes and the Mayfield Project was a testament to this mentality.” (PI)

Given individual groups have had the opportunity to work and get to know each other … it would make sense to take things further …” (KB)

References


Lara Mackintosh has over 15 years experience as an architect working in the residential, retail and educational sectors. Her focus on educational facilities began as project architect at Taylor Robinson Architects when working on Harmony Primary School, a pilot ESD (Environmentally Sustainable Design) school for the West Australian Department of Education. This prompted her to return to full time study to complete a M.S. in Environmental Architecture at Murdoch University and a teaching position in the Department of Architecture and Interior Architecture at Curtin University in Perth. Now an academic, Lara has been able to develop a keen interest in teaching sustainability in architecture, bridging across the science and the design of architecture. Through her current research activities, in which the relationship between the built and natural environments is examined, the role of education and education environments has come to the fore. Her practice, viridis architecture, provides the opportunity to extend her role as sustainability and education consultant.
Safe, High-Performance, Sustainable Precast School Design

By Peter I. Finsen

School design utilizing integrated architectural and structural precast and prestressed concrete components has gained greater acceptance recently for numerous reasons, including increasingly sophisticated owners and improved learning environments based on material benefits such as: sustainability, energy efficiency, indoor air quality, storm resistance, cost effectiveness (initial and life-cycle), durability and low maintenance. Safe, high-performance, sustainable school design provides physical facilities that improve learning environments while offering shelter from the storm, saving energy and resources, and delivering improved life cycle cost value.

School administrators and designers are recognizing the numerous advantages that precast concrete architectural panels and structural systems can offer K-12 and higher education school projects. Precast buildings can greatly accelerate construction time to meet tight occupancy deadlines; provide competitive construction costs with significantly reduced lifecycle costs; and provide a variety of architectural finishes to blend with a campus’ institutional look or create a cutting-edge modern style. And, an integrated precast concrete design can assist in providing safe, healthy, high-performance and sustainable learning environments.

Safe School Facilities

Achieving a safe and secure school structure for owners and users provides key challenges for designers. Integrating these critical functional aspects while meeting aesthetic goals and educational programmatic needs, requires designers to remain up to date on new techniques and systems that can minimize the intrusion of security and safety elements in the overall plan. As security worries rise and Mother Nature continues to show her power, these concerns become key drivers for the safety of students.

Precast concrete designs can offer protection against fires, earthquakes, hurricanes, tornados and even explosive blasts when design and detailing are correctly applied. The requirements for achieving these goals must be taken into account early in the design process to maximize the effectiveness of precast concrete’s capabilities against each of these issues.

Fire Resistance

A key goal for the design team and the client is to protect the building from the multiple risks and losses caused by fire. A common misconception is that fire destroys by flames, which can be suppressed by sprinklers. In practice, this oversimplification can leave both property and human life vulnerable during a fire. Precast concrete provides noncombustible construction that can help contain a fire within minimal boundaries. As a separation wall, precast concrete helps to prevent a fire from spreading throughout a building or jumping between structures.

An important aspect of dealing with fire endurance is to understand the benefits to the owner of a building in the proper selection of materials incorporated in the structure. These benefits fall into two areas: codes and economics. While code requirements must be met, designers typically have many options in the specification of materials and assemblies that meet these regulations. Economic benefits associated with increased fire endurance determined through a life-cycle cost analysis can include lower insurance rates, larger allowable gross area, and fewer stairwells and exits.1

A design approach that stresses compartmentalization offers a more

fundamental method to protect lives and property. Compartmentalization uses passive, noncombustible floors and walls, such as those made of precast concrete, to construct sections of the building as separate modules that confine fire to a specific area. Once constructed into the building, these passive protectors will protect the building throughout its life.

Noncombustible compartmentalization, combined with an inherently fire resistant/tolerant structural frame, provides the best combination of economics and protection. When this passive design combines with other safety measures, including sprinklers and early-warning detection systems, a balanced design approach is achieved.

A variety of precast concrete components can be used in creating a complete passive, fire resistant design. Foremost among these are: insulated sandwich wall panels, columns and beams and double tees or hollow-core slabs. A total-precast concrete system provides an effective design for minimizing fire damage and containing the effects within the smallest space possible for the longest time.

Earthquake Resistance

Precast concrete can be designed to resist seismic events and recent advancements in connection approaches provide additional design options. Earthquakes in Guam, US (Richter scale 8.1); Manila, Philippines (Richter scale 7.2); and Kobe, Japan (Richter scale 6.9), have subjected precast concrete buildings, using both architectural cladding and structural components, to some of nature’s deadliest forces. During the 1994 Northridge, CA., earthquake (Richter scale 6.8), in which damage was estimated at $20 billion, most engineered structures within the affected region performed well, including structures with precast concrete components.

