

DESIGN FOR LEARNING FORUM

School Design and Student Learning in the 21st Century

A REPORT OF FINDINGS



Convened by:



The American Architectural Foundation (AAF) is a national nonprofit organization that seeks to educate individuals and community leaders about the power of architecture to transform lives and improve the places where we live, learn, work, and play. Through numerous outreach programs, grants, and educational resources, AAF inspires people to become thoughtful and engaged stewards of the built environment.

AAF's *Great Schools by Design* initiative aims to improve the quality of America's schools by promoting good design, encouraging collaboration in the design process, and providing leading-edge resources that empower schools and communities to transform themselves. At AAF, we seek to make individuals and communities aware of their vital roles in shaping the world around them. For more information, please visit www.archfoundation.org.

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For the past three years, the American Architectural Foundation (AAF) has been engaged in an exciting new initiative called *Great Schools by Design*. This program has been developed on many levels, from conducting numerous school design institutes for local education and civic leaders to convening the National Summit on School Design with KnowledgeWorks Foundation in 2005. Also in 2005, we established an ongoing commitment to help school districts on the Gulf Coast redesign and rebuild their schools in the wake of Hurricane Katrina.

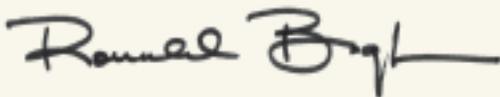
During the National Summit on School Design, the 200 grassroots participants identified “designing schools to enhance learning” as their most important finding and suggested that we explore this topic in greater detail. In response, AAF convened a small group of national and international thought leaders in October 2006 to participate in the Design for Learning Forum, hosted by Target at its headquarters in Minneapolis, Minnesota.

This is an important time to be holding such a forum. As the report of the National Summit on School Design noted, “The American schoolhouse is becoming something new and different here at the beginning of the 21st century.” The Forum provided a unique opportunity for educators and designers to discuss the pressing issues facing school development.

We also sought to address two questions: “How does design impact student achievement?” and “How do we explain the importance of innovative design to education decision makers?” To answer these questions, we brought together architects, technology experts, design advocates, and seasoned educators who have years of experience in our nation’s schools. We were particularly pleased to involve students from across Minneapolis in a special student panel as part of the Forum.

AAF appreciates the willingness of Forum participants to give their time and energy to this process, and we are grateful that several participants have responded to our request to provide additional commentation in this report. Their comments are insightful and to the point. We look forward to the response of our readers as well and hope that this report will advance innovative design and new thinking regarding more effective learning environments.

Sincerely,

A handwritten signature in black ink that reads "Ronald Bogle". The signature is written in a cursive, flowing style.

Ronald E. Bogle
President and CEO
American Architectural Foundation

American Architectural Foundation: *Great Schools by Design* Initiative

Each day across the United States, more than 59 million students, teachers, and education employees spend considerable time in our nation's 120,000 school buildings. Unfortunately, too many of these schools are aging, crowded, and in need of repair. These pervasive conditions negatively affect our children's ability to learn and our teachers' ability to teach. With school enrollment forecast to increase at record levels through 2013, and spending on school construction, renovation, and maintenance expected to total nearly \$30 billion annually, the need to transform our schools has never been more urgent.

In response, the American Architectural Foundation (AAF) created *Great Schools by Design*, a national initiative that seeks to improve the quality of America's schools and the communities they serve by promoting collaboration, excellence, and innovation in school design. AAF is pleased to partner with Target as the presenting sponsor of *Great Schools by Design*. Throughout the country, *Great Schools by Design* engages superintendents, architects, teachers, parents, residents, students, local government officials, and other stakeholders in a far-reaching conversation about what must be done to improve the places where children and young adults learn. We strive to help create schools that both support student achievement and serve as centers of community.

AAF brings a variety of school design stakeholders together through such events as the National Summit on School Design, forums on particular topics, and school design institutes that help school districts and decision makers consider innovative options for school design. In addition, AAF works with its partner, KnowledgeWorks Foundation, to produce a video library of best practices in school design. The first award-winning video, "Schools as Centers of Community: John A. Johnson Elementary School," has received national exposure. AAF has just released its second video, "Schools Designed for Learning: The Denver School of Science and Technology." AAF is grateful to the funding, programmatic, and alliance partners that make *Great Schools by Design* possible.

National Summit on School Design

The National Summit on School Design was convened by AAF and KnowledgeWorks Foundation on October 6-8, 2005, in Washington, D.C. The summit brought together more than 200 grassroots participants from around the country. The mix included educators, architects, facility planners, school administrators, community-based organizers, mayors, urban planners, teachers, students, school board members, health advocates, and technology experts.

The Summit planners made a deliberate effort to reach out to organizations and groups that have traditionally not been involved in the school design process, including the American Planning Association, the National Association of Realtors, the National Association of Homebuilders, and the Heritage Foundation.

The Summit sought to give focus to an ongoing national dialogue on school design at a time when this nation is spending billions annually to build or modernize school facilities. This dialogue coincides with a growing concern among American educators that much more needs to be done to bring American education into the 21st century.

At the conclusion of the Summit, participants made eight overall recommendations on subjects ranging from the need to design schools to encourage a variety of learning styles to ways of fostering a small school culture and creating schools as centers of community:

1. Design Schools to Support a Variety of Learning Styles
2. Enhance Learning by Integrating Technology
3. Foster a “Small School” Culture
4. Support Neighborhood Schools
5. Create Schools as Centers of Community
6. Engage the Public in the Planning Process
7. Make Healthy, Comfortable and Flexible Learning Spaces
8. Consider Non-Traditional Options for School Facilities and Classrooms.

For more information, go to <http://www.archfoundation.org/aaf/gsbdb/Events.Summit.htm>.

Because of the recommendations of the Summit participants, AAF and other partners in the *Great Schools by Design* initiative are committed to holding a series of in-depth forums over the next two years to follow up on this work on two broad themes: designing for learning and building schools for better communities. This report seeks to advance our understanding of the issues related to designing for learning.

Design for Learning Forum Participants

Photo: David Sibbet

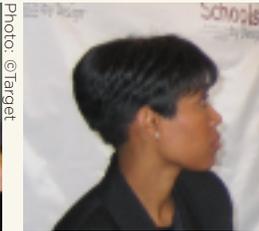


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Executive Summary

As a follow-up to the recent National Summit on School Design, the American Architectural Foundation (AAF) brought together more than 30 architects, educators, design experts, and students for a two-and-a-half-day Design for Learning Forum in Minneapolis, Minnesota, on October 11–13, 2006. Target was the presenting sponsor. This Forum sought to look at the future of school design, with a particular focus on improving the link between school design and achievement.

One of the participants' principal conclusions was the belief that we are at a moment in time—a tipping point—when the combination of increased learning opportunities, advances in technology, and changes in teaching and learning are working to change the nature of school design.

The definition of “school” is being called into question as the learning environment continues to expand.

As one participant noted, “How do you design for learning when classrooms are no longer needed to deliver learning?” As a result, educators are increasingly moving away from the large, factory-like schools that defined K-12 education for most of the 20th century. Increasing efforts are being made to replace standardized education with a greater level of personalization.

In this new, media-rich environment, participants recognized that a school as we now know it may become just one of many educational hubs, as people increasingly use handheld devices to learn anytime and anywhere.

The forum participants made 10 key findings:

1. Recognize the Paradigm Change

The design community must respond more quickly to the ongoing changes in teaching and learning. The current models for school design are not evolving quickly enough, given what one participant called a “snowstorm of paradigm changes.” Flexibility must become a defining principle in school design. There was a strong consensus that the design process should give voice to multiple ways of learning in multiple environments.

The two-decade-long effort to improve education has not abated, and there is a new sense of urgency that American education must find a way to jump into the 21st century. New initiatives—such as universal prekindergarten and ending high school at the 10th grade—have profound implications for the design of schools. The voice of design is needed in this larger conversation about schooling and education.



“Through AAF’s *Great Schools by Design* program, many superintendents and other district leaders have asked us to help them understand how the design of educational facilities can support student achievement. Target and AAF convened this Forum to help answer their question.”

Ronald E. Bogle
President & CEO
American Architectural Foundation

2. Create New Links to the National Education Reform Effort

Participants see a need to create a stronger link between members of the design community and education reformers who are seeking to close the achievement gap and give students access to 21st-century skills. In the past decade, both education reformers and designers have worked on separate but parallel tracks in developing principles to improve our nation's schools. What is missing is the creative link that allows both communities to join together to find ways to improve student achievement.

3. Build for a Changing Student Population

There is a growing consensus among educators that American education should move toward a system of universal prekindergarten programs. Architects must design new facilities to address the specific needs of these younger students.

At the same time, the design community must recognize that an increasing percentage of K-12 students will be poor, members of minorities, or new immigrants and will have a much greater need for additional social services. Seamlessly co-locating these services in the design of new schools is one clear way to help close the achievement gap.

4. Design for the Age Wave

The impending retirement of millions of aging baby boomers in the next decade may dramatically expand the population of citizens who will want access to school facilities. Designing schools as community learning centers is one way to respond to the changing dynamics in this new era of lifelong learning. In addition, the existing workforce is likely to turn to schools for help in updating skills for the new knowledge economy.

Designing schools that are open to people of all ages is also an important way to remain connected to the majority of Americans, who do not have children and have no direct link to America's public schools. In the coming decade, we will reach a point where 75 percent of all Americans will have no direct links to schools. Designing schools for this new age wave will increase the likelihood that this important voting bloc will continue to support public education.

5. Use Technology to Expand Learning but Recognize Its Limits

There was a strong consensus that students have fully embraced new information and multimedia technologies and that educators will have to adapt more quickly. Students commonly have personal computers and other multimedia communication tools, and this shift is leading to a major redefinition of work spaces in school facilities.

“Where you learn is in your hands.”

Linda G. Roberts, Ed.D.

National Consultant on Technology and Education



Even as technology gives students greater freedom to learn anytime and anywhere, participants recognized that technology has its limits. Schools still provide what students most need—access to teachers who provide wisdom and meaning in a rapidly changing world.

6. Design for Health, Safety, and Sustainability

The importance of daylight and indoor air quality are now givens for increasing student achievement. Participants agreed that other environmental factors, including lighting, sound, heating, and nontoxic materials, deserve greater attention.

Sustainability must become much more of a defining principle in new construction and renovation. Participants also recognized that school design can and should play a role in addressing the growing challenge of student obesity. There is, however, a tension between designing for learning and designing schools to meet growing safety concerns in a new era of terrorism.

7. Blur Boundaries—Design for Community Benefit

The traditionally rigid boundary between school and community is becoming blurred and will only become more so as technology increases the capacity of students to learn anytime and anywhere. Participants agreed that we now have the opportunity to rebuild the connection between school and community and see the community and the larger environment as a valuable learning asset.

School facilities serve multiple civic and social purposes beyond teaching and learning, and historically they have played a major role in the socialization of young people. In addition, schools play an increasing role in child rearing by providing a wide array of nonacademic services and supports—including breakfast, lunch, health care, and after-school programs—to millions of children, in addition to providing emergency shelter in times of crisis.

Participants believe that these civic and social purposes will become even more important in the years ahead and should be more fully integrated into the design of new schools. Schools in the future will increasingly provide a rich array of social, recreational, and artistic opportunities to the broader community, as mayors and other community leaders seek to cluster educational and municipal facilities in order to maximize the use of tax dollars.

8. Involve Citizen Designers to Reinvigorate the Design Process

Authentic community engagement makes for a better school and a stronger community. Diversity matters—who is at the table in the design of new schools matters a great deal. Participants agreed that design process must include many voices, including the students and teachers who will inhabit the space on a daily basis. Several forum participants recognized that many parents and other decision makers have outdated ideas of what a school is. Such ideas prevent design excellence that is in the interest of improving student achievement. One way to encourage creativity is to develop a “wiki” for school design to give parents and students a better understanding of the language of school design.

Other participants voiced concerns about state and regulatory policies and suggested that these policies dictate the development of mediocre schools. There was also a clear consensus about the need to create a new and richer design matrix to move school boards beyond the bottom line as the sole and overriding reason to choose one design over another. Several participants suggested that design be integrated into current educational metrics regarding accountability.

There was a strong consensus on the issue of developing a pedagogy of space in order to use schools as learning tools. Participants generally agreed that a greater effort should be made to document the complete design process, including the development of post-occupancy reports. Some participants suggested that the education community should examine how evidence-based design is now being used by hospitals and other industries to improve services.

“Reimagine what a school can be, do it well, make it great, because it matters.”

Gregg Betheil
Senior Vice President
National Academy Foundation



9. Expand the Research Agenda

In the coming decade, American education will continue to move forward in developing a new system of data-driven decision making. This process has just begun and will only accelerate in the years ahead. The design community must recognize this sea change in educational policy making and act accordingly.

Although there is a growing body of evidence regarding the link between student achievement and teacher retention, and such factors as daylight and indoor air quality, little has been done in the way of research. The link between school design and other conditions for successful

learning needs to be investigated, including student mobility, truancy, graduation rates, personalization, and ways special education accommodations affect the achievement of other students.

10. Develop a Campaign for Innovative Design

There is a growing disconnect between what we know about good design and what is happening in the field. Although some districts are incorporating new concepts, reaching a broader constituency across the country continues to be difficult. Forum participants agreed that a tension exists between the value of good design and the reality of just getting a school built. This problem speaks to the greater need for bringing educators together with designers to support new concepts in how education is delivered.

There was a strong consensus on the need to develop an awareness campaign to change people’s understanding of the importance of innovative design and the ways it can help improve learning. Participants also agreed that the design community should make much more of an effort to document both its successes and failures.

Forum participants recognized that improving the design process presents significant challenges. The ability to design great schools is often hindered by state and regulatory policies that dictate mediocre school design. Implementing reform is difficult in a context of inappropriate standards, security concerns, and the difficulty of getting stakeholders to arrive at a consensus about the value of innovative design and its link to learning.

Nevertheless, participants were optimistic about the ability to create a stronger link between design and student achievement. They also recognized that our nation’s schools must act as centers of community, serve multiple civic purposes, and reflect the core values of our democracy—active citizenship, diversity, equity, and access to new learning opportunities.

The Evolution of the American Schoolhouse

The evolution of the American schoolhouse has reflected the changing economic history of our nation, an evolving education philosophy, and a continuing drive for equity and full citizenship by racial minorities and immigrants. Education has always played a role in America's progress. Even in the earliest years of the Republic, Congress recognized the value of education. Surveying teams sent West under the provisions of the Northwest Ordinance of 1787 were required to divide new townships into four equal parts and set aside one part for schools and courthouses.

In time, America's iconic one-room rural schoolhouse gave way to the demands of the Industrial Age and the creation of multistoried common schools in the nation's growing urban areas. Horace Mann and other reformers in the 1850s created a system of free public education, in part to pass on the civic virtues and democratic values of the Republic to new immigrants flooding into the country. The need to educate large numbers of students and to Americanize the continuing flood of new immigrants would dominate American education until well into the 1920s.