The key reason designers have gravitated toward precast concrete components is because they can span long distances between attachments to the main structure. Design methods and details have been developed to accommodate these applications in seismic areas. The Precast/Prestressed Concrete Institute (PCI) has worked to help create new design solutions that provide more effective responses to seismic events. A 10-year study by the Precast Seismic Structural Systems (PRESSS) Research Program produced three new approaches that have been or are in the process of being codified.

Wind Resistance (Tornados and Hurricanes)

In most areas of the United States using the International Building Code, the earthquake loading will be more critical than wind. But wind loads should be checked, and more emphasis today is being put on designing structures to withstand tornado and hurricane impacts, certainly in coastal areas where they are being addressed through supplemental codes and other local requirements. Precast concrete structural systems and architectural panels provide significant benefits in meeting wind-resistance needs.

In regions of the country where tornados can wreak havoc on school buildings, precast concrete designs can provide a durable, wind-resistant structure. Building-envelope requirements often lead to facilities constructed with precast concrete wall panels and double-tee girders for roof structures. Historically these have provided a cost-effective method of construction. Specifying certified precast concrete ensures a known quality-control process will be used (a requirement) and construction time can be better minimized and quantified.

The design of “safe rooms”, which may qualify for FEMA grant funding, go above and beyond the requirements of standard building design. Depending on the geographic location, design wind speeds range from 130 mph to 250 mph, and the facilities are required to meet specific flying-debris or missile impact criteria. Code requirements for Safe Rooms include FEMA 361 – Design & Construction Guidance for Community Safe Rooms, ICC-500 Standard for Design & Construction of Storm Shelters, and the locally adopted building code.

A safe room’s main function is to protect occupants from extreme environmental events, but the secondary use can be just as important to the owner, especially in mitigating budget costs. Secondary uses of safe rooms may include gymnasiums, cafeterias, band rooms, classroom buildings, park facilities and community centers. Integrating a secondary use provides multiple benefits and safe rooms integrated into a larger facility with multi-uses will reduce the overall project cost, versus a standalone safe room.

The devastating impact of recent hurricanes, notably Katrina and Rita, have put a spotlight on designing to withstand the highest levels of these forces, which are more complex than those associated with tornados. Hurricanes produce not only high winds but also forces associated with the impact from high waves and immense amounts of water overwhelming a structure.

High winds can be dealt with similarly to those in tornados and do not pose a substantial risk for buildings built of precast concrete. Examination of projects exposed to the high winds of Hurricane Katrina indicated that wind loads for precast concrete buildings were well accounted for. Wind-borne debris creates the largest problem and results in only chipping or cracking in some instances at the high end of the wind speeds. Precast concrete components can help to withstand these forces if designers take into account all of the actions involved and how the components must react to them. The factors that designers must consider in addition to high winds include:

3 "Designing School Safe Rooms", Ascent, Summer 2011, pp. 38-42.
surge, scour, buoyancy and structure orientation.4

Concrete is not damaged by water. In fact, concrete that does not dry out continues to gain strength in the presence of moisture. Concrete submerged in water absorbs small amounts of water over long periods of time, and the water does not damage the concrete. In flood-damaged areas, concrete buildings are often salvageable. Concrete will only contribute to moisture problems in buildings if it is enclosed in a system that does not let it breathe or dry out, and moisture is trapped between the concrete and other building materials.

While not typically addressed in K-12 school design, in today’s environment of enhanced risk, some facilities require protective design (external blast resistance) and the management of risk. There are many design options available to reduce the risk to any building and features can be incorporated into precast concrete panel systems to accommodate blast loading. Economically feasible design for antiterrorism/force protection (AT/FP) requires an integrated approach encompassing many aspects, including siting, operation programming of interior spaces and the use of active and passive security measures using provisions of both technology and human involvement.

The objective of blast-resistant design is to provide an acceptable level of safety to building occupants in the event of an explosion. Considerable damage is usually acceptable as long as components remain attached to the building and the building does not experience a progressive collapse. Planning must include all involved members of the design team – owners, architects, structural engineers, and blast consultants. They must agree upon the blast forces to be withstood as well as the risk and vulnerability assessment to the occupants and the protection levels that can be achieved within budget.5

High Performance School Design

High performance schools are facilities that improve the learning environment while saving energy, resources and money. “High performance school” refers to the physical facility – the school building and its grounds. A well-designed facility can enhance performance and make education a more enjoyable and rewarding experience. Creating a high performance school requires an integrated “whole building” approach to the design process. Key systems and technologies must be considered together from the beginning of the design process, and optimized based on their combined impact on the comfort and productivity of students and teachers.6

High performance design can have a positive effect on health and comfort, and design strategies such as daylighting have been shown to enhance student learning. Good indoor air quality is essential for teacher and student health. Good design also produces more comfortable environments with proper lighting, air temperature, humidity, and noise levels. This reduces distractions and creates environments where students and teachers can see clearly, hear accurately and not feel too warm or too cold. Precast concrete designs are material efficient and can aid in producing schools that are thermally, acoustically and energy efficient. They require less maintenance and provide greater durability.

These increased efficiencies save money on maintenance and utilities, and healthier environments can bring additional savings by lowering absenteeism and increasing funding based on Average Daily Attendance. These financial, health and productivity benefits are the result of integrated design – understanding how building elements affect one another to optimize the performance of the entire school.

Sustainable School Environments

The characteristics of high performance schools mesh well with the concepts of sustainable design and precast concrete components can aid designers in meeting requirements for environmentally friendly, green design. In general, sustainability is considered to mean development that meets present needs without compromising the ability to meet the needs of future generations. The goal is to use building materials and energy resources in ways that will minimize their depletion or not restrict their ability to be used by future generations.

Today’s approach extends beyond the ability to renew or recycle resources to examine the embodied energy required to make use of that material. This accounting practice encompasses all the energy necessary to manufacture, deliver and install the product, including fuel to extract materials, finish them and transport them to the site. And, the concept balances environmental impact with cost-effectiveness.

While other building materials may have to alter their configurations or properties to be applicable to sustainable structures, precast concrete’s inherent composition allows it to naturally achieve sustainability. It contributes by incorporating integrated design, using materials efficiently, and reducing construction waste, site disturbance, and noise.7

Precast Components and Innovation

Nowhere is the recognition of these benefits more apparent than in Greenville County, S.C., where the school district used innovative financing and construction methods to undertake a comprehensive $1-billion
rebuilding and expansion program. The program, completed in 2008, involved renovation, expansion and new construction of 70 schools to better serve the district’s 71,000 students.

Such a dynamic plan required a thorough examination of new technologies, designs and materials. As a result, the program is using more than 1 million square feet of precast concrete insulated wall panels. The panels feature a layer of R-11 insulation sandwiched between two layers of concrete. The inner layer forms the school’s interior wall and provides thermal mass to help reduce energy costs, while the exterior of each panel serves as the architectural façade.

Two innovative methods were used on different schools to connect the inner and outer wythes of concrete, making the panels nonconductive so they provide a continuous insulation profile. As a result, walls don’t generate hot or cold spots along the perimeter, producing thermal comfort and energy efficiency. Additionally, electrical conduit and switch boxes were cast into the wall panels at the precast manufacturing plant, eliminating some on-site construction time.

Multistory wall panels were used in both load-bearing and non load-bearing applications in the district, with a range of aesthetic designs. Integrally cast thinset brick provided a traditional masonry look, appropriate community scale and a high performance wall system than traditional masonry construction techniques. Designers combined this system with other aesthetic applications, including sandblasted textures, reveals, medallions and pigmented concrete mixes.8

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Components Aid Design Economy

A number of precast concrete components are used in school projects, and they offer a “kit of parts” capability that allows them to be used in a variety of ways. The most commonly used types of precast concrete components are:

- Wall panels, either non-load or load bearing, often with an interior (sandwiched) layer of insulation.
- Hollow-core and double-tee floor/ceiling/roofing panels.
- Columns and beams, often used in large-volume assembly areas (gymnasiums, theaters, cafeterias) to accommodate the longer spans required.

Even more advantages are achieved when the components are combined in a ‘total-precast’ concrete system, which integrates the building’s structural frame with the architectural façade and thermal envelope.

First-Cost and Lifecycle Cost Effectiveness

Precast concrete components save money in many ways, both for capital construction budgets and long-term operational needs. Savings include costs often hidden within the overall construction budget and create advantages that continue throughout the building’s lifecycle.

Precast concrete is prefabricated at off-site manufacturing facilities, providing more quality control with fewer required site inspections. Construction of integrated precast elements eliminates months from the construction schedule, resulting in less time to carry financial bonds, lower contractor overhead costs and risk, elimination of expenses for masonry scaffolding, site storage and site waste, and reduced subcontractor costs due to a greater level of responsibility being given to a single-source supplier.

A total precast concrete system can help reduce insurance costs due to its inherent fire and storm resistance. It also saves cost and offers environmental friendliness by combining several components into a single panelized system. Combining the savings from the construction budget with those in the long-term operating budgets produces a dramatic advantage. A precast concrete system is estimated to save between 5 and 8 percent of overall costs during the school’s lifetime compared to a masonry building.

Precast Accelerates Schedules

School buildings are complex projects, with a wide range of programmatic needs and active community involvement. That combination creates a tight restraint on construction schedules, as the facility must be ready when the fall school bell rings — and it’s ringing earlier than ever. Precast concrete components can accelerate the construction schedule to ensure early delays don’t impact the final deadline.