By the beginning of the 20th century, "a majority of Americans age 7 to 13 attended school. But only one in 10 remained in school beyond the age of 14, and fewer than 7 percent of 17-year-olds graduated from high school."¹ In the early years of the 20th century, a growing effort was made to increase the number of children going to high school. According to Stanford education historian David Tyack, "Americans built one new high school a day from 1890 to 1918. High school enrollment swelled from about half a million in 1900 to 2.4 million in 1920 and to more than 6.5 million in 1940."²

At the time, educators struggled to find a balance between competing educational philosophies: "Taylorism,"³ with its intense focus on factory-like efficiency and standardization, eventually led to the development of standardized testing. Meanwhile, the Progressive movement led by John Dewey advocated a more child-centered form of education and the development of active and well-informed citizens.

Jeff Lackney, a historian of educational architecture, has made the point that the "general acceptance of various innovations and paradigms in educational design usually occurs many years following a specific innovation."⁴ A good example is the Crow Island School in Winnetka, Illinois, which was built by the architect Eero Saarinen in 1940 and is now considered "among the first of U.S. schools to incorporate concepts of progressive education into its design."⁵

Crow Island was the first school to move away from the "traditional two-story square and rectangular schools of the day"⁶ and to develop an open-plan campus. Saarinen's success stemmed, in large part, from his willingness to center his design on the children. Saarinen's novel architecture included extensive storage built into the L-shaped rooms, space for multiple instructional strategies (including group projects), and well-thought-out lighting and window walls that linked the school to the immediate outdoor environment.

In 1956, 50 architects and scholars selected Crow Island as 12th among all buildings and 1st among schools in an *Architectural Record* poll naming the most significant buildings of the past 100 years in America. In 1971, the American Institute of Architects honored Crow Island, declaring that "there have been no significant advances in elementary school design since Crow Island School."⁷ The school is now listed in the National Register of Historic Places.

Between 1930 and 1970, school districts across the country went through a massive period of consolidation. More than “100,000 schools were closed and the average school size increased fivefold.”⁸ The movement to consolidate reflected a host of factors: the decline of America’s rural farm economy, the rapid suburbanization, the need to meet the demands of the post-World War II baby boom, and a desire to professionalize American education.

This “big is better” and “one size fits all” approach, which defined American culture in general, would lead to the construction of thousands of large comprehensive high schools. This new approach to school design was greatly encouraged by the 1959 Conant Report (named after its author James Conant, the president of Harvard University).⁹ This report, which was based on a survey of more than 2,000 high schools, concluded that large, comprehensive high schools “were more cost-efficient and provided higher-quality education through a wider range of course offerings.”¹⁰

Another milestone in school design was the establishment in 1958 of the Educational Facilities Laboratories (EFL) by the Ford Foundation. EFL has been hailed as having a greater effect “on educational facilities than any other single force in the history of American education.”¹¹ During its 28 years (1958-86), EFL led the way in a host of innovations, including the open-plan school, the development of standardized methods for constructing school buildings, the expansion of middle schools, and the redesign of libraries to focus on the individual needs of readers.

Photo: @Target



EFL also encouraged new spatial organizational methods—from the promotion of folding and movable walls to team teaching and the use of new media such as television in the classroom. EFL’s research and studies stretched across the broad spectrum of educational needs from the use of air conditioning to the promotion of joint use, the development of schools as community centers, and the use of citizen participation in the planning process. Though not successful in all its initiatives—particularly the controversial open plan—EFL set a standard for innovation that has yet to be equaled.

>> Participants in the Design for Learning Forum visited the InterDistrict Downtown School in Minneapolis.

Through out the 20th century, school design had little positive effect on the plight of minorities when it came to improving education. African-American children in the South had to endure gross inequality with respect to school facilities. This inequality was legally sanctioned by the “separate but equal” doctrine established in 1896 by the U.S. Supreme Court in *Plessey v. Ferguson*. Three years later, the same Supreme Court ruled in *Cumming v. Richmond County Board of Education* that “separate but equal” did not necessarily mean that black students have the same right to a high school education as white students. This landmark case sanctioned the *de jure* segregation of America’s public schools and would not be overturned by the U.S. Supreme Court until *Brown v. Board of Education* in 1954.

Throughout the 20th century, school design had little positive effect on the plight of minorities when it came to improving education.

Indeed, one of the chief complaints that the National Association for the Advancement of Colored Persons brought to the Supreme Court in 1954 in the landmark case of *Brown v. Board of Education* was the lack of decent public school facilities for minority children. The lone bright spot in school design for African Americans in the South was the development of state-of-the-art architectural plans that were initially drawn by professors at Tuskegee Institute for the 5,000 Rosenwald Schools. By the 1930s, these school facilities provided a place to learn for one-third of all African-American children in Southern schools.¹²

One of the continuing themes in the history of school design is that society continues to assign public education new and additional responsibilities. Schools have gotten bigger because they have been assigned more things to do. The demand for better-skilled and more physically fit soldiers during World War I led to the development of vocational education and a growing demand for physical education. The shock of Sputnik in 1957 encouraged the National Science Foundation to invest \$500 million over a 20-year period in reforming science education and spurred school districts to spend millions of dollars to build science labs.

Schools have gotten bigger because they have been assigned more things to do.

In the 1960s, the growing awareness that there were deep pockets of rural and urban poverty encouraged President Lyndon Johnson to launch the “War on Poverty,” which added the school breakfast and school lunch program to the tasks assigned to public education. Over time, public schools have provided a growing array of health and social services. Community school activists have been at the forefront of efforts to get policy makers to acknowledge the multiple roles that our nation’s schools now play in providing services to children in order to close the achievement gap.

In the 1990s, American education was given three new tasks. The passage in 1990 of the Americans with Disabilities Act requiring accommodations for special education students added a new dimension to school design. The advent of the Internet launched a national effort to wire our nation’s schools. Net Day became every day as schools were assigned the task of overcoming the digital divide. Computer labs became the great new space in thousands of new schools built in response to the baby boom echo. The new and growing demands by working parents for schools to provide high-quality after-school programs is only the latest task that must be integrated into the design of future schools. American education in the past 50 years has had to adjust to a host of dynamics that have had significant implications for school design. While not inclusive, seven major trends have had significant impact on how we design our nation’s schools:

- The demand for greater equity in the financing and construction of new schools, which has led to major tax reform in many states
- The need to spend billions of dollars annually to build thousands of new schools in response to the baby boom echo

Current Issues and Challenges

Although many of the trends that have influenced the design of schools in the past several decades continue to unfold, several immediate issues became the focus of discussion at the Forum: the importance of equity, the speed of change, the issues that prevent great design, the tension between personalization and standardization, the reality that school serves many purposes beyond academics, ways to measure the effect of good design, and the identification of design principles for success.

The Importance of Equity

Equity was high on the agenda for most participants. **Joe Nathan**, director of the Center for School Change at the University of Minnesota’s Hubert H. Humphrey Institute of Public Affairs, noted that it was a bitter irony that he had spent the preceding week in Topeka, Kansas, working on the issue of inadequate facilities more than 50 years after that community filed the legal complaint that led to the Supreme Court decision in *Brown v. Board of Education*. **George Copa**, a professor at Oregon State University, reminded participants that rural America still has some of the most inadequate facilities in the nation.

Kenneth Stevenson, a professor at the University of South Carolina School of Education, Department of Educational Leadership and Policies, approached the issue another way. Stevenson suggested that school districts will increasingly have to face the challenges of whether aging and largely white baby boomers will continue to fund school construction for a student population that is increasingly made up of minorities and immigrants, and whether this generational disconnection might lead to the “balkanization” of our society.



photo: @Target

>> Ellis Kaufman, Kenneth Stevenson, and Linda Roberts discuss the future of school design at the Design for Learning Forum.

Educational Trends Shaping School Planning and Design

By Kenneth Stevenson, Ed.D.

In 2002, the National Clearinghouse for Educational Facilities asked Kenneth Stevenson, professor at the University of South Carolina Department of Educational Leadership and Policies, to write an article on major trends in school design. Stevenson, who participated in the Forum, recently updated this article, delineating 12 major trends that are currently shaping school planning and design:

1. **School choice and equity will redirect facilities planning.**
2. **Small schools may trump larger schools in future construction.**
3. **There is continuing debate over reduced class size, and cost is a factor.**
4. **Technology may replace teachers as a cost-saving measure.**
5. **The changing mission of schools may require greater flexibility in the use of space.**
6. **Classrooms are being reconfigured.**
7. **Schools go 24/7. They will be kept open longer to extend learning time and for greater community use.**
8. **Paper-based learning materials will disappear, particularly in the higher grades.**
9. **Grade spans are changing: K-8 schools are staging a comeback.**
10. **Special education will go mainstream, requiring design modifications.**
11. **Early childhood programs will expand and become the norm.**
12. **Schools as we know them may disappear, as more children are home schooled and use virtual media to learn. The traditional school may morph into a production and broadcast center.**

***Kenneth Stevenson** is professor and chair, College of Education, University of South Carolina. For a copy of the paper, titled "Educational Trends Shaping School Planning and Design: 2007," go to the National Clearinghouse for Educational Facilities website at www.edfacilities.org.*

Stevenson's suggestion that equity is often at the heart of the debate regarding school facilities raises concern. In the past decade, the United States has gone through an extraordinary period of school construction. Yet the enduring inequality that is so much a part of American society has not changed.

According to a recent report titled "Growth and Disparity: A Decade of U.S. Public School Construction," school districts spent \$304 billion (2005 dollars) in the past decade on the "hard costs" of bricks and mortar to build 12,000 new schools and to finish 130,000 renovation and improvement projects. Unfortunately, the least affluent school districts made the lowest investment (\$4,800 per student), while the most affluent school districts made the highest investment (\$9,361 per student).¹³

The Speed of Change

For many participants, one of the most challenging issues is finding the answer to one question: how do you design for learning when learning is no longer contained in the classroom or the school? There was a consensus that both the education and the design communities are adapting too slowly to the speed of change brought about by technology, even as students are accelerating their learning curve in order to use new technology outside the classroom.

Tim Dufault, AIA, President of Cuningham Group, observed in the first session of the Forum that the design community is moving with the speed of an aircraft carrier when it should be moving like a speedboat to adapt to change more quickly. **Bruce Jilk, AIA**, an award-winning architect, suggested that the current design process is “narrowing down choices rather than creating new opportunities.” **Dufault** and **Tom Blurock, FAIA**, suggested that a lack of resources is forcing charter schools to become much more nimble and creative in their designs and urged participants to look to this “fringe” for new models.

Photo: @Target



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Tim Dufault, AIA, makes a point at the Design for Learning Forum.

What Prevents Great Design?

Even as participants suggested the possibility that we are at a tipping point in school design, they recognized that inertia and fear of change often hampers creativity. **Blurock** suggested that many schools and institutions are risk averse and so “obsessed with security that they are containerizing schools and isolating themselves.” **Jeff Vincent**, co-director of the Center for Cities and Schools, echoed Blurock’s comments, stating that “fear and liability are restricting designs for learning” and that new concerns about safety in light of 9/11 will only make people more cautious.

Many participants described the current design process as rigid and bureaucratic. They pointed out that, as this process has evolved, it has squeezed out any opportunity for creativity. **Ron Bogle**, president and chief executive officer (CEO) of AAF, suggested that there is often a tension between the push to meet a budget or schedule and the need for seats, and the time it takes to develop creative designs that reflect the education philosophy of the community.

Prakash Nair, REFP, president of Fielding Nair International lamented, “Once we set things in place in our built environment, particularly with schools, we tend to stick with it forever.” Participants acknowledged that current school design models are not evolving quickly enough and that much more needs to be done to show people the effects of good school design and how to implement those ideas.

Another factor that hinders creativity is the reality that parents and school board members often have fixed and outdated mental images in their heads about what a school is. These old mental images are a roadblock to new designs that can improve achievement. Both **Jilk** and **Copa** suggested the need to get these outdated images out of the heads of school board members before a school district actually hires an architect.

Personalization vs. Standardization

There was significant discussion regarding the tension between standardization, given the new demands for accountability and the growing effort to personalize learning. In many ways, these two powerful trends are in direct conflict. Many education reformers believe that the standardization of learning in the past 50 years has been a great failure and is one of the principal reasons so many young people continue to drop out of school. These reformers point to a growing body of research on the importance of personalized learning.

However, new demands for accountability embedded in the No Child Left Behind legislation militates against personalization, giving students the freedom to learn on their own. **Tom Carroll**, President and CEO of the National Commission on Teaching and America’s Future, suggested that standardization in schooling might actually encourage many more students to leave school because “there are more powerful learning opportunities outside of the school.” **Ty Goddard**, director of the British Council for School Environments and managing director of School Works, went so far as to suggest that educators would be smart to learn how to “harness the power of gaming, fashion, and retail to attract students to school.”

Academics vs. Civic and Social Purposes

Although great attention has been paid in recent years to closing the achievement gap as a result of No Child Left Behind, the reality is that school facilities serve multiple civic and social purposes beyond education. Participants noted that schools provide meaning and purpose in countless ways—providing child care, food, recreation, life preparation, citizenship, social skills, job training, emergency shelters and are at the very center of community life. As a result, it is sometimes difficult to create a direct link between academic achievement and school design.

Gregg Bethiel, vice president of the National Academy Foundation, remarked that in thinking about design we have to remember that “schools as an entity serve multiple purposes, and I do not think that dynamic is going to go away. For many people, the school is a child care center regardless of the quality of the learning...We are, in a sense, trying to redesign how we think about learning, what it looks like, and where it happens, and schools play a potentially smaller part. That said, school buildings will serve other needs that have nothing to do with learning.”

One of the most important roles that schools do play, however, is providing space for the socialization of young people. “There is a reason for schools. They create a safe place, a practice space for the world, and I don’t want to throw that out,” stated **Kristina Hooper Woolsey**, director of the New Media Thinking Project.

Seven students who participated at a special panel conducted at the Interdistrict Downtown School were asked for their ideas. The students placed a significant emphasis on designing schools to give young people the space for learning and forming relationships. As expressed by **Daniel Schwarze**, “There should be openness. Everything should be connected to make better relationships with other people.” **Anna Wakefield**, another student on the panel, expressed the sentiment this way: “The best part is when students learn from each other, and I think the teachers also learn a lot from us.” All seven of the students, who came from various downtown Minneapolis schools, emphasized a need for a sense of freedom within the school environment.

Measuring the Impact of Good Design

Given the multiple roles that a school facility can play in the life a community, there was considerable discussion on how to measure the effect of school design on student achievement. The lack of data, ways to use data, and the need for data to link achievement to better design became the topics of lively discussion. **Linda Roberts**, the first director of the Office of Technology at the U.S. Department of Education, noted that “Data-driven decision making is taking hold in many school districts” but the downside of this new drive is that “gathering data becomes an end in itself.”

The role of research was a point of contention. Some participants claim that very little research is available to support claims that design improves student achievement. However, others suggested that there is no time to lose on research and that, although it is quite difficult to prove the importance of some design components, anecdotal evidence strongly supports their importance. Still other participants felt that it was imperative to have evidence that specific design strategies do affect achievement, so that the public and decision makers will be convinced, even if it takes time to develop the research.

Photo: @Target



>> High school students from the Minneapolis region share their perspective at the Design for Learning Forum.

Participants recognized that hard data has been developed that directly links daylight, air quality, color, and other factors important to improving student achievement and affecting teacher retention. Schools are also generating hard data to meet Leadership in Energy and Environmental Design (LEED) standards, so that they can demonstrate and improve sustainability. The link, however, between student achievement and design is, at best, indirect with respect to dropout rates, graduation rates, and other conditions for learning that affect achievement. **Thomas Fisher, AIA**, and **Jeff Vincent, Ph.D.** suggested that the education community should explore how hospitals and other industries are now using evidence-based design to improve performance.

Design Principles and Strategies for Success

It became clear during the Forum that a great deal of work is being done in the field by both educators and members of the design community to develop new principles to guide ongoing reform efforts. Participants presented a variety of principles that guide their work. One of their chief concerns, however, was the realization that they face a significant challenge in putting these principles into action. For help in facing that challenge, architects and educators are often talking to people in their own professional communities.

Ellis Kaufman, director of Small Learning Communities and School Redesign for the Los Angeles Unified School District, presented the seven principles that currently guide his work: 1. unifying vision, 2. personalization, 3. access and equity, 4. rigorous standard-based instruction, 5. parent and community collaboration, 6. professional development, and 7. accountability and distributed leadership.

National High School Alliance: Call to Action

The National High School Alliance is a national partnership network of 43 leading organizations, including the Education Trust, the Council of Great City Schools, and the Bill & Melinda Gates Foundation. The Alliance has developed a set of six guiding principles that it believes should frame the design of any new high school, large or small, in order to improve achievement.

Schools should have:

1. Personalized learning environments
2. Academic engagement of all students
3. Intelligent systems of high standards, curriculum, assessment, and support
4. Empowered educators
5. Accountable leaders
6. Engaged communities and youth

For more information go to www.iel.org or www.hsalliance.org.

Copa suggested that the key concepts that should be incorporated in the design of a new school include freedom, diversity of students, safety and security, the need for in-between space for each and every learner, and an emphasis on flexibility—the ability to adapt to new functions.

Gail Burnaford, dean of the College of Education at Florida Atlantic University, presented the five standards that define the work of the Center for Research on Education Diversity and Excellence at the University of California, Berkeley School of Education: 1. Use instructional group activities in which students and teachers work together to create a product or idea; 2. develop language and literacy skills across all curricula and in all subject areas; 3. connect lessons to student's lives and experiences at home, in the community, and at school; 4. engage students by challenging them, designing activities to advance understanding to more complex levels; 5. emphasize dialogue over lectures: instruct through teacher-student dialogue, especially academic, goal-directed, small-group conversations rather than lectures.

Why Design Matters—Connecting Conversations

By Gregg Betheil

Of course design matters—at least to designers and architects.

For education reformers, reform matters, and for teachers, teaching matters. For school leaders, leadership matters, and for policy makers, be they federal or state officials or local school board members, policy matters (and of course the budget and taxpayers). I know we spend lots of time and energy trying to convince students that school matters—or better yet, that learning matters.

Schools have multiple stakeholders—students, parents, teachers, administrators, the community, political leadership, unions, and vendors. They also have many purposes, some far beyond learning or completely unrelated. Schools are community centers, polling places, theaters, child care providers, shelters, and safe havens. Although some of those who visit schools each year are there to learn, many are there to work. And let's not forget athletics, the arts, adult learning, and on and on. In short, schools are a lot of things to a lot of people.

So, for all the discussion about redesigning the American education system to meet the demands of the new century, much of the conversation remains isolated in the silos of past practice and parochial interest. Only recently have reports like *Tough Choices or Tough Times* begun to challenge prevailing assumptions of how we define school, suggesting, for example, that high school end after grade 10.¹⁴

With the call for and pace of change only quickening, it is critical that we come together to recognize the connections between these different perspectives, constituencies, and ways of thinking about the challenge of improving educational outcomes for all students. It is in both our national and individual interests to meet this challenge.

In recent months, I have been reminded of what should have been obvious: design impacts the effectiveness of our learning and working environments. When I began my teaching career, in the basement of a New York City high school, it never occurred to me that I could have expected someone to think about the role natural light would play in my classroom and my daily interactions with students. After five years in the basement, it was abundantly clear to me that nobody had given much thought to me or my students. It was probably the bottom line that led to classrooms in the basement, misleadingly given room numbers in the 100s, as if to obscure our subterranean setting.

As groups like the National High School Alliance try to bring consensus to the education reform community, similar consensus-building efforts are under way in sectors that will have a direct bearing on our future success. The U.S. Chamber of Commerce's Institute for a Competitive Workforce is convening business leaders; the National Governors Association has focused state policy makers on the issue. Parent groups and civil rights advocates, tax reformers and universities—all have connections to American public education.

It is only appropriate then that the design community bring its voice to the discussion. We will spend more than \$30 billion this year on school construction. We must view that investment as a collective opportunity. Reimagine what a school can be, do it well, make it great, because it matters!

Gregg Betheil is senior vice president of the National Academy Foundation in New York City and a member of the National High School Alliance steering committee.

Future Forces Shaping School Design

Participants at the Forum spent considerable time discussing how American education will change in the decades ahead and the effect these changes will have on school design and our efforts to close the achievement gap.

Barbara Diamond, vice president for education strategy at KnowledgeWorks Foundation, initiated this discussion by walking participants through the Foundation’s newly released Map of Future Forces Affecting Education: 2006-2016. The map and an explanation of how to use it can be retrieved at www.kwfdn.org/map/.

The map suggests that six major global trends at work in the coming decade will have a profound influence on American society:

1. The development of a system of grassroots economics will place high value on collaboration, bottom-up processes, and shared resources. *Which existing and new players can catalyze grassroots education innovation?*
2. Smart networking encourages the ability to form ad hoc groups and catalyze communities of action using personal interactive media. *How will engaged networkers transform education?*
3. The continued fragmentation of the global media culture will generate a more fundamentalist view of complex problems. *Where will strong opinions intensify tensions around core educational issues, triggering tipping points that cause major disruptions—both positive and negative?*
4. With population density increasing dramatically and environmental crises looming in a more interconnected global society, there are increasing signs that health will become a more pressing concern. *What role might education play in addressing health problems?*
5. As the world’s population continues to increase and becomes more urbanized, city leaders will be increasingly challenged to manage wealth, health, infrastructure, and social discontent. *How will people adapt to the new challenges of living in extremely large cities and how will that reshape the role of urban schools?*

“The world of our children will be a snowstorm of paradigm change.”

Prakash Nair, RA, REFP
President
Fielding Nair International



6. At the end of cyberspace, places and objects are becoming increasingly embedded with digital information and linked through connective media into social networks. The result is the end of the distinction between cyberspace and real space. *What opportunities do newly animate, responsive environments and immersive media present to urban schools and communities?*

These trends raise a host of new questions for educators and will require the design community to think in fundamentally new terms.



>> Barbara Diamond, Vice President for Education Strategy, KnowledgeWorks Foundation, presents a chart titled "2006-2016 Map of Future Forces Affecting Education."

Given these developing global social and economic trends, the future is likely to be highly uncertain and, indeed, even unstable. Cities may develop what KnowledgeWorks (using the military term) calls VUCA environments—that is, volatile, uncertain, complex, and ambiguous environments—that will redefine the mission of schools. **Diamond** suggested that these trends present the following significant implications for American education and school design:

- **More Choice**—Public schools will no longer have a monopoly on learning, and their role as education’s sole providers will change. In their place will be an expanding learning economy.
- **New Career Paths for Teachers**—Teachers will take on new roles and have many more options. New career paths for teachers will require different spaces in schools. Teachers may become content experts, learning coaches, network navigators, classroom managers, and cognitive specialists. Given these new roles, teachers will need offices like those of other professionals.
- **Community as Classroom**—In the expanding learning economy, the community will increasingly be used as the classroom. Students may not be in school all day or all the time and will learn about places using mobile technology. Enrollment may fluctuate from semester to semester because students will have off-campus experiences.
- **Personalized Learning**—A greater effort will be made to personalize learning, including the development of individual education plans. Schools will have to develop a variety of learning spaces for individual work, for group projects, and for different learning styles. There will be a greater emphasis on do-it-yourself learning, and many more venues will be available for learning.

- **Zones of Health and Safety**—Schools will expand health and mental health services and health education and may even provide extended child care. Schools will be seen as healthful environments.
- **Agile, Smart Schools**—There will be a greater focus on designing agile, smart schools. Flexibility in design will become the defining principle. Schools will be smaller; computer labs will disappear and be replaced by \$100 laptops. Computers may replace books and there will be a greater focus in developing on-demand education.
- **Unbundled Education**—The responsibilities that today belong chiefly to schools will be shared with others as a result of open content and curricula, social media, and communities of action. These forces will redefine the role of schools and their distinct identity. Schools will increasingly be seen as network hubs and resource coordinators.

Diamond pressed home the point that young people today “don’t think of themselves as citizens or customers but as networkers” and that the idea of schools as “isolated castles run by a power structure just doesn’t work in the world of smart networkers.”

Fisher, Dean of the College of Design at the University of Minnesota, suggested a need to look for even larger paradigms to answer the question of what all these changes mean. He cited the work of the cultural anthropologist Ken Clawson in suggesting that people are using technology to “return to the village, to communities of interest. This is how we evolved.”

He went on to cite the work of Roberto Eco and his theory that we are moving to a “new medievalism” and “returning to a new mindset of fragmentation but at the same time globalization.” In a sense, we are “moving away from the Enlightenment view of the world that underscores much of our system of public education.”

Roberts worried that “those who have the skills to use these forces are the winners...[and] the more educated you are the more likely you will participate in education and technology and use community resources.”

Woolsey suggested that with the development of this new, media-rich, pervasive learning environment, educators will have to develop a whole new set of “practices and research.”

Mark Buesgens, an advocate for charter schools, stated that a new definition of public education is emerging that will lead to “a mindset change” and will allow us to stop thinking about “public education as a system,” instead thinking of it as an “educated public.” His remarks suggested a new openness to innovation.

More than a few participants responded by saying that for all this talk of change and innovation, the inability to change the system is quite powerful. **Betheil** noted that we have “had these moments before” and that the tensions that we are dealing with are the same issues that “John Dewey dealt with 100 years ago.”

Ten Findings

1

Recognize the Paradigm Change

A significant number of global social, economic, and technological trends will reshape American society in the coming decade. These trends will have a profound influence on American education and will certainly reshape how we design the next generation of schools.

As new educational opportunities emerge, one of the core issues that the design community will have to address is the very definition of “school.” One of the key points raised at the Forum is the growing recognition of a need to move design beyond “place.” As **Woolsey** noted, “We have models for schools but need new models for learning.”

“Form is failing function.”

Bruce Jilk, AIA
Educational Planner
Atelier Jilk



At the turn of the century, Louis Henri Sullivan popularized the defining principle of 20th-century architecture: “form follows function.” This sharp departure from 19th-century sensibilities would be adopted by other Modernists such as Le Corbusier, Walter Gropius, and Mies van der Rohe. Now, however, according to **Jilk**, “form is failing function.” Indeed, the inability to adapt to rapidly changing learning styles may actually hinder our national effort to propel American education into the 21st century.

American education is slowly moving away from the large, factory-like schools that defined K-12 education for most of the 20th century. Standardized education is being replaced by new efforts to increase personalization and a growing recognition that students will have an increasing number of educational choices (home schooling, charter schools, virtual schools, for-profit education centers, etc.) and that young people will increasingly learn outside the traditional school environment.

There was a strong consensus at the Forum that the design process should give voice to multiple ways of learning in multiple environments. Flexibility must become a defining principle in school design. As **Dufault** noted, “This isn’t about architecture; this is about learning.” The reality is that the snowstorm of paradigm change that is now on us may not fit into the current confined space we call school.

Participants recognized, however, that their sense of urgency is mitigated by the powerful inertia of the status quo; that despite many big ideas in the past 45 years, the stand-alone teacher in the classroom continues to be the defining model for American education.

What is good design and can it be measured?

By Prakash Nair, RA, REFP

Good school design can be defined and it can be measured. This makes it all the more odd that more than 99% of the \$30 billion that the U.S. spends on school buildings each year goes into the construction of schools that will fail the test of good school design. Once we define good school design, we will be well on our way to measuring it. Good school design must meet 7 key conditions:

1. Consciously and measurably enhance occupants' physical comfort and well-being.

We are talking here about things like good indoor air quality, plenty of natural ventilation, and comfortable, ergonomic furnishings—though this list is by no means exhaustive.

2. Strongly support 21st-century teaching and learning principles.

The book *The Language of School Design: Designing Patterns for 21st Century Schools* identifies 18 different modes of teaching and learning that school facilities must support, such as project-based learning, cooperative learning, peer tutoring, integrated technology that is ubiquitously available when and where needed, team teaching, naturalist learning, and performance-based learning.¹⁵

3. Demonstrate environmental responsibility.

This means that all decisions, from planning and design through commissioning and occupancy, must be informed by the best science of sustainable design. In schools, we need to take this thinking further and integrate the campus's design and the art and science of sustainability as inseparable parts of its learning culture.

4. Serve the educational needs of the larger community.

Schools as primary places for learning have become anachronisms. The boundaries between school and community should be blurred so that learning takes place as much in the larger community as it does within the four walls of a school facility. By the same token, the school itself becomes an extension of the community's learning resources.

5. Incorporate design principles that make buildings last longer, cost less, be more inspiring, and adapt to changing needs.

In other words, firmly established principles of good architecture come into play as much in school design as with any other building type. Christopher Alexander's *A Pattern Language*¹⁶ and Designshare.com's *The Language of School Design* are only two examples of the resources that discuss the elements of good design that can be applied to schools.

6. Apply an open, transparent, and collaborative process.

Good school design is as much about ownership and a sense of belonging as it is about the pure principles of good design. It is important to demystify the design process. There are many ways to do this, including collaborative work sessions such as discovery and design charrettes. These formats allow all stakeholders to be involved in the development of designs that allow occupants to customize their spaces as needed over time.

(continued on next page)

7. Be accountable through meaningful, measurable results.

This brings us to the “measuring” challenge. Many of the above criteria would be considered “soft” and, therefore, not measurable. However, tools exist that describe and define such qualitative elements as aesthetics, day lighting, indoor-outdoor connections, collaborative spaces, spaces for independent study, areas for hands-on learning, the extent to which a school campus supports a personalized education model, and so on.

One such instrument is called the EFEI (Educational Facilities Effectiveness Instrument). It provides a percentage score that reveals, at all stages in a project’s life cycle, how closely the design is adhering to its educational vision and function. In this way, it functions as a formative design assessment tool for continuous improvements while still allowing lots of room for creative freedom and innovation.

It is time for the school facilities profession to demonstrate that good school design does not have to be an accident but can be a powerful and inspirational force in the overall education reform movement.

Prakash Nair is president of Fielding Nair International.



© Jim Berchert Photography, Courtesy Klipp

>> The Denver School of Science and Technology uses computer technology and innovative design to enhance student learning and create an identity in its neighborhood.