For instance, it takes significantly less time to design a precast concrete school than one built of masonry, due to the lessened detail required for precast’s panelized system and the ability to quickly replicate components for each floor or wing. Precast manufacturers offer a high degree of engineering expertise and design assistance to speed the process further.

Prefabrication allows components to be manufactured early in the construction process with just-in time delivery to the construction site to accelerate construction sequencing. Fabrication can occur while permitting, site prep and foundation work progress, giving contractors a significant head start before the site is available. Once the foundation is complete, precast components typically can begin erection immediately. And, as the single-source supplier for a large portion of the structural system and building envelope, precasters can help to maintain the critical-path schedule.

Because precast components are fabricated under factory-controlled conditions, adverse winter weather does not impact the production schedule or product quality. Precast concrete can be erected in almost all weather...
conditions, eliminating unknown factors and ensuring tight timetables will be met. Precast construction can also aid in improved construction site safety. Less on-site trades are needed to erect the structure and thermal enclosure. Once erected, other trades can work in more productive conditions.

Precast concrete insulated sandwich panels create a finished interior wall that avoids the time and cost of insulating, fireproofing, furring and drywalling. The wall is highly durable and vandal-resistant, making it an ideal option, especially in high-use areas such as gymnasiums and pools.

Precast’s just-in-time delivery and its array of efficiencies creates a speed advantage that grows throughout the construction process, saving costs and meeting deadlines. The use of precast concrete has been estimated to cut one-third from the required timetable.

**Aesthetic Diversity Expands Options**

Often school administrators want their facilities to project a strong, secure image featuring a traditional appearance that incorporates such materials as brick or limestone. Others desire the school to blend with existing campus buildings, the neighborhood or have a cutting-edge style. Precast concrete components can be designed to respond to each of these needs in a cost efficient way.

Using embedded thin-brick technology on precast’s panelized systems can create the traditional masonry look that many school districts seek while providing higher performance benefits that typical masonry can’t provide. Precast inset brick panels eliminate months of onsite labor needed for laid-up brick while removing several trades from the site. It ensures a high quality, even appearance and limits the need for on-site inspections. And thin-brick, insulated precast wall systems do not require a wall cavity (like masonry walls), eliminating the potential for future mold and mildew problems.

Precast concrete panels offer variety in color, form and texture. They interface smoothly with glass and other materials. Precasters’ capability to tint concrete and provide numerous surface treatments within one panel creates unlimited design aesthetics. Special mixes and finish techniques are used to mimic limestone, granite and other materials. The finishes are produced more economically than real stone can be purchased and the panels can be erected much quicker. Form liners can replicate textures such as cut stone or slate.

**Sustainable Design Accomplished**

As educators and stewards of their communities, school administrators want to minimize their projects’ environmental impact while providing comfortable and healthy buildings in which to learn and work. Precast concrete systems can help achieve those goals while maintaining a budget that may not allow for “green” building extras.

Precast concrete contributes to sustainable practices by incorporating integrated design, using materials efficiently and reducing construction waste, site disturbance and noise. Using precast concrete can help meet minimum energy requirements, optimize energy performance and increase the life of a building. The constituents of concrete can be recycled materials and precast concrete components can be deconstructed and reused or crushed and materials (aggregate, steel) recycled. Precast concrete and its constituents are usually available locally.

Precast concrete panels offer high durability, which means fewer chemicals are needed to keep it clean and maintained. Insulated sandwich wall panels provide high energy efficiency. And precast’s thermal mass helps minimize energy consumption naturally, offering a concrete advantage that drops to the bottom line. This is especially significant for large spaces, such as gyms and pools. Stored thermal energy helps reduce HVAC usage when the school is unoccupied for long periods without risking mold growth. And, precast concrete includes no chemicals that provide off-gassing and thus contributes to a healthier indoor air quality.

Precast concrete systems provide sustainable-design attributes that are recognized by the Leadership in Energy & Environmental Design (LEED) green-building rating program administered by the U.S. Green Building Council. In the LEED rating system, products don’t receive points, but appropriate use of precast concrete can help a building earn points in the categories of: Sustainable Sites, Energy & Atmosphere, Materials & Resources, Indoor Environmental Quality, Innovation in Design, and Regional Priority.

Whether a capital program involves expansion of a single school or construction of multiple campuses, precast concrete provides benefits to contribute to its success. Its ability to be cost-effective, accelerate construction schedules, and achieve aesthetic goals further contribute toward safe, high-performance, sustainable school design.