2

Create New Links to the National Education Reform Effort

There is a need to create a stronger link between the design community and education reformers who are seeking to close the achievement gap and give students access to 21st-century skills. In the past decade, education reformers and the design community have been working on separate but parallel tracks in developing sets of principles to improve our nation's schools. What is missing is a creative link that encourages both communities to join together to find ways to improve student achievement.

Efforts have been made to create these links. In 1990, architects and educators came together to attend the first National Invitational Conference for Architects and Educators on the occasion of the 50th anniversary of the construction of the Crow Island School. In 1998, the U.S. Department of Education, under the leadership of Secretary of Education Richard Riley, and the American Institute for Architects (AIA) co-sponsored the National Symposium on School Design. This symposium helped launch the growing national effort to design schools as centers of community.

Since that time, there have been sporadic efforts to create links between educators, community activists, health reformers, environmentalists, and the school design community. In 2003, for example, a major conference sponsored by the Building Educational Success Together (BEST) Partnership focused on "Designing Healthy, High Performance Schools." Despite these efforts and others, educators, architects, and community members more often than not have gone their separate ways.

When successful connections are made, they are often the result of persistent efforts at the local level by such organizations as New Schools Better Neighborhoods in Los Angeles or the 21st Century School Fund in Washington, D.C., and AAFs *Great Schools by Design* program. These organizations have developed the staying power, the political connections, the research base, and an understanding of the construction process that has allowed them to build successful partnerships between educators, architects, and community advocates.

The question put to the participants at the Forum was whether a similar effort could be made at the national level by building on the work of the National Summit on School Design. This question comes at a time when there is a growing sense of urgency that the education reforms of the past 20 or more years are insufficient.

The recent report released by the New Commission on the Skills of the American Workforce, which calls for universal pre-K and the end of high school at the 10th grade, suggests that the ongoing debate about how to propel American education into the 21st century has not abated. Architects and facility planners should actively be part of this ongoing discussion.

The Educational Program and School Design: A Crucial Partnership

By Elizabeth Lodal

Learning happens when students feel safe and secure, have all their senses engaged, feel connected to the world, have relevant and compelling content, and are challenged to learn and grow intellectually. Schools of the future must produce students who are engaged citizens, who seek and find meaning through learning, and who see the application and importance of their school experience. The future depends on schools graduating students who are literate and numerate and who appreciate and understand the arts and sciences. These students need to be inspired to become creative problem solvers and intellectual risk takers so that they are prepared for the world of the 21st century. School design will either inhibit or support and enhance such a robust education program.

As a lifelong educator, I have witnessed firsthand the toll that sick rooms, inadequate ventilation and lighting, and outdated floor plans take on youth, adults, and educational outcomes. Schools need to be more than just adequate, up-to-code buildings. Learning space for the 21st century must accommodate styles of teaching and learning that go far beyond the traditional classroom. Curricula are increasingly interdisciplinary, and learning must be project based to provide hands-on opportunities to apply knowledge and to solve problems.

This need requires facilities that allow interactive teams of teachers to work with groups of students on a variety of meaningful learning projects, moving beyond traditional classroom confines. Hands-on, interactive activities are the key—doing scientific experiments, speaking new languages, interacting with teachers and other students in seminar settings, and performing community service. Service learning (increasingly a required component of curricula) takes students beyond the walls of the school to the larger laboratory of the community and helps them become productive citizens and understand their own environment.

Great school design can also serve as a teaching resource to demonstrate the interdependence of the environment and modern technologies. What better way to teach our students about sustainability than for them to inhabit green spaces daily and become custodians of their environment? These learning spaces clearly must be healthy and safe but also visually stimulating and flexible. Teachers need the option of reorganizing the spaces for a variety of learning activities. Flexibility of space is crucial to the creation of a vibrant learning community.

Both new and renovated schools need to be the products of a true partnership of educators, designers, and the community. They need to provide multigenerational opportunities for interaction, guidance, and mentoring. The more caring citizens who interact with students, the safer our schools become. Students who are engaged in meaningful activities and learning are not discipline problems. Rather they develop immunities to gangs by becoming strong, engaged individuals. School buildings and learning spaces that communicate that education is highly valued help intrinsically to teach our youth about the responsibilities of citizenship.

School buildings are a lasting legacy of any era. Great architecture and design are inspirational, and students should not be exempt from experiencing them. Buildings that are sculptural, with interiors that stimulate the senses and provide a variety of spaces, will enhance thinking, creativity, and indeed learning. Achieving these ideals will require courageous and visionary school boards, civic leaders, and designers.

Elizabeth Lodal recently retired as the award-winning principal of the Thomas Jefferson Science and Technology High School in Fairfax, Virginia. She currently represents Virginia on the Education Commission of the States.

3

Build for a Changing Student Population

There is a growing consensus that American education should move to develop a system of universal pre-K education in the coming decade. A growing body of research suggests that expanding early childhood programs for three- and four-year-olds will give them the skills they need to be ready to learn and provide a strong start as they begin their education. The need for this preparation is all the more pressing, given that an achievement gap already exists when children enter kindergarten.

In 2005, state lawmakers increased pre-K funding by \$600 million across 26 states, adding 180,000 more children to preschool attendance rolls around the country. The creation of a universal pre-K system will require the design community to consider issues of safety, health, and additional space for age-appropriate developmental activities. At the same time, an increasing number of school districts will have student populations that are largely minority or will be addressing the influx of new immigrants.

In 2003, 42 percent of all public school students were considered part of a racial or ethnic minority group, an increase from 22 percent in 1972. This diversity, according to the U.S. Census Bureau, will only increase as our nation's Hispanic and Asian populations more than triple in the next half-century.

The majority of these children will attend schools that are struggling academically and are housed in crowded and outdated facilities. Many will lack basic health care, will be identified as “special needs” students, will have limited proficiency in English, and will need access to quality after-school programs in order to extend their learning time and to keep them out of harm's way. Seamlessly co-locating additional social, health, and other services into the design of new schools is one way to help close the achievement gap for these young people. This increase in the need for services may, in turn, redefine the meaning of equity when it comes to school facilities.



Photo: @Target



Students at the Design for Learning Forum explore how the design of their schools affects their educational experience.

4

Design for the Age Wave

In 2011, the baby boom generation will begin to retire in large numbers. As a result, the number of Americans over age 65 will increase from 35 million to 70 million by 2025. At the same time, the number of families with children, the traditional base of support for public education, will reach a new historic low, at just 25 percent of the overall population. Put simply, three-quarters of all Americans will have no direct links to schools.

These baby boomers are already changing the very definition of aging and have every expectation of living full and healthy lives. These future retirees are aware of new medical research that suggests that they can live longer and healthier lives if they remain lifelong learners and remain physically active. School facilities that are built to accommodate both students and adults and are designed specifically for multipurpose use offer senior citizens the opportunity to do both. These new retirees also have the potential to provide schools with an enormous new pool of volunteers to help disadvantaged children during their retirement years.

These aging baby boomers will dominate America's political landscape in the next 25 years and have an enormous influence in dictating education spending. **Stevenson** has suggested that a generational clash over scarce public dollars is one of the most pressing challenges that school districts may face in the coming decades, unless they build new links to this important voting bloc.

Courtesy St. Paul Public Schools.



At the very least, the educational system will find it increasingly difficult to convince taxpayers to support bond referenda to build new schools and/or remodel existing ones. At the same time, school facilities themselves will need to be used more than ever before. In effect, to meet the needs of the next generation of parents and students, schools must be open year-round, including evenings and weekends.¹⁷

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John A. Johnson Achievement Plus Elementary School in St. Paul, Minnesota offers a variety of educational and athletic resources to the local community.



5

Use Technology to Expand Learning but Recognize its Limits

Forum participants clearly recognized that young people today—the digital natives of the 21st century—are on a learning curve that is continuing to accelerate and that they will increasingly use this capacity to learn outside the school environment. Technology will become more mobile, ubiquitous, less expensive, and more interconnected. The computer lab as we know it will disappear.

Technology will become, as many participants suggested, the intersection between learning inside the classroom and learning on the web or in the community. **Jilk** made the point that “Learning is like a river flowing in new directions and increasingly flowing outside the established boundaries of the school. School must be porous and open.”

In 2005, Roy Pea, director of the Stanford Center for Innovations in Learning, made a major presentation on technology at the National Summit on School Design. It is worth recalling his remarks:

In the next ten years, there will emerge a growing number of 1:1 digital classrooms, where students bring some kind of Internet-enabled portable computing device equipped with wireless communication capabilities...these devices will be used frequently and integrally in the course of instruction, becoming indispensable learning tools like pencils and chalkboards, yet enabling students to learn more quickly, more deeply, and with more fun.¹⁸

As a result, an increasing number of students will go to school virtually, students will develop lifelong digital learning portfolios, and learning will no longer be “place bound.” School facilities will require greater flexibility in design to adapt to new practices that evolve as technology becomes more intertwined with the learning process. These changes and others will have a profound influence on education and design.

At the same time, however, participants recognized that that technology is only a tool to improving learning. Innovation can come in many forms. **Roberts**, who established and then directed the Office of Technology at the U.S. Department of Education for eight years, noted that a simple change in structure can influence classrooms to be organized more flexibly. She suggested that one of the most dynamic innovations was one of the simplest: “unbolting desks from the floor.”

Roberts was passionate in her belief that schools will have a role to play in the future. “We should not lose sight of the power of education.” **Roberts** continued, “schools aren’t going to go away and strong curriculums have staying power” but we must have “multiple designs and multiple variations of schools.”

Fisher joined her in making the case that despite the many advances in technology, schools will continue to have an important role because “students are looking to teachers and each other for meaning and wisdom, not just data.”

Digital Natives: A Natural Experiment

By Linda G. Roberts, Ed.D.

Unlike the designs for schools and classrooms, which have changed little since the 1950s, advances in digital technologies have revolutionized the way we communicate and access information, solve problems, live, and learn. Today's mobile digital devices, powerful computers, and the Internet have become indispensable tools in business, medicine, government, higher education, and research. These same technologies are also coming into our nation's schools and classrooms, and in a select—but growing number of instances—technology is changing the way students learn and teachers teach.

There is no question that today's students are “digital natives,” heavy users of media, music players, video games, computers, and the Internet. Educators estimate that elementary students use technology and media outside school for an average of 3.8 hours a day, middle school students 4.9 hours a day, and high school students 5.1 hours a day.¹⁹

Other surveys affirm that almost all teens use the Internet, that Internet use among younger children is substantial and growing, and that these digital natives are routinely creating and sharing content and information with other users (Pew Internet and American Life Project, 2004–06). They create blogs, personal web pages, or web pages for school or friends. They share original content such as artwork, photos, stories, or videos online, or remix content online to create new content.²⁰

The effect of digital technologies on K-12 education has largely been a “natural experiment,” with both positive and disappointing outcomes. Much has been learned about the design of interactive content and the design of effective training and support for teachers. Greater understanding of how people learn has coincided with vastly improved technology design, interfaces, and operation. It is now possible to see innovative and effective use of technology in classrooms across America, and those classrooms are where school design teams must go to learn how to build great school environments that will empower educators and students now and in the future.

Design teams should visit middle and high schools in Maine, where every student has a laptop and where technology supports, enriches, and expands every area of the curriculum. If not Maine, then they should find a district in a state or a school in the local community where technology is being deployed in revolutionary and powerful ways. Organizations such as the State Ed Tech Directors Association, the International Society for Technology in Education, the Coalition of School Networking, Cable in the Classroom, Project Tomorrow, and others can help locate the teachers, school leaders, and programs that are at the cutting edge.

Understanding how these students use technology to acquire skills and mastery of the curriculum, and seeing how these teachers use technology to enable and inspire learning, are necessary to make sure that schools are designed to support innovative and effective use of technology. In addition, design teams should meet with long-term thinkers and inventors of the next generation of technologies in corporate research centers, in media labs, and in America's technology-smart schools.

Linda G. Roberts, Ed.D., is a national education technology consultant and former director of Educational Technology at the U.S. Department of Education.

6

Design for Health, Safety, and Sustainability

One of the tensions that emerged at the Forum is how to improve design to create the space young people need to be free to learn while protecting their health and well-being. As participants presented various sets of design principles, it was quite clear that safety and health are not only the first priorities for parents but also a prerequisite for learning. **Copa** suggested that students must both have the “freedom” to learn and “feel safe and secure.” **Elizabeth Lodal** noted that learning only happens when “you feel safe and secure.”

Participants suggested that smaller schools allow young people to develop relationships with each other and with their teachers. As a result, these schools are far superior to schools that continue to use traditional safety measures such as x-ray machines and guards at the door. **Claire Ryan**, a member of the Forum student panel, put it this way “Small schools are important because you don’t get lost—you can make a name for yourself” and because “we are free to be who we are.”

The importance of daylight and indoor air quality are now givens for increasing student achievement. Participants agreed that other environmental factors—including lighting; sound; improved heating, ventilation, and air-conditioning systems; and the use of nontoxic materials—deserve greater attention. Participants recognized that schools are increasingly being used by the health community to address specific health concerns and that the design of schools can and should play a positive role in addressing the rising level of obesity among students.

In the coming decade, sustainability will increasingly become a defining factor in building design in response to the growing demand by the public that children go to school in healthier environments and that civic buildings go “green.” According to a recent report titled *Greening America’s Schools: Costs and Benefits*, “green schools cost less than 2 percent more than conventional schools—or about \$3 per square foot—but provide financial benefits that are 20 times as large.”²¹

Scott Prisco, AIA, a participant at the Forum, designed the recently opened Microsoft “School of the Future” for the Philadelphia School District. Designed to showcase new trends in technology, learning, and sustainability, the 162,000-square-foot high school was built at a cost of \$42 million. Microsoft, the Philadelphia School District, and The Prisco Group made a deliberate effort to earn the highest possible environmental rating—a Gold LEED certification—which demonstrates that the facility meets performance standards in six different categories, as defined by the U.S. Green Building Council.



“Small schools are important because you don’t get lost—you can make a name for yourself.”

Claire Ryan
Student

To achieve Gold LEED certification, The Prisco Group built the School of the Future to feature a system that catches rainwater that can be reused for toilets, a green roof that aids in energy conservation, and panels within windows to capture light as energy. Room light settings are adjusted on the basis of natural light, oxygen levels in classrooms are monitored, and sensors turn the lights on and off depending on whether the room is occupied. The school is seen as an additional learning tool for the hundreds of students in attendance.



Courtesy Andre Bell/The Prisco Group

>> *The Microsoft "School of the Future" uses innovative technology to support student achievement.*



7

Blur Boundaries—Design for Community Benefit

The ability of students to use technology to learn anytime and anywhere will continue the trend of blurring the traditionally rigid boundary between school and community. If learning is no longer place bound, students may develop a new mindset about school and come to see it simply as a “hub” or “docking station” for a broad range of learning activities. This is particularly true during the high school years, when service learning and other new learning options in the community are encouraged.

Even as the public school loses its monopoly, many facilities can redefine their mission and actually increase the number of people served. The school of the future may no longer be only a public school for an age-specific group of young people, but also a community learning center that is open later and on weekends for people of all ages.

This idea is not novel. Community schools have had an established role in American education for decades, but there is new interest in updating and expanding this model of education. By tapping the community to manage social service needs, recreational opportunities, and out-of-school time, these schools can free teachers to focus on what they do best—teaching and learning to help close the achievement gap.

Municipalities also increasingly see the advantage of clustering a wide range of community services at school sites in order to save tax dollars. As a result, public schools are sharing facilities with community recreation centers, YMCA facilities, walk-in health centers, public libraries, artistic centers, social services, and even police substations. This clustering creates new synergies in terms of learning opportunities.

The other reality is that as schools become smaller and more specialized they will continue to divest themselves of their traditional roles of providing gyms and library space. They can, however, develop creative partnerships with YMCAs, public libraries, and other public institutions to provide services for their students.

Fisher spoke eloquently about the challenge of reintegrating education into the life of a city. “Over the course of decades, we have taken our cities apart and segregated learning and living...The problem of reintegrating learning into daily life is the problem of reintegrating the city as an entity.”

Reintegrating Living and Learning

By Thomas Fisher, AIA

Years from now, people will look back at the era just ended and see it as a time in which we separated so many things that used to be connected, such as how and where we live, work, and learn. The era that we are now in will also be seen as just the opposite, a time in which we have begun to reintegrate all that we had previously taken apart.

Many things have driven this change, from the high price of greenhouse gas-producing oil, which makes our spread-out lives so costly economically and environmentally, to the rise of electronic media that, as Thomas Friedman says, has made the world “flat.” Whatever the cause, there is no question that most students and a growing numbers of adults now see the world in interconnected, ecological, and web-like ways, making the standardized and suburbanized learning environments of the past seem artificial, isolating, and unsustainable.

The era of reintegration we are now in has already had an enormous impact on how students learn and teachers teach, as well as on the layout and locations of schools. We now see that learning does not just happen in the classroom, but also in the corridors and cafeterias, libraries and lounges of schools, wherever there is comfortable seating, wireless data connections, and places to meet and converse. To accommodate these new forms of learning, the school building needs to cease being a box containing repetitive rooms, and instead become an indoor and outdoor landscape for learning, in which the ecology of education increasingly mimics that of nature.

The same is true of teaching. With information and data now so readily available, teaching demands much less lecturing and much more discussion-based learning around integrative projects, occurring not just at certain times of the day, but almost anywhere, anytime. That, in turn, requires schools to have more flexible furniture, more workshop-like arrangements, and a greater variety of spaces than the standard classrooms of the past allowed.

Just as school buildings need rethinking, so too does their location. The reintegration of living and learning requires that we stop segregating schools on large parcels of land away from civic and commercial life, and start locating them in the center of things, close to all that students are learning about during the school day. This not only allows the city itself to become an extension of the classroom, but also lets schools take advantage of resources, from public libraries to public parks, that otherwise have to be replicated on the school grounds, at great expense.

As we reintegrate our lives spatially, and rediscover what human communities have long known—the knowledge and stimulation that comes from diverse, mixed-use, urban settings—so too must we reintegrate learning into our daily lives. Such learning will benefit not just school-age children, but all of us. We will spend our lives continually learning new skills and embracing new ideas as we discover what it means to live more sustainably in a world that’s flat.

Thomas Fisher is dean of the College of Design at the University of Minnesota.

8

Involve Citizen Designers to Reinvigorate the Design Process

Authentic community engagement is highly valued, and there is clear recognition that the community often brings new ideas and resources to the table as a result of the process. **Dorothy Dunn**, representing the Professional Association for Design (AIGA), captured the sentiment of the participants best when she said, “We need citizen designers.”

Diversity matters—who is at the table in the design process matters a great deal and goes to the heart of the issue when it comes to equity and fairness in the design process. Too often in the past, the process of designing schools has deliberately overlooked community concerns, particularly in minority communities.

Participants evinced a strong belief that the design process should include many voices, such as those of the students and teachers who will inhabit the building on a daily basis. **Nathan**, from the Center for School Change, made the case that he was always much more successful in going before a school board when parents and children were involved in making the presentation.

Jilk suggested that architects should give teachers and students—the ultimate clients and end users—the freedom to redesign features of the school once they are in the facility. Several participants, including **Carroll** and **Dunn**, echoed **Jilk** in suggesting that “design is a verb” and that the process never stops if schools are designed to be adaptive and flexible to meet the interests of students and teachers.

Many participants suggested that the current outdated images that parents and school board members have of “what a school is” prevent creativity. Changing these outdated and preconceived notions of how people think about a school is a prerequisite for innovative design.

Several suggestions were put forward, including the development of a video on the concept of “what is a school?” and the creation of a “wiki for school design” to familiarize parents and students with the language of school design. Several participants noted the success of the National Clearinghouse for Educational Facilities in becoming a valuable source of information for education decision makers.



Photo: @Target



Attendees at the Forum listen to presentations by various experts on design and education.

Students Have Something to Say

The Forum included a student panel organized by Judy Hoskens of the Cuningham Group, which was held at the Interdistrict Downtown School after Forum participants toured the school. The seven students included in the panel were **Sarah Messer** from the School of Environmental Studies, **Va Mousa** from Crossroads Arts and Science School, **Jane Peterson** from the Main Street School of Performing Arts, **Claire Ryan** from the Main Street School of Performing Arts, **Daniel Schwarze** from the Crosswinds Arts and Science School, **Anna Wakefield** from the Saint Paul Conservatory for Performing Artists, and **Allison Wong** from the Interdistrict Downtown School.

The students were unanimous in their belief that design should place high value on creating an open and free environment, allowing flexibility, and giving students a sense of ownership. **Wong** noted, “It’s important that students have a place they can make their own.” The students also emphasized the need for connections and relationships. **Peterson** made the point that “in all learning experiences you need connections to something for you to learn.”

Wakefield echoed Peterson’s sentiments: “The best part is when students learn from each other, and I think the teachers also learn a lot from us.” **Messer** may have summed it up best when she stated “I have one word—schools have to be versatile.”

Colors, spaciousness, flexibility, and a sense that they are respected all feed young people’s natural curiosity and desire to learn. Young people know what they want!

In the opinion of most attendees, the design process is often rigid and bureaucratic, and it narrows the opportunity for innovative design that can enhance learning. Many attendees voiced concerns about state and regulatory policies and suggested that these policies dictate the development of mediocre schools. According to **Vincent**, “State public policy dictates mediocre schools and creates a race to the bottom.” **Jilk** posed the question differently: “How do we find opportunities for risk in a bureaucratic environment?”

There was a clear consensus among participants about the need to create a new and richer design matrix to move school boards beyond the bottom line as the sole reason to choose one design over another. In a lively set of presentations, participants suggested that school boards could be persuaded about the value of good design in several ways:

- Integrate design into current educational metrics regarding accountability by creating an Education Facilities Effectiveness Instrument.
- Establish a link between high-performance environments and high-performing schools. Everyone in the process must know and understand how the design of the building supports student achievement.
- Recognize that design can be misinterpreted. Clear definitions and good examples are needed.
- Always encourage parents, students, and community leaders to make the case for you.

Copa suggested that a greater effort should be made to develop and use before-and-after design assessments to improve facilities.

Chatting With Students: You'll Be Surprised What They Tell You

By Ty Goddard

In 2006, School Works conducted a poll of secondary students in the United Kingdom on what they thought about their schools. We called our poll “Make Your School Cool.”

School Works is a nonprofit advisory body that believes in using existing resources differently to create beautiful places that are designed to raise educational achievement and support lifelong learning in local communities. As managing director of School Works, I came to the conclusion, along with my colleagues, that it makes a great deal of sense to ask our clients—the students—what they think about their schools. This is very important, given the massive capital investment now being made by the current British government, led by Prime Minister Tony Blair, to redesign and rebuild schools all across the country.

So in February 2006, we developed our latest national online poll, which was created by Gemin-i.org. We asked students to rate their school in five categories: 1. school buildings, 2. safety and security, 3. classrooms, 4. social spaces, and 5. community. More than 1,100 young people between the ages of 10 and 18 responded to our call for their opinions.

We were not surprised by many of the responses, but we were rather overwhelmed by their intensity. The young people showed that they had a clear awareness of the links between their school environment and learning, and they were on the whole extremely lucid in their arguments. These articulate, intelligent young adults were very aware of the positives and negatives of their schools.

School Buildings Sixty-two percent of the young people questioned said their schools were old, dirty, and boring. Complaints included cramped spaces (even in new buildings), peeling paint, a lack of general hygiene or maintenance, and “cities” of temporary buildings. Dining rooms, in particular, emerged as an issue throughout the poll. Apart from these dining rooms being too cramped, respondents complained that they were dirty and smelly, that students were not allowed to stay inside them long enough to finish lunch, and that the food being served was not healthy.

Safety and Security Sixty-five percent feel safe in school. This finding is encouraging. However, a large number of students complained that their school was starting to look like a prison and that their freedom was being curtailed. According to the poll, the prison analogy seems to be working its way into the culture of a lot of the young people questioned. Suggestions for how to improve security included patrolling for drugs with sniffer dogs, random knife and drug searches, metal detectors, and police patrols.

Whether the dangers that these proposed solutions suggest are real or perceived, I believe that now is the time for us to address these concerns. We need to ask whether, through the design of our school buildings, we are actually educating the next generation to be fearful of society rather than involved in it.

Classrooms In response to the question “Do you like your classrooms?” 63 percent of the respondents said they did not. Reasons included old, uncomfortable, or broken furniture and equipment; boring environments, temperatures that were too cold in winter, too hot in summer; messy, smelly environments; and not enough windows.

(continued on next page)

Suggestions for improvements included a change to the arrangement of classrooms, more color and light, more space and personal storage in classrooms, and better decoration. Pupils want spaces where they can relax, do homework, and study or chat with their friends. The 37 percent who felt comfortable in their classrooms generally described them as bright, light, airy, and clean.

Social and relaxation spaces Young people, perhaps unsurprisingly, were very concerned by the lack of spaces for recreation and relaxation. Seventy percent responded “no” to the question “Do you like the places where you can hang out at breaks?” They see spaces for relaxation as very important for creating a receptive state for learning. This seems to be a major issue for young people.

Many complained that there were simply no places for them to relax and socialize. A particular complaint stemmed from the fact that they had no warm, sheltered spaces in which to congregate. Where spaces had been planned into the design, particularly in new buildings, many of the respondents complained that they were not allowed inside to use them.

Community Sixty-nine percent answered “yes” to the question “Is your school building used for things other than teaching you?” The majority of young people were aware of their school buildings being used for activities other than teaching. From the answers given, they are generally in favor of buildings being used outside school hours. Despite a few comments to the contrary, many agreed that the school should be a resource for the whole community, with a particular emphasis on sports and services for helping people.

The young people in this poll have painted a picture of school buildings that are drab and not fit for their purpose: learning. These schools, with their dreary, uninspiring interiors, peeling paint, cramped conditions, and problems with ventilation and heating, cannot fully support learning. The current massive investment in school buildings in the United Kingdom has come at exactly the right time.

If we take heed, school buildings of the future promise to be fantastic; however, the poll provides a warning. Not only do we need to learn lessons on issues such as design and maintenance for future schools; we also should not forget the many thousands of young people who will finish their education in these old and badly maintained buildings. According to the poll, there are hints that even recently built new schools are not delivering a minimum standard of maintenance and cleanliness.

The poll proves that young people have a very sophisticated understanding of their learning environments and what it takes to make them successful. We were extremely impressed by the level of interest and knowledge these young people showed. The time is right to create schools that provide young people with inspiring, inclusive environments that support all aspects of their learning, from engaging in academic pursuits to learning how to become a rounded member of society.

First however, we need to listen.

Ty Goddard is the director of the British Council for School Environments and managing director of School Works, London.

9

Expand the Research Agenda

In the coming decade, American education will continue to move forward in developing a new system of data-driven decision making. This process has just begun and will only accelerate in the years ahead. The design community must recognize this sea change in educational decision making and act accordingly.

A greater investment should be made to research the link between school design and student achievement and to develop a richer and more coherent research agenda. For example, an accumulating body of evidence has drawn a convincing link between student achievement and teacher retention and the importance of daylight, indoor air quality, noise, temperature, and lighting. There is also a growing consensus about the value of small schools in helping students in high-poverty communities.

There is, however, a need for greater research regarding the link between school design and other conditions for successful learning, including student mobility, truancy, graduation rates, personalization, the condition of schools and ways that design accommodations for special education students affect the achievement of all students.

Other questions merit greater attention: How can data be used to change the learning environment and what data do we need? How does co-location of other community assets improve learning? How do we measure the success of personalization in a learning environment? How should schools transform themselves, and how can schools close the achievement gap given the new, evolving, media-rich learning environment?

Courtesy LAUSD Facilities Services Division.



<< South East High School,
South Gate, California.

10

Develop a Campaign for Innovative Design

Participants agreed that much more needs to be done to make the case that design matters to the process of teaching and learning. As one participant noted, “Great schools are not an accident.” A compelling case can and should be made for innovative design.

There is a clear recognition of the growing disconnect between what we know about good design and what is happening in the field. There is a gap between the knowledge base of educators and the knowledge base of architects. Participants also agreed that a tension exists between the value of good design and the reality of just getting a school built on time.

Blurock noted that school boards often view matters of design as “frivolous and wasteful.” His comments were echoed by **Goddard**, who stated that the design community has been fighting for decades the notion that good “design equals the Taj Mahal.” **Lodal** made the point that it is no surprise that innovative design is often considered suspect given that the fine arts are often the first classes eliminated when schools need to meet budgets.

Ed Feiner, FAIA, director of Skidmore Owings Merrill and member of the AAF Board of Regents, was emphatic throughout the Forum in making the case that “Design counts, matters, and is very important” and that “we should not be embarrassed to talk about excellence in design.” **Feiner** went on to argue that architects “can’t be totally reactive” to what people want and must make the case for quality and excellence in design.



Photo: @Target

A strong consensus developed regarding the need to develop an awareness campaign to promote a greater understanding of the importance of innovative design and its link to student achievement. Communities that have not built a school in years, or even decades, need help to make the connection between design and achievement.

As **Kaufman** noted, “Everyone must know and understand how design supports high-performing students.” The design community should also make much more of an effort to develop a portfolio of cases to document both its successes and its failures. **Dunn** summed up this desire for success stories by suggesting that what was needed most was a “show me, don’t tell me” campaign.

>> *Ty Goddard, director of the British Council for School Environments.*



>> Elizabeth Lodal, Former Principal, Thomas Jefferson High School for Science and Technology.

Forum participants were impressed by the presentation made by **Goddard**, who has fostered a growing partnership between educators, business leaders, and community reformers around the idea that design matters in the construction of a school. He was emphatic in arguing that such a campaign must be inclusive and done in partnership with other educational and community institutions: “We want a campaign. We want a movement, but if it is just led by designers we are not going to win.”

Participants also believed that a much stronger case can be made that design excellence need not be costly or overbudget and that well-designed schools are, in fact, a community investment that has long-term value. Innovative designs create a sense of ownership among teachers and students and reflect both the pride and identity of the community.

Lodal summed it up in suggesting that “great design engages teachers and students in a dialogue that allows learning to happen.”