**Peter Finsen**, Assoc. AIA, serves as the chief executive officer of Georgia/Carolinas PCI, a chapter of the Precast/Prestressed Concrete Institute. He is responsible for association management with key emphasis on educational, technical and marketing promotion of solutions to advance the design, manufacture and use of precast/prestressed concrete products. Peter has a Master of Architecture degree from the University of Pennsylvania and a career that spans more than 30 years in the design and construction industry. With early stints as a design architect, his experience includes PM/CM project development services on over $6 billion in construction value of educational, correctional, housing, infrastructure and governmental projects. Peter serves on numerous PCI committees, and is active in numerous associations including the American Institute of Architects, American Concrete Institute, Construction Specifications Institute, Design Build Institute of America, and Georgia Society of Association Executives. A long time member of the Council of Educational Facility Planners International, Peter formerly served on the Board of Trustees for the CEFPI Foundation & Charitable Trust.

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9 DN-16-10: PCI Designer’s Notebook: Sustainability, pp. 10-12.
Students Design Tomorrow’s Sustainable Schools and Communities

By David Schrader, Michael Carlson, John Sumlin and Barbara Worth

Educating for a sustainable future is the imperative of our time. Creative and individual artistic expression helps us all to inform and share with one another. If we hope to fulfill the vision of sustainability as it pertains to environmental, social and economic realities, we must give our students the fluency and the tools to grow into green builders, activists, advocates and teachers. Participants in the School of the Future Design Competition illustrate the kind of creativity that students bring to the design process and create environments where kids can’t wait to get to school every morning!

Middle school student teams from across the country, and indeed several parts of the world, participate in the CEFPI School of the Future Design Competition, Challenging students with real world problems that are relevant to their lives and asking them to work as a team in coming up with solutions, this classic example of project-based learning bridges the gap between conceptual theory and real life skills. The competition gives them an opportunity to think about the learning environment; express their creativity visually; establish a framework regarding interdisciplinary subject matter - STEM, visual arts, language arts, social studies, presentation skills; ask questions and problem solve; engage in collaboration and community involvement; and gain experience in tactile, hands-on work while developing the eye for beauty and design.

The SOTF competition is a springboard for discussion regarding stewardship, sustainability and social justice. Working as a team, students learn new techniques, recognize individual expression and gain an appreciation of each other’s work. Furthermore, they learn to negotiate among themselves as they resolve planning and design issues. The participants apply new knowledge regarding structures that convey their ideas and, working as a true planning team, they learn how to resolve conflicts as they work through the tasks at hand. To create and facilitate the structures and opportunities for these powerful connections is a significant part of working thoughtfully with educational and social systems in which students are genuinely affirmed and encouraged to build self confidence.

This competition enhances the learning process by encouraging the learner to consider issues such as embodied energy, environmental quality, conservation of resources, and engaging the surrounding community in the problem at hand. Every team submits a built project/scale model using recycled materials and a video or PowerPoint presentation and narrative that documents the planning process and rationale for the team’s design. Supporting materials such as plans, elevations and perspectives are encouraged. These documents are typically developed from Sketchup, Revit or CAD. As with architectural training, a key element of this program includes student team presentations before several juries of experts.

One of the goals of this project is to motivate students to learn by using a variety of tools and resources, which is intended to instill a sense of pride and ownership of their school and community. Key to the success of the program and leading the students to paths of investigation regarding the environment, architecture, history of design and use of technological tools to enhance their work disciplines, the mentor program adds an inspiring and motivational dimension to the competition program. Dedicated professionals, working in the various fields of knowledge that contribute to creating effective learning environments and sustainable communities, mentor the students so that learning about design and the built environment can take place. They also discuss ways to strengthen relationships between students, students and teachers, and the school and the community.

Presenting to a live jury from the school and school district level to the city, state and region is a daunting
experience, yet these middle school students handle it like professionals. The regional winners travel to Washington, DC to participate in the final jury process. “Facing a formidable 20-person jury would be a daunting experience for most adults, but these students took them on without a blink of an eye!” remarked Don Gillmore, AIA, REFP, CEFPI chairman of the Board. “The competition was rigorous and the students continue to raise the bar. Today’s middle-schoolers are innately socially responsible and committed to creating healthy, high performing schools and communities. This year’s submissions epitomized project-based learning and demonstrated a deep understanding of the planning process and rationale.”

“It was my pleasure to chair such a prestigious jury for this event,” remarked David Schrader, AIA. “As the day progressed, it was clear that no matter how experienced and talented each of the panel members were, the children’s message, knowledge, passion and enthusiasm humbled each and every one of us. Placing a strong emphasis on learning styles and culture, the students acknowledged that what they do today has tremendous impact on their personal and global future. This memorable day left us all believing that if these students represent the leaders of tomorrow, our future is in good hands.”

Just look at what these young students can accomplish!

Students at Seneca Middle School, Macomb, Michigan demonstrated a great understanding of true urban re-development. Locating their magnet boarding school on the grounds of the old Tiger Stadium, still in existence but unused, they designed a 24/7 school – they felt that students in the downtown Detroit area had missed so much “schooling” that they would need a 24-hour curriculum to catch up and excel. But, then they took that extra leap—they tied student learning to real life—parking lots were turned into organic urban farms that were run by the students giving them an introduction to careers and providing food for the school with the surplus food donated to the local food banks. They thoroughly engaged the local community in their school, which would become an icon and a community treasure. This project exemplified “renew, reuse, recycle” from programs within the facility to the actual facility design. Outstanding features include a virtual reality room, green roof, heating and cooling controlled by temperature sensitive “smart bricks” and smart boards in each “u-shaped” classroom.

Seneca Middle School Transforms Tiger Stadium, Macomb, MI

Brimming with enthusiasm, the Teeland team presented a project that was well thought out and inspirational. Highly professional and passionate. The kids demonstrated an exceptional planning process. Cognizant of the different learning styles, they employed a strong concept based on three learning areas – sustainability, environment and community – which directly translated not only into the physical shape of the 3 building wings, but their inherent curriculum as well. There were also three other guiding principles, which were: integration, inspiration and education, which can be clearly seen in how they developed their school of the future. The use of group brainstorming activities early on enabled them to come up with many ideas to the benefit of the project all of their team members, describing their contributions to the project and clearly assigning value to each member of the team. This kind of teamwork and group dynamic is exemplary and to be encouraged! A key point made during the presentation was that they wanted a building that sparks creativity, and that there was a reason behind each design move. This team had a strong sense of how things are inter-related and have an impact on each other, including: adding a waterfall to add oxygen to the water for the underground fish hatchery.

Since they did not have a dedicated class for this project all of their team time was done after school or on weekends.

Tri Peaks School – Teeland Middle School, Wasilla, Alaska

Following the theme of “the future is now,” Heritage Middle School, Wake Forest, North Carolina, chose to transform Glen Royal Mills in Wake Forest, North Carolina, into an eco-friendly historic building and community icon. Incorporating existing technologies and interdisciplinary learning into a school of the future, the students realize future potential now, not in 30 years. They stressed the need for the School of the Future today, not tomorrow, if they were indeed going to compete in the global economy. They did not want to wait for green schools to be developed – they insisted that they be part of them now.

Focusing on 21st century learning skills and cognizant of different learning styles, they created a prototype for pocket STEM schools to serve other schools in the area. Their proximity to Research Triangle affords student access to business and academic sources for teaching and learning. Boasting three alternative energy sources generated on campus and transmitted
through the school’s passive and active solar power plant, the school sells power back to the grid. The school is truly a community center with several public areas and a fitness trail located in the arboretum.

The boys from Newtown Middle School followed a comprehensive planning process and conducted exemplary research. They displayed great pride in their inclusive school and community learning environment that inspires conservation, responsibility and prepares students for the challenges of life. Their use of a dam on the nearby river to provide hydro electric power was resourceful and inspired. They employed thin-film solar panels, wind turbines and a green roof garden to be used not only by the students but also for the community. A nearby river houses an underwater classroom making this school a remarkable learning tool. The school features three clean energy sources - thin-film solar panels, wind turbines and a dam providing hydro-electric power. Their design includes skylights, multi-purpose flexible classrooms, light sensors, automated climate control and a green roof. Offering a community garden, telescope dome for astronomy studies, athletic fields and other facilities for public use, the school plays a major role in the community.

Demonstrating a tremendous grasp of various learning opportunities, Null Middle School features elective classes with community leaders linked to career development opportunities. Their net-zero school incorporates hydro-power to fuel its water source from a freshwater lake. The lake provides fresh water that is filtered and purified and supplies not only the school but the entire surrounding community. The school creates its own electricity with a solar glass roof. Underfloor sensors respond to the weight of the students to create an electric pulse. A great deal of attention is given to good ventilation, indoor air quality, green cleaning practices and their affect on student health and performance. Underfloor sensors respond to the weight of students to create an electrical pulse.

Valley Academy involved the entire 7th grade in their collaborative planning process of a single educational space. Their art studio incorporates vibrant colors and lighting to stimulate creativity. The jury applauded their successful problem-solving of real world issues.

Michael Carlson, AIA is a principal of the firm McCool Carlson Green Architects in Anchorage Alaska and has a broad range of experience with public projects including, schools, universities, justice and transportation projects. His three decade practice in Alaska includes the full range of K-12 facilities with a focus on creating dynamic, interactive environments that bring students, teachers, parents and the community together.

As managing partner of SCHRADEGROUP architecture, LLC, David L. Schrader, AIA AIA is responsible for the firm’s leadership including initial design, management and business development. For nearly two decades his professional experience has been and is focused on the design of facilities of public interest. Mr. Schrader has led design teams specifically focusing on educational design. David Schrader holds a Masters of Architecture from the University of Pennsylvania, Philadelphia, PA and a BA from Pennsylvania State University Council.