Conclusion

The American schoolhouse is an iconic symbol of America’s progress and democracy. It remains for many Americans the place where communities bind themselves together to nurture and prepare their children for the future. The school is part of the fabric of every community and the daily life of millions of Americans, from the early morning drop-off of children at the “kiss and go” door, to afternoon pickups where neighbors catch up, to Friday night football games under the lights.

For many Americans, a school represents certainty, pride of place, tradition, and a sense that, while the world may change all around them, school is still school. Not much changes. This report suggests, however, that the school as we know it may be radically transformed in the coming decades as teaching and learning evolve.

Educators, designers, and community members must recognize the many paradigm changes now under way and find common purpose in redefining the role of the school in the life of every community. The 10 concepts in this report provide a framework for developing a dynamic partnership between educators and designers in order to create schools that are worthy of the students, teachers, and citizens of the 21st century.

One of the consistent themes that came out of the Design for Learning Forum was the call as **Linda Roberts** put it, “to follow the children, to find a way to give voice to the students.” AAF has every intention of doing this. One of our most ambitious projects, with the support of Target, is the launch of a national student design contest for high school students.

In the months ahead AAF, working with Target, will use this report to continue the national dialogue about the evolving role of the American schoolhouse through our *Great Schools by Design* initiative. AAF remains committed to expanding on the work of the National Summit on School Design. We will host two more forums in 2007, including one on school size, siting, and location. We also hope to work with other partners in the near future to spark continued progress on sustainable design.

We hope that you, the reader, find value in this report and will join us in redefining and redesigning the American schoolhouse for the 21st century.



Photo: ©Target

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Students at the InterDistrict Downtown School in Minneapolis.

Design for Learning Forum Participants

Gregg B. Betheil

Senior Vice President
National Academy Foundation
New York, NY

Gregg B. Betheil is a senior vice president with the National Academy Foundation, a nonprofit 501(c)(3) intermediary organization whose mission is to sustain a national network of career-themed academies, small learning communities, and small schools and to support the development of America's youth toward personal and professional success in high school, in higher education, and throughout their careers. The Foundation provides a full range of technical assistance and program support to all partners in the effort to transform high schools.

As a member of the senior management team, Betheil oversees academy and school operations at the Foundation. He is responsible for the oversight and support of its 529 Academies of Finance, Travel and Tourism, and Information Technology nationwide. The Academies enroll more than 50,000 students in 40 states and the District of Columbia.

Thomas H. Blurock, FAIA

Thomas Blurock Architects
Costa Mesa, CA

Thomas H. Blurock has built a practice dedicated to the creation of better urban schools. In its 20-year history, his firm has completed nearly 200 school projects, most for inner-city school districts with constrained budgets, poor socioeconomic conditions, grave security issues, and highly politicized decision making processes.

Building on Blurock's expertise in public finance, educational programming, urban economics, and school security, Thomas Blurock Architects has expanded its services beyond those of a standard architectural practice to offer an integrated approach to educational architecture. These supplemental services have allowed Blurock to assist other architects in creating better schools. The result of one such collaboration with Pritzker Prize winner Thom Mayne, FAIA, resulted in Diamond Ranch High School, the most critically acclaimed project of its type in California and the winner of a national AIA Honor Award for Architecture.

Many of Blurock's designs have become prototypes for urban educational solutions. Blurock turns the negative aspects of urban centers—poverty, high density, and land scarcity—into creative opportunities. He is a leader of the Committee on Architecture for Education (CAE), a national AIA knowledge community.

Dan Bodette, Ed.D.

Principal, School of Environmental Studies
Apple Valley, MN

Dan Bodette is the principal of the School of Environmental Studies, an optional high school that is thematically based and is located in the Twin Cities metropolitan area. He has been a leader in education for 26 years, serving as a principal for 18 years and as a science teacher for 8 years.

Bodette has presented at numerous national and international conferences on the unique and innovative programming that occurs at the School of Environmental Studies. Thousands of educators have visited the

school and have responded in a positive fashion to the curriculum, the culture, and the climate of the building. The school has been recognized nationally for implementing the “breaking ranks” components of the school day, and was named a New American High School by the U.S. Department of Education in 1999.

Ronald E. Bogle

President and CEO
American Architectural Foundation
Washington, D.C.

In 2002, Ron Bogle was named the seventh president/CEO of the Washington, D.C., based American Architectural Foundation (AAF). With the appointment, Bogle brought to the position a career-long commitment to public service and his lifelong passion for community development, civic engagement, education, art and architecture. Under his leadership, AAF has significantly expanded its program scope and impact.

At AAF, Bogle’s efforts are squarely focused on creating and sustaining programs to identify and advance best practices for the design of livable communities across the country. He also created and leads *Great Schools by Design*, a national AAF program that provides resources to local community and educational leaders engaged in K-12 school facility design and construction. In addition, he is the managing partner of the Mayors’ Institute on City Design, a renowned program co-sponsored by the National Endowment for the Arts, the US Conference of Mayors and AAF that provides innovative resources to mayors across the country about city planning and design.

Bogle’s professional experience includes senior leadership appointments in higher education, business and non-profit fields. A native of Oklahoma City, he served nine years on the Oklahoma City Board of Education and several years as the Board’s President. While in Oklahoma, Bogle was a leader in two major initiatives resulting in over \$1 billion in public-funded support to transform the commercial and cultural viability of the city’s urban center by replacing or restoring a wide range of civic and educational facilities.

Gail Burnaford, Ph.D.

Dean, College of Education, Florida Atlantic University
Boca Raton, FL

Gail Burnaford holds a doctorate in curriculum and instruction from Georgia State University. Since 2003, she has been a professor of teacher education at Florida Atlantic University, where she teaches doctoral coursework in program evaluation and instructional practices. She is the co-author of three books: *Renaissance in the Classroom: Arts Integration and Meaningful Learning* (Burnaford, April, and Weiss, 2001); *Teachers Doing Research: The Power of Action through Inquiry* (Burnaford, Fischer, and Hobson, 2001, 2nd ed.); and *Images of Schoolteachers in America* (Joseph and Burnaford, 2001, 2nd ed.), all published with Lawrence Erlbaum Associates.

In 2005, Burnaford presented school program evaluation research at the International Congress for School Effectiveness and Improvement in Barcelona, Spain, and in 2006, she presented a paper on assessment and research at the World Conference on Arts Education (sponsored by the United Nations Educational, Scientific, and Cultural Organization) in Lisbon, Portugal. In January 2007, she presented at the European and International Symposium for Evaluating the Impact of Arts and Cultural Education on Children and Young People, held in Paris, France.

Tom Carroll, Ph.D.

President, National Commission on Teaching and America's Future
Washington, D.C.

Tom Carroll is president of the National Commission on Teaching and America's Future. He leads the organization's efforts to raise standards for teaching and learning, to improve professional development, and to restructure school environments so that the needs of all students are met. Carroll joined the Commission from the U.S. Department of Education, where he was founding director of the Preparing Tomorrow's Teachers to Use Technology grants program.

From 1997 to 1999, Carroll was director of technology planning and evaluation at the Schools and Libraries Corporation, the nonprofit agency charged with implementing the "E-rate," which granted Internet access to schools at discounted prices. From 1994 to 1997, he served as the founding director of the Technology Innovation challenge grants at the U.S. Department of Education. In 1993 to 1994, Carroll was the U.S. secretary of education's liaison to the Corporation for National Service during the start-up year of the AmeriCorps National Service Program. From 1986 through 1992, he was the deputy director of the Fund for the Improvement of Postsecondary Education in the U. S. Department of Education. In 1979, he managed research programs on nonformal education and lifelong learning at the National Institute of Education.

George H. Copa, Ph.D.

Professor, College of Education, Oregon State University
Director, New Designs for Learning
Corvallis, OR

George H. Copa is a professor in the College of Education at Oregon State University. He also serves as director of New Designs for Learning, an enterprise entailing research, development, reporting, and consultation to improve the learning experience. He has held university administrative positions at the research center director, department chair, college dean, and vice president levels. He has published in more than 150 journal articles, reports, papers, and books.

Copa teaches courses in educational leadership, planning and design, and research and evaluation. He works with schools, colleges, and state education agencies across the United States and around the world. His work involves assisting with and facilitating educational design efforts for schools and colleges, public policy agencies, and foundations interested in major redesign, updating, and revitalization of education. His design concepts have been applied to K-12 schools, colleges and universities, and community-based organizations in the United States and several other countries.

Barbara M. Diamond

Vice President for Education Strategy, KnowledgeWorks Foundation
Cincinnati, OH

Barbara M. Diamond is the vice president for education strategy at KnowledgeWorks Foundation. Previously, she was responsible for one of the Foundation's major program areas—communities and school facilities—and for its public policy work. The Foundation is Ohio's largest education philanthropic organization, with a mission to increase access to education throughout Ohio. Its other major program areas are college and career access, and school improvement. All of its work is designed to empower communities to improve education. Diamond received her B.A. and J.D. degrees from Harvard University. She has been admitted to the bar in Massachusetts, Minnesota, and Ohio. She has extensive experience as an attorney and policy analyst. She has served as staff attorney for the Education and Higher Education Committees of the

Minnesota House of Representatives and for the Committee on Criminal Justice and Committee on Ways and Means of the Massachusetts Senate. Before moving to Cincinnati in 1999, she served as counsel for policy development for the Massachusetts Supreme Judicial Court, where she was responsible for implementing the recommendations of the chief justice's commission on the future of the court.

Timothy J. Dufault, AIA

President, Cuningham Group
Minneapolis, MN

Timothy J. Dufault is the President of the Cuningham Group and has been responsible for the design, management, and construction of more than \$700 million of new and remodeled educational facilities. As the managing principal of Cuningham Group's Education Studio, a group of 35 people dedicated to creating effective learning environments for people of all ages, Dufault is responsible for bringing to each project the resources necessary to ensure success. He works out of the Minneapolis office and is responsible for coordinating all the educational design work for the firm's two offices. He is a 1986 graduate of North Dakota State University with a bachelor of architecture.

Dufault continues to serve as a guest lecturer at major education conferences around the country, including the American Association of School Administrators, the AIA CAE, the National School Boards Association, and the Council of Educational Facility Planners International. He believes that understanding and integrating the needs and beliefs of educators into the built environment is key to the success of any school. He has effectively used this approach to develop projects at both the elementary and secondary levels.

Dorothy Dunn

AIGA, the Professional Association for Design
New York, NY

Dorothy Dunn is a design education and experience consultant. She develops transformative events, seminars, conferences, and study tours for diverse professional and cultural audiences as well as design education resources and products for youth and school audiences. Dunn was the recipient of the inaugural Smithsonian Education Achievement Award in 2004 in recognition of her leadership as education director for the Cooper-Hewitt National Design Museum. While at the Smithsonian, she launched and directed several signature programs. Under Dunn's direction, the museum's Education Department presented "design as a verb," creating award-winning programs and resources that directly engaged audiences in the design process, often by working with professional designers.

For the past two years, Dunn has worked with AIGA, the Professional Association for Design, to reposition the International Design Conference at Aspen, the world's oldest forum for business and design leaders. Now the Aspen Design Summit, the forum aims to launch a new relationship between design and society and present design as a tool to inform and inspire innovative leadership. Dunn also launched new K-12 design education initiatives, working in partnership with AIGA members Target and Scholastic.

Frank Feinberg

Principal, John A. Johnson Achievement Plus Elementary School
St. Paul, MN

Feinberg began his career with Saint Paul Public Schools in 1974. Before entering administration in 1989, he taught children with emotional disturbances. Feinberg was the principal at Como Park Elementary School from 1993 to 1999 and has been principal of John A. Johnson Achievement Plus Elementary School since 2000. His education includes a B.A. from the City College of New York in 1968, an M.A. in special education and educational psychology from the University of Minnesota in 1973, and an educational specialist's degree in educational administration from the University of Minnesota in 1978.

In 1999, Feinberg was appointed principal of a former high school that was to undergo a total renovation and open in the fall of 2000 as an elementary school. Soon to be named John A. Johnson Achievement Plus Elementary School, the school has become known as an all inclusive, one stop shop program that collaborates with community partners. He is grateful for the hard work and dedication his teaching staff has committed to make Johnson Elementary the magnificent community school it is.

Edward A. Feiner, FAIA

Office Director, Skidmore, Owings & Merrill LLP
Washington, DC

Edward A. Feiner joined Skidmore Owings & Merrill in 2005 as director of the Washington, D.C. office. Previously he served as chief architect of the U.S. General Services Administration (GSA). He was appointed to that position in 1996. As chief architect he was the senior adviser to the GSA administrator and the commissioner of the Public Buildings Service on federal architecture, design, and construction policy and innovation. He provided national leadership for the design and construction activities of the agency, which included the development of federal courthouses, office buildings, national laboratories, border stations, computer centers, and special-use projects. Feiner developed and directed the Office of the Chief Architect, which is composed of five national centers.

Before joining the GSA in 1981, Feiner served as program manager of the U.S. Navy's shore establishment master planning program at the Naval Facilities Engineering Command. He is a fellow of the AIA and received its Thomas Jefferson Award for Public Architecture in 1996. He lectures at the Harvard Graduate School of Design and has spoken at many schools of architecture and design. He is a graduate of the Cooper Union (bachelor of architecture, 1969) and the Catholic University of America (master of architecture/urban design, 1971). He was elected to the AAF Board of Regents in 2006.

Thomas Fisher, AIA

Professor and Dean, College of Design
University of Minnesota
Minneapolis, MN

Thomas Fisher has served as the editorial director of *Progressive Architecture and Building Renovation* magazines, as the historical architect for the Connecticut State Historic Preservation Office, as the regional preservation officer at the Western Reserve Historical Society, and as a historian with the Historic American Engineering Record. In addition, he has lectured or juried at more than 30 schools of architecture and more than 60 professional societies, and he has published two books, several book chapters, and more than 200 articles in magazines and journals.

His research revolves around the relationship between the history of ideas and the design and production of architecture. A recent focus has been on the ethical, economic, and cultural ideas that drive unsustainable building practices in the United States and on the development of new design tools and conceptual structures that would allow us to create a more environmentally sustainable built world. Fisher remains active as an architectural critic, writing frequently for professional and consumer magazines. He has written a book of essays on architectural practice titled *In the Scheme of Things, Alternative Thinking on the Practice of Architecture*, published by the University of Minnesota Press. His book *Salmela, Architect*, on the work and ideas of Duluth architect David Salmela, was published by the University of Minnesota Press in 2004.

Wendy Friedmeyer

Educational Programs Coordinator, Design Institute
Minneapolis, Minnesota

Wendy Friedmeyer has coordinated the Design Institute's Design Camp—a week-long hands-on design workshop for teens taught by practitioners from all over the world—from 2003 to 2006 and is working on a book to disseminate what has been learned in those years. She also coordinates the University of Minnesota's Interdisciplinary Design minor, a curriculum developed by the Design Institute to introduce students from many different backgrounds to design and to enhance the university's design major programs, and advises the Institute's student board.

In addition, she is also completing her master of arts in teaching at Hamline University, with a focus on secondary art and design education and its connections to student achievement.

Ty Goddard

Director, British Council for School Environments
London, U.K.