John Sumlin, national sales vice president for education, Tandus Flooring, is a native of Atlanta GA and a graduate of the University of Georgia with a B.A in Economics in 1985. In his current position, John leads the strategic direction for education sales for the Tandus Flooring brand. This includes strategic market penetration and assessment, national trade association leadership, contract negotiation and deployment, marketing deployment and strategic growth within our markets.

Barbara Worth, director of strategic and private development for CEFPI, maintains key contacts with organizations, federal agencies and private sector entities that may further the mission of CEFPI. She serves as project manager for grants and cooperative agreements of the Council. Providing support on all policy issues, objectives, projects and services of CEFPI, Barbara serves as a spokesperson for the organization. She is a graduate of the University of California at Los Angeles.
PLANNING PERSPECTIVES

Improving the Places Where Students Learn: An Online Learning Experience for Educational Facility Professionals

By Cynthia L. Uline, Ph.D.

“You say you will explore the current research, but you don’t. The accountability & rigor of the program pushes you to do it. It brings the joy back into planning.”

CEFPI/SDSU Advanced Certificate Program Student

An increasingly complex global environment, with its corresponding international connectedness as well as competition, challenges educators to rethink curriculum, instruction and assessment through the lens of the 21st Century. High-skilled, technology-driven jobs and careers require individuals who possess deep content knowledge as well as soft skills, including the capacity for critical thinking and problem solving.
In order to provide extended opportunities for communication and learning between and among key educational facility professionals, the Council of Educational Facility Planners International (CEFPI) and San Diego State University’s National Center for the 21st Century Schoolhouse, along with the university’s Center for Distance Learning and College of Extended Studies partnered to develop and deliver a fully accredited Advanced Certificate Program in Educational Facility Planning. The fall of 2011 will welcome in our fifth student cohort. These students learn from some of the most experienced practitioners in the field how to plan, design, build and maintain 21st century, learner-centered school facilities. At the same time, they interact with, and learn from, a select group of educational facility professionals from around the globe.

Connecting key stakeholders involved in the educational facility enterprise, this fully online program focuses squarely on the student, beginning with a course on learner needs and styles and culminating in a course on life cycle facility assessment. The 12-credit certificate program is comprised of six two-unit courses that earn participants graduate credit. Students complete the program in three semesters. Beginning in fall semester, they take one eight-week course at a time, through fall, spring, and the following fall semesters. The CEFPI/SDSU Advanced Certificate in Educational Facility Planning, awarded by San Diego State University, also fulfills the requirements for achieving the Recognized Educational Facility Professional (REFP) designation of the Council of Educational Facility Planners International (CEFPI). In addition, The American Institute of Architects (AIA) has also approved the program courses for recertification credit.

Program Curriculum and Instruction

We’re reminded everyday that it’s not just about the designing and the selling. It’s about the application. It’s about the learning. It’s about the student.

~ CEFPI/SDSU Advanced Certificate Program Student

The comprehensive program of study is grounded in the key knowledge and skills central to the sound planning, building and maintaining of learner-centered school facilities. Based on chapters of Creating Connections: The CEFPI Guide for Educational Facility Planning (Myers & Robertson, 2004), each course addresses one phase of the capital project, while the complete program emphasizes a collaborative process that engages all stakeholders. The primary text is supplemented with relevant materials collected and developed by the expert instructors.

Six nationally and internationally recognized experts were recruited to develop and deliver this rigorous and engaging course of study. One Certificate Program student shares, “Every course has its own nuance. The breadth of information and the way it is presented—every instructor is unique.” All course content is intentionally designed and delivered by practitioners, thus ensuring its relevance to the day-to-day work. According to another Certificate Program cohort member, “The reading and the curriculum is immediately applicable. I’m teaching myself, and I am sharing it with everyone in my work place.”

Expert faculty members include practicing educational facility planners, practicing architects, a state education department official and two internationally recognized experts in learning styles theory. Meg Parsons, principal at Cutingham Group and instructor of the Community Engagement and Master Planning course, addressed the generative nature of the program curriculum, “This series of courses is a unique opportunity for professionals
to reflect on what they do and how they do it. By sharing not only class materials, but also our experiences and viewpoints, we have the opportunity to learn from each other.”

Beginning with the very first pilot cohort, students regularly assess course content, instructional effectiveness, opportunities for peer interaction and the overall online learning experience. Program faculty and staff continuously revise and refine various program elements according to these student evaluations. With regard to the course on Assessment of the School Facility, one student offered the following appraisal, “I have been doing facility assessments for about 10 years, but I never knew about the information included in this course. It has given me a much deeper understanding of the subject that will benefit my clients.”

**Practice-Oriented Signature Assignments**

*My very first project for the first class, my LEED signature project, I applied to the state and received several million dollars to make it happen in our district.

~ CEFPI/SDSU Advanced Certificate Program Student*

Culminating performance-based projects link each course to the larger Certificate Program curriculum. These six signature assignments comprise the Advanced Certificate Program Candidate Portfolio. Each signature project involves significant opportunity to apply the concepts taught within various courses. All are meant to support and advance students’ day-to-day work in the field. Signature assignments include the development of a learning space responsive to diverse learner needs and styles, a community engagement process or a final master plan report, a chosen section of an educational specification, an implementation plan for facility construction and the design of facility assessment tools, to name a few. With regard to these practice-based signature assignments, one student offered this advice, “Don’t ever take for granted that you know one area or another. Even if you think you have had all the experiences you could imagine, bring this new learning to the table in your various projects. Take them as an opportunity to push yourself.”

**Creating an Online Community of Practice**

*One of the richest aspects of these experiences is the fact we are working with educators, planners and architects in the Midwest, East Coast and West Coast as well as from other parts of the world. We discuss how we all approach education and design, seeing some of the commonalities, but also the differences.

~ CEFPI/SDSU Advanced Certificate Program Student*

For many Advanced Certificate Program students, the program offers them their first experiences in online learning. “At first I wasn’t sure about the online format, but I like that I can choose to do my work in one big chunk, or in small bits as I have time. My schedule demands this flexibility.” Although many express initial reticence, students report receiving the ongoing support they need to be successful. According to a recent graduate, “Tech support is truly 24/7. No matter where I am, on the road or in some hotel, it’s like this angel bailing you out.”

Certificate program students are facility planners, school district leaders, building principals, architects, state department of education officials, construction managers and teachers. Student cohorts include seasoned professionals with up to 26 years of experience, as well as the novice with ten years or less. Beginning with a pilot cohort of students in Fall 2007, the CEFPI/SDSU Advanced Certificate Program’s growing community of practice (Wenger, 1998) now represents 31 states and 4 countries.

Hogisfeld, Rundle, and Wolsey (2011) recently conducted research on the manner in which one Certificate Program student cohort constructed knowledge within their course on learning styles. Findings from this study suggest program participants worked together, transcending geography to support one another’s learning. Their work online required conventional collaboration skills as well as new technology literacy. In addition, various online tasks promoted critical thinking and introspection (Hogisfeld, et al., 2011). Through weekly interactive discussion boards and team assignments, cohort members forge personal and professional relationships that continue on beyond graduation. One student underscores the powerful influence of this growing community of practice. “When we had our break between courses, I missed being able to go on to the discussion board and ask for input. I got so used to being able to go on and say, ‘How are you dealing with this?’”
Certificate Program
Educational Administration, Teachers College Record, and the Journal of School Leadership. Her work has appeared in journals such as Educational Administration Quarterly, the Journal of University and executive director of the National Center for 21st Century Schoolhouse. Ph.D. serves as professor of Educational Leadership at San Diego State University and executive director of the National Center for the 21st Century Schoolhouse (http://edweb.sdsu.edu/schoolhouse/). Her research explores the influence of built learning environments on students’ learning and the role the public plays in shaping learning spaces. Other areas of research include school leadership for learning and school reform and improvement. She has published over 30 scholarly articles, monographs, and book chapters. Her work has appeared in journals such as Educational Administration Quarterly, the Journal of Educational Administration, Teachers College Record, and the Journal of School Leadership.

Cynthia L. Uline, Ph.D. serves as professor of Educational Leadership at San Diego State University and executive director of the National Center for the 21st Century Schoolhouse (http://edweb.sdsu.edu/schoolhouse/). Her research explores the influence of built learning environments on students’ learning and the role the public plays in shaping learning spaces. Other areas of research include school leadership for learning and school reform and improvement. She has published over 30 scholarly articles, monographs, and book chapters. Her work has appeared in journals such as Educational Administration Quarterly, the Journal of Educational Administration, Teachers College Record, and the Journal of School Leadership.

References


Past and Current CEFPI/SDSU Advanced Certificate Program Expert Faculty

Allen Abend, R.A. Former Director, Maryland State Department of Education School Facilities Office

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Sandy Kate, LEED AP, REFP- Principal, Cunningham Group Architecture

Don Pender, AIA, LEED AP, Principal, LPA Inc.

Margaret S. Parsons, AIA, REFP, LEED® 2.0 AP, Principal, Cunningham Group Architecture

Fran Pickett, REFP, President, Fran Pickett & Associates, Inc.

Sue Robertson, REFP – Director, Planning Alliance and co-author, Creating Connection: The CEFPI Guide for Educational Facility Planning.

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