In December 2004, Ty Goddard became director of School Works, an organization aiming to build better schools through consultation and participation, bringing together the best in the building industry with the best in education. He previously worked as community strategic manager at Brighton and Hove City Council's Schools. He has also acted as an adviser to the Department for Education and Skills on extended schools and co-location of services.

In 1998, Goddard was elected to Lambeth Council and became chair of education. He later combined this position with a role in Social Services. He has worked as the U.K. and European political adviser for the National Society for the Prevention of Cruelty to Children, lobbying on child protection issues, particularly during the passage of the sex offenders bill. He has also worked as the national campaigns coordinator for Scope.

In the past year, School Works has been involved in launching the British Council for School Environments, a membership organization made up of schools, local authorities, construction companies, architects, and those involved in and concerned about designing excellent learning environments.

Bruce A. Jilk, AIA

Educational Planner, Atelier Jilk
Afton, MN

Bruce A. Jilk is recognized for his ability and experience in organizing processes, which has made him a leader in educational consulting. This combination enables him to provide quality services in a unique format. He has worked for educational clients since the mid-1960s, focusing on projects with innovative programs. Concentrating his contributions in the area of innovations in education, Jilk actively promotes the elevation of the science and art of planning and design by advancing the standards of educational research, planning, and practice. Distinct among his achievements in architecture and education is his ability to bridge research into the built form.

Currently Jilk's work includes developing of learning communities and conventional educational services and enterprise, linking further education with the world of work, using new information and communication technologies, and integrating services such as health and education through new technologies. He has consulted and designed learning environments in more than half of the U.S. states as well as in 36 foreign countries. Jilk is the 2005 recipient of the Council of Educational Facility Planners International Planner of the Year award. He served as the 2002 chair of the AIA CAE and is the current AIA delegate to the Union of International Architects' Program on Cultural and Educational Facilities. Jilk is currently planning an international congress on learning environments for the Union of International Architects and United Nations Educational, Cultural, and Scientific Organization, to take place in Toronto in 2007.

Ellis Kaufman

Director, Small Learning Communities and School Redesign
Los Angeles Unified School District
Los Angeles, CA

Ellis Kaufman guides the implementation of small learning communities in the construction of more than 50 new middle, span, and high schools within the nation's second-largest school district. He also oversees the \$188 million upgrade and redesign of another 50 high schools that are required by the Board of Education to move to small learning communities within the next few years. He designed and managed a communications-technology magnet school and supervised instruction and operations at a number of comprehensive high schools. He coordinated the gifted and talented program for more than 10,000 K-12 students and guided the implementation of periodic assessments and performance assignments in 88 schools.

Immediately before joining the Los Angeles Unified School District Facilities Division, he successfully restructured a failing span school that had been scheduled to be closed and steered it toward success. In 2005, the school was named a Title One High Achievement School and became a candidate for the California Distinguished School honor. During the past few years, Kaufman has made presentations regarding the power and implementation of small learning communities to the AIA, the University of Southern California School of Architecture, and the Council of Educational Facility Planners International.

Meg King-Abraham

Grade 6 Teacher, John A. Johnson Achievement Plus Elementary
St. Paul, MN

Meg King-Abraham has taught in the St. Paul school system for 18 years. She has taught grades 5 and 6 at Highwood Hills Elementary and John A. Johnson Achievement Plus Elementary. For the past seven years, she has specialized in mathematics, social studies, and visual arts. She earned National Board for Professional Teaching Standards certification in 1995 as an early adolescent generalist. She completed her bachelor's degree at the University of Minnesota in 1989 and her master's degree in curriculum and instruction at Hamline University in 2000.

King-Abraham has held several leadership roles within the schools, serving as chairs for gifted and talented, professional development, and school climate committees. She is currently in her second year as the site team chair for John A. Johnson Achievement Plus.

Her professional working environments have been urban schools and day care centers in a wide variety of facilities, from church basements to high-rise complexes, converted open schools, and a newly renovated turn-of-the-century high school. As a practitioner of Responsive Classroom, a holistic approach to teaching and learning, she appreciates spaces that allow flexibility in classroom configurations.

Patrick Leier

Former Superintendent, Pomona Unified School District
Pomona, CA

Patrick Leier served as superintendent of schools for the Pomona Unified School District for 12 years. He received his B.S. and M.S. degrees from California State Polytechnic University, Pomona, and completed a School Business Education program at California State University, Fullerton. His professional career at Pomona Unified School District includes work as a teacher, counselor, assistant principal, principal, and assistant superintendent of business services, as well as his years as superintendent. Currently, he works as an affiliate with the IBI Group and is also an independent contractor.

Leier served as a member of the Commission on Technology in Education, charged with developing the technology master plan for education for the state of California. He has led the district in pioneering the educational village construct, a nationally recognized model focused on transforming a decaying shopping center into a state-of-the-art facility. In addition, he was directly involved in creating Diamond Ranch High School, which has been nationally and internationally recognized for its unique design. He and the school district were honored by the National Association of School Boards with a Magna Award for innovation in 1998 and 2002. In February 2003, the American Association of School Administrators awarded Leier the 2003 President's Technology Award.

Saskia Levy

Visiting Fellow, Manpower Demonstration Research Corporation
New York, NY

Saskia Levy is a visiting fellow at Manpower Demonstration Research Corporation, the preeminent research group on policies and programs aimed at poor populations. She brings the practitioner perspective to the corporation's quest to build knowledge to improve social policy. Levy most recently ran the Urban Assembly, a New York City-based nonprofit organization that starts and manages small, college-preparatory public

high schools. As the founding executive director, she guided the organization through its start-up years. Achievements included planning and launching 15 new schools, negotiating a contract with the New York City Department of Education that enabled the schools to operate independently, and building and staffing an organization capable of best supporting them.

Before her work at the Urban Assembly, Levy played a key management and policy role at the Municipal Art Society, where she organized the political, practical, and financial aspects of the Tribute in Light, the first large-scale memorial to the victims of the World Trade Center attacks. Prior to that, she worked at the second-largest law firm in Argentina, where she crafted a communications strategy that solidified the firm's presence among its North American clientele and resulted in a direct increase in its international activities.

In addition to her professional accomplishments, Levy is an active volunteer, who has mentored a 16-year-old for the past three years and continues to contribute time to community planning efforts in her home borough of Brooklyn.

Elizabeth V. Lodal

Former Principal, Thomas Jefferson High School for Science and Technology
McLean, VA

Elizabeth V. Lodal serves as a Virginia commissioner on the Education Commission of the States, appointed by Governor Tim Kaine for a four-year term (2006-10). During her 40-year career in public education, she has served as the principal of Thomas Jefferson High School for Science and Technology, McLean High School, Langston Hughes Middle School, and Joyce Kilmer Middle School, all Fairfax County public schools.

Among her many honors, Lodal has received the 2005 Virginia Educator of the Year Award from the American Association of University Women; the 1998 Rice University Distinguished Alumni Award; the 1996 McLean Chamber of Commerce President's Award for service to the community; and the 1993 Rabbi Richard Sternberger Social Justice Award from Temple Rodef Shalom for combating racism, bigotry, and prejudice in Northern Virginia. The Fairfax County School Board has named both the McLean High School Library and the College and Career Center at Thomas Jefferson after her in recognition of her contributions. Lodal holds a B.A. in history from Rice University and an M.A. in secondary school administration from the George Washington University.

Prakash Nair, RA, REFP

President, Fielding Nair International
Tampa, FL

Prakash Nair is a futurist, a visionary planner, and an architect with Fielding Nair International, one of the world's leading change agents in school design. He is also the managing editor of DesignShare.com, which attracts more than a million visitors each year. He is the recipient of several international awards, including the prestigious MacConnell Award from the Council of Educational Facility Planners International, the top honor worldwide for school design.

Nair has written extensively in leading international journals about school design and educational technology and their connection to established educational research. Before co-founding Fielding Nair International, he worked for 10 years as director of operations for a multibillion dollar school construction program for New York City.

In 2003, Nair completed a project with the University of Wisconsin on a Rockefeller Foundation—funded grant to develop international best-practice standards for tomorrow's schools. He also led the effort to

develop a new research-based tool to evaluate the educational effectiveness of schools. This tool, now being tested by schools and governments in the United States, Australia, and Singapore, will revolutionize the way we look at how school buildings and campuses actually work to support teaching and learning. By staying current with the research and with national and international social, economic, and cultural trends, Nair is always able to bring best-practice thinking from many disciplines and fields to bear on education-related problems and projects.

Joe Nathan, Ph.D.

Director, Center for School Change, University of Minnesota
Minneapolis, MN

Joe Nathan directs the Center for School Change at the University of Minnesota's Hubert H. Humphrey Institute of Public Affairs. Initiated in 1989, the Center works with communities and schools throughout the United States to help make significant, measurable improvements in public education. Nathan has also been an aide, teacher, and administrator with the Wichita, Minneapolis, and St. Paul public schools. He helped start and worked for seven years in a 500-student K-12 public school that began in September 1971. This school won an award from the U.S. Office of Education as a "carefully evaluated, proven innovation." Nathan directed a project to help other educators replicate the school.

Nathan serves on the National Clearinghouse for Educational Facilities National Advisory Committee. He co-authored a National Clearinghouse for Educational Facilities publication, *Smaller, Safer, Saner, Successful Schools*. He has a B.A. from Carleton College and an M.A. and Ph.D. from the University of Minnesota.

Scott Prisco, AIA, NCARB, PP, LEED AP

Principal, The Prisco Group
Hopewell, NJ

Scott Prisco has developed and led various teams in the preparation of plans and the subsequent construction of numerous capital improvement projects for a range of clients. He has more than 18 years of experience in architecture, planning, and interior design. He began his career with Chapman and Biber Architects, in Summit, New Jersey, after receiving his bachelor of arts in architecture at the University of North Carolina at Charlotte in 1985.

While working full-time at Chapman and Biber Architects, Scott received a second bachelor of architecture degree from the New Jersey Institute of Technology. In 1987, he joined Morton, Russo and Maggio Architects, in North Brunswick.

In 1997, with the goal of becoming a partner in his own firm, Prisco joined Horowitz and Edwards as an equal partner with William A. Edwards, AIA, changing the firm's name to Prisco & Edwards, AIA, RCI. In 2001, the firm was renamed The Prisco Group to better reflect the spectrum of services the firm provides. Prisco's mission for his firm is to become a talented, highly motivated, professional organization committed to listening to and understanding the needs of clients and creating extraordinary environments by recognizing the dynamic nature of architecture and technology. In fewer than eight years, Prisco has rapidly moved his firm toward achieving and maintaining this mission with a planned growth process.

Linda G. Roberts, Ed.D.

National Consultant on Technology and Education
Darnestown, MD

Linda G. Roberts directed the U.S. Department of Education's Office of Educational Technology from its inception in September 1993 to January 2001, and she served as the U.S. secretary of education's special adviser on technology. Roberts developed the first National Technology Plan, launched five new technology programs for the Clinton administration, and increased the federal technology budget from \$30 million to more than \$900 million. *Smithsonian* magazine called Roberts "America's advocate for educational technology at the highest levels of government."

Roberts played a key role in the development of the E-rate, a \$2.25 billion program to bring the Internet and advanced telecommunications to the nation's schools and libraries. Along with program development, Roberts supported research and international efforts to advance the effective use of technology. She is at present a consultant to Apple Computer and several leading technology companies. In addition, she serves on the boards of directors of Carnegie Learning, ProQuest, and Wireless Generation.

Before joining the Clinton administration, she led the research on educational technology at the Congressional Office of Technology Assessment, where she directed three landmark studies. She is a former elementary school teacher and reading specialist, university professor, and academic dean. She holds a B.S. from Cornell University, an Ed.M. from Harvard University, and an Ed.D. from the University of Tennessee.

Kenneth R. Stevenson, Ed.D.

Professor and Chair, Department of Educational Leadership and Policies
College of Education, University of South Carolina
Columbia, SC

Kenneth R. Stevenson is on the faculty of the University of South Carolina and serves as the chair of the Department of Educational Leadership and Policies. He has spearheaded the development of online courses and the electronic delivery of the department's master's program leading to principal certification. Stevenson teaches courses in school facilities planning, organizational theory, and general educational administration, as well as directing dissertations, among which six have recently focused on the relationship of school size to academic outcomes or school climate. Among his other research interests are the use of computers in schools and the effect of school size on the educational process. Study topics include long-range facilities studies with an emphasis on educational program planning, population projections, the effectiveness of technology in the educational process, management and staffing analysis, and employee compensation.

Stevenson earned an undergraduate degree in psychology from Florida State University. He completed his doctoral work in educational leadership at the University of Florida. As part of that program, he completed an extensive internship with the Facilities Division of the Dade County Public School System. During his professional career, Stevenson has been an elementary teacher, a school principal, a long-range facilities planner for a school district, and a facilities planning specialist for the Florida Department of Education.

Jeffrey M. Vincent, Ph.D.

Deputy Director, Center for Cities and Schools
University of California
Berkeley, CA

Jeffrey M. Vincent is a co-founder and deputy director of the Center for Cities and Schools at the University of California, Berkeley. The Center works to position high-quality education as a critical component for broader city and metropolitan policy making. Through education, direct service, and scholarly research, the Center works to make visible the ways in which cities and schools are interconnected in order to inform public policy, urban planning, and educational practice.

Vincent's research looks at the intersection of land-use planning, school facility planning, and community development. He recently completed a study, "Planning and Siting New Public Schools in the Context of Community Development: The California Experience." This research includes a survey of the land-use planning practices of California's school districts, followed by case studies of two urban school districts working with their local governments to build new schools in conjunction with redevelopment projects. Vincent is also a researcher for the BEST (Building Educational Success Together) initiative.

Kristina Hooper Woolsey, Ph.D.

Director, New Media Thinking Project
Adviser, Learning, Design, and Technology Program, Stanford University
Kentfield, CA

A noted pioneer in the development of interactive multimedia as a distinguished scientist at Apple Computer Inc. from 1984 to 1998, Kristina Hooper Woolsey received her Ph.D. in cognitive science at the University of California, San Diego. Her focus in graduate school was on visual representations, leading her to a postdoctoral fellowship in architecture and landscape architecture at University of California, Berkeley, and at University of California, Los Angeles.

Woolsey is currently director of the New Media Thinking Project, which investigates how youth might gain new media literacy. She is also an adviser to the Learning, Design, and Technology program at Stanford University; a consultant to the Museum of Contemporary Art, Cleveland, on the design of its new facilities; and the "visionary" member of the New Media Consortium Board, a consortium of 200 major universities and museums involved in new media innovation.

From 1998 to 2004, Woolsey served as a technology consultant for the James Irvine Foundation on a five-city after-school program. Between 2002 and 2006, she worked with the Exploratorium to develop a website for the Institute for Inquiry and with the Exploratorium's Center for Informal Learning and Schools to outline the relationships between formal and informal learning. She served for four years as a school trustee for Ross School, a K-8 public school in Marin, including two years as president and two years as the head of the design committee for a \$4 million middle school addition designed by EHDD Architecture.

Resource List

American Architectural Foundation; KnowledgeWorks Foundation. 2006.

Report from the National Summit on School Design. A Resource for Educators and Designers.

<http://www.archfoundation.org/aaf/documents/nssd.report.pdf>

The report details eight recommendations made by Summit participants to help create schools that encourage student achievement and stronger communities.

American Architectural Foundation; KnowledgeWorks Foundation; Target. 2006.

Schools Designed for Learning: The Denver School of Science and Technology.

<http://www.archfoundation.org/aaf/gsbdb/Video.Denver.Intro.htm>

A video case study and discussion guide show how the design of an educational facility can help promote student achievement.

American Architectural Foundation; KnowledgeWorks Foundation. 2005.

Schools as Centers of Community: John A. Johnson Achievement Plus Elementary School.

<http://www.archfoundation.org/aaf/gsbdb/Video.Johnson.Intro.htm>

A video case study and discussion guide show local leaders and residents about the benefits of creating "Schools as Centers of Community."

Bingler, Steven; Quinn, Linda; Sullivan, Kevin. 2003.

Schools as Centers of Community: A Citizens' Guide For Planning and Design.

Washington, D.C.: National Clearinghouse for Educational Facilities.

http://www.edfacilities.org/pubs/scc_publication.pdf

This outlines a process for planning schools that more adequately addresses the needs of the whole learning community. It explores six design principles for creating effective learning environments, provides 13 case studies that illustrate various aspects of the six design principles, and examines the facilities master planning process for getting started and organized.

Boniface, Russell. July, 2006.

A School Building Designed to Teach.

AIArchitect.

http://www.aia.org/aiarchitect/thisweek06/0714/0714pw_roanoke.cfm

Profiles the Roanoke Academy for Mathematics and Science, a K-5 magnet school whose use of brick, mortars, beams, trusses, and purlins can be used for math and science teaching. Floor tiles, window patterns, and plantings reinforce geometric principles. Large amounts of glass and more than 80 colors in the building create interest and help define work and play areas.

Borden, Rebecca. 2004.

Taking School Design to Students.

Washington, D.C.: National Clearinghouse for Educational Facilities.

<http://www.edfacilities.org/pubs/schooldesign.pdf>

This describes seven strategies for effectively involving students in school design, including using student artwork, using disposable cameras, hosting student forums, involving students in planning committees, organizing a student design competition, providing design programs during out-of-school hours, and integrating design activities into class work.

Chan, Tak Cheung; Petrie, Garth. May-June, 2000.

Well Designed School Environment Facilitates Brain Learning.

Educational Facility Planner, 35(3), 12-15.

<http://shop.cefpi.org/journalview.esiml?jid=3723>

Review of research on how space, color, lighting, temperature, and acoustics can either facilitate or inhibit brain learning.

Copa, George; Sutton, Sharon. 2001.

New Visions.

Northwest Education, 6(4), 10-13.

http://www.nwrel.org/nwedu/summer01/new_visions.html

An educator and an architect discuss school design considerations that include developing a strong learning plan, a strong concept of community, and architecture that supports both.

Cunningham Group Architecture. 2003.

Schools That Fit: Aligning Architecture and Education.

Minneapolis: Cunningham Group Architecture.

<http://www.cunningham.com/schoolsthatfit/index.html>

This book presents lessons learned about designing schools and about the process and the planning that are required to align facilities with programs, and architecture with education.

Filardo, Mary; Vincent, Jeffrey M.; Sung, Ping; Stein, Travis. 2006.

Growth and Disparity: A Decade of U.S. Public School Construction.

Washington, D.C.: Building Educational Success Together.

<http://www.edfacilities.org/pubs/GrowthandDisparity.pdf>

Study finds total expenditure for school construction approached \$600 billion over past 10 years and the schools with the greatest need, those in high-poverty and minority school districts, have seen the least investment.

Frumkin, Howard; Geller, Robert; Rubin, I.; Nodvin, Janice. 2006.

Safe and Healthy School Environments.

New York: Oxford University Press.

Addresses different concerns about the school environment, including the physical environment of the school, air quality issues, cleaning methods, food safety, safe designs of playgrounds and sports fields, crime and violence prevention, and transportation.

Jilk, Bruce. 2002.

Freedom and Creativity: A Story of Learning, Democracy, and the Design of Schools.

DesignShare.

http://www.designshare.com/Research/Jilk/Freedom/Free_Create.htm

This describes the development of an Icelandic school for students in grades 1-10. The school is designed according to the needs of students, their families, their communities, and their country and is based on a "design down" process which refers to starting with the biggest issues and moving toward smaller goals.

Karcher, Rick; Pilla, Rob; Smartschan, Glenn. December, 2006.

A Learning Curve.

School Planning and Management, 45(4), 20-24.

School design must respond to evolving teaching methods and society's changing demands on education. This article discusses the facilities implications of today's No Child Left Behind mandates, career-driven education, "learning to learn" programs, and community use.

Kats, Gregory. 2006.

Greening America's Schools: Costs and Benefits.

Washington, D.C.: Capital E Report. <http://www.cap-e.com/ewebeditpro/items/O59F9819.pdf>

Report demonstrates that green schools (schools designed to be energy efficient, healthy and environmentally friendly) are also extremely cost-effective.

KnowledgeWorks Foundation; Institute for the Future. 2006.

2006-2016 Map of Future Forces Affecting Education.

<http://www.kwfdn.org/map/>

This map presents a forecast of external forces that are important in shaping the context for the future of public education and learning in the next decade; technology is a critical component

KnowledgeWorks Foundation; Harwood Institute for Public Innovation. 2004.

Public Engagement and School Facilities Conversation Workbook.

http://www.kwfdn.org/resource_library/resources/workbook.pdf

Workbook to assist community groups in engaging the public concerning school facilities, with discussion guidelines, worksheets, and steps for organizing the meeting.

Lackney, Jeffery A. 1998.

Changing Patterns in Educational Facilities.

DesignShare.

<http://www.designshare.com/Research/ChangingPatterns/ChangingPatterns1.htm>

Report examines patterns in societal trends, educational approaches, and facility design within the following time frames: Agricultural Society (1650-1849); Industrial Society (1850-1949); Information Society (1950-1999); and Knowledge Society (2000-2025).

Nair, Prakash; Fielding, Randall. 2005.

The Language of School Design: Design Patterns for 21st Century Schools.

DesignShare.

<http://www.designshare.com/patterns>

An illustrated book presents 25 design patterns of existing innovative learning environments from around the world. It defines a new graphic vocabulary that synthesizes learning research with best practice in school planning and design.

Nathan, Joe; Febey, Karen. 2001.

Smaller, Safer, Saner, Successful Schools.

National Clearinghouse for Educational Facilities and the University of Minnesota, Center for School Change, Humphrey Institute.

<http://www.edfacilities.org/pubs/saneschools.pdf>

This report provides case studies of public school buildings representing urban, suburban, and rural communities, including both district-run and charter public schools. The studies demonstrate schools' ability to improve academic achievement and behavior in safe, nurturing, and stimulating environments.

National Center on Education and the Economy. 2006.

Tough Choices or Tough Times: The Report of the New Commission on Skills of the American Workforce.

New York: Josey-Bass.

http://www.skillscommission.org/pdf/exec_sum/ToughChoices_EXECSUM.pdf

This provides a road map for transforming all levels of education, preschool through postsecondary, to meet the challenges of a rapidly changing global economy.

National High School Alliance. 2005.

Call to Action: Transforming High School for All Youth.

<http://www.hsalliance.org/downloads/home/Call%20To%20Action%202005/CalltoAction2005.pdf>

Here is a framework of six core principles and recommended strategies for preparing the nation's youth for college, careers, and active civic participation. It identifies what it takes to produce high academic achievement, close the achievement gap, and promote civic and personal growth among all high-school-age youth

Nigaglioni, Irene. 2006.

Thinking Outside the Box: Reinventing the Traditional Classroom.

Educational Facility Planner, 40(3/4), 3-8.

<http://www.cefpi.org/journal.esiml>

Discusses shortcomings of traditional learning environments and provides examples of classroom designs appropriate for contemporary educational delivery. These designs accommodate flexibility, variability, extended learning areas, interdisciplinary teaching, and technology integration.

Oblinger, Diana. 2005.

Leading the Transition from Classrooms to Learning Spaces.

Educause, 28(1).

<http://educause.edu/apps/eq/eqm05/eqm0512.asp?bhcp=1>

This considers learning space design, emphasizing the migration away from the traditional classroom as the sole venue for instruction. Incorporation of virtual learning and an improved understanding of human cognition inform this discussion of learner- and discipline-centered space design.

School Works. 2006.

The A-Z Sketchbook of School Build and Design.

United Kingdom: School Works.

<http://www.school-works.org/publications.asp>

To help students and others participate in the school design process, this presents a visual guide to the key areas which must be considered when renovating or building a school. The publication is in a hand illustrated cartoon format.

Schneider, Mark. 2001.

Do School Facilities Affect Academic Outcomes?

Washington, D.C.: National Clearinghouse for Educational Facilities.

<http://www.edfacilities.org/pubs/outcomes.pdf>

A research review explores which facility attributes affect academic outcomes the most, including indoor air quality, ventilation, and thermal comfort; lighting; acoustics; building age and quality; school size; and class size.

State Educational Technology Directors Association. Winter, 2007.

Threshold: Exploring the Future of Education.

Cable in the Classroom Magazine.

<http://www.ciconline.org/thresholdwinter07>

The end is near for the one-size-fits-all approach to teaching and learning that has dominated American schools for most of the past century. Instead, that outdated model must be replaced by schools designed to better support individualized instruction enhanced by technology. This features eight articles focused on personalizing education.

Stevenson, Kenneth. 2006.

Educational Facilities within the Context of a Changing 21st Century America.

Washington D.C.: National Clearinghouse for Educational Facilities.

http://www.edfacilities.org/pubs/Ed_Facilities_in_21st_Century.pdf

Presents possibilities and critical issues related to the future of education and educational facilities. A scenario of educational technology that eliminates the school facility and decreases social interaction through "virtualized" distance learning is presented, followed by a discussion of eight educational and social trends that may greatly impact education in the upcoming decades.

Stevenson, Kenneth. 2007.

Educational Trends Shaping School Planning and Design: 2007.

Washington D.C.: National Clearinghouse for Educational Facilities.

<http://www.edfacilities.org/pubs/trends2007.pdf>

Twelve educational trends, including school choice, smaller schools, technology usage, changing grade configurations, and new classroom designs for various learning styles, provides insight into the factors influencing school planning and design.

Sullivan, Kevin. 2002.

Catching the Age Wave: Building Schools with Senior Citizens in Mind.

Washington, D.C.: National Clearinghouse for Educational Facilities.

<http://www.edfacilities.org/pubs/agewave.pdf>

Examining the trend toward an older U.S. population, this publication discusses why educators and school facility planners should consider designing multipurpose schools that specifically contribute to stronger intergenerational links.

U. S. Department of Education. 2007.

School 2.0.

<http://www.school2-0.org/>

School 2.0 is a brainstorming tool designed to help schools, districts and communities develop a common education vision for the future and to explore how that vision can be supported by technology.

Vincent, Jeffrey M. 2006.

Public Schools as Public Infrastructure.

Journal of Planning Education and Research, 25(4), 433-437.

<http://jpe.sagepub.com/cgi/content/abstract/25/4/433>

City planning scholars need to increase their engagement with public schools and school facilities, and think more critically about how development and redevelopment decisions impact our public schools.

Yoders, Jeff. June, 2006.

School Design That's Not by the Book.

Building Design and Construction, 47(7), 24-32.

<http://www.bdcnetwork.com/index.asp?layout=articlePrint&articleID=CA6342191>

Profiles the innovative design and use of technology in Philadelphia's School of the Future and two other schools that also use a "main street" plan lined with flexible learning and social spaces.

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Courtesy LAUSD Facilities Services Division.

>> Dena New Primary Center, Los Angeles, California.

About the Author

As a senior adviser to and speechwriter for U.S. Secretary of Education Richard Riley (1993–2001), Kevin Sullivan worked on a wide range of education issues, including teacher quality, reading, high school reform, school modernization, character education, development of the E-rate, special education, and school violence.

In 1998, Sullivan organized the National Symposium on School Design. He is co-author, with Steven Bingler and Linda Quinn, of *Schools as Centers of Community: A Citizen's Guide for Planning and Design*. He is also the author of *Catching the Age Wave: Building Schools with Senior Citizens in Mind*, which was published in 2002 by the National Clearinghouse for Educational Facilities. In 2005, he helped to plan and organize the National Summit on School Design.

Sullivan currently is a consultant to the National Commission on Teaching and America's Future, KnowledgeWorks Foundation, American Architectural Foundation, the National Clearinghouse for Educational Facilities and Co-operation Ireland and continues to support former U.S. Secretary Richard Riley in his work as a national education leader. He is also senior education adviser to Potomac Inc., a strategic communications firm in Bethesda, Maryland.

Notes

¹ Education Week staff, *Lessons of a Century: A Nation's Schools Come of Age* (Mt. Morris, IL: Education Week Press, p. 4).

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³ See http://en.wikipedia.org/wiki/Frederick_Winslow_Taylor

⁴ C. Kenneth Tanner and Jeffery A. Lackney, "History of Educational Architecture," in *Educational Facilities Planning: Leadership, Architecture, and Management* (Boston: Allyn & Bacon, 2005). See <http://www.coe.uga.edu/sdpl/historyofedarchitecture/historyofedarchitecture.htm>

⁵ Steven Bingler, Linda Quinn, and Kevin Sullivan, "Schools as Centers of Community: A Citizen's Guide for Planning and Design" (Washington, D.C.: National Clearinghouse for Educational Facilities, 2003), p. 30.

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Other organizations and institutions contributing to the success of the Forum include:

American Institute of Architects: Committee on Architecture for Education: The Committee on Architecture for Education (CAE) is a large and active group of architects and allied professionals concerned with the quality and design of all types of educational, cultural, and recreational facilities. For more information, please visit www.aia.org/cae.

KnowledgeWorks Foundation: KnowledgeWorks Foundation is committed to furthering universal access to high quality educational opportunities for individuals to achieve success and for the betterment of society. The foundation seeks to increase the number and diversity of people who value and access education, by creating and improving educational opportunity at pre-kindergarten through high school and post-high school institutions and through community organizations.

In Ohio and across the nation, billions of dollars are being spent on the rebuilding of our nation's public schools. KnowledgeWorks Foundation recognizes that this investment as a tremendous opportunity to re-connect the public with public schools—to bring a diverse group of stakeholders to the table to consider the relationship between the new schools and their communities. KnowledgeWorks Foundation believes that such conversations will lead to more effective schools and healthier neighborhoods. For more information, please visit us at www.kwfdn.org.

National Clearinghouse for Educational Facilities: Created in 1997 by the U.S. Department of Education, the National Clearinghouse for Educational Facilities (NCEF) provides information on planning, designing, funding, building, improving, and maintaining safe, healthy, high performance schools. The Clearinghouse is funded by a grant from the U.S. Department of Education with oversight by the Office of Safe and Drug-Free Schools and is managed by the National Institute of Building Sciences (NIBS), a non-governmental, non-profit organization authorized by Congress in 1974 to serve as an authoritative source on building science and technology. For more information, please visit www.edfacilities.org.

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