
Charter School Patterns of Innovation: A New Architecture for a New Education

PAMELA HARWOOD
Ball State University

INTRODUCTION

An interdisciplinary team of students in architecture, urban planning, business, education, communications, and psychology conducted research on the planning and design of educational environments for charter schools as part of Ball State University's Business Fellows Immersive Learning Program.¹ Ideas about how children learn and how educators teach have the potential to reform educational approaches and re-shape learning environments across the United States. Our society and educational system have changed radically in recent decades. Educational facility design must mirror changes in educational styles and enable new ways of learning. Differing educational missions, faculties, and student populations all require significantly different design approaches. This research connects the designed physical environment with the learning innovations charter schools support, encourages the entrepreneurial vision, emphasizes creativity in the renovation adaptive reuse, and non-traditional use of existing buildings, maximizes student safety and learning, and adheres to best-practice standards of ecological design.

In a case study research method we profiled eight charter schools nationally and twelve charter schools locally to develop ways to incorporate issues of curriculum, funding, and facility planning into the design of this 'new' educational building type. The primary research activities involved traveling to the selected schools to carry out place-based observations, behavioral mapping, and trace measure analyses.² Focused interviews with administrators, students, teachers, and the community helped us gather information about people's attitudes, values, and behavior. Specific lessons learned from the case studies were then used to

develop, write, and illustrate design "patterns." A pattern describes a problem that occurs in an environment and then describes the core of the solution in such a way that it becomes useful to the human communities that the pattern supports.³

Six design principles endorsed by the United States Department of Education, the American Institute of Architects, and the Council of Educational Facility Planners were used to clarify and organize the fifty design patterns we developed. These six design principles, reworded for emphasis are: 1) Teaching and learning to accommodate the needs of all learners, 2) Maximize health, physical comfort, well-being, safety and security, 3) Be environmentally responsible, clean and green, 4) Be practical, cost effective, flexible, and adaptable, 5) Serve as a center of the community, and 6) Involve all community interests in the planning, design and ongoing process of the school.⁴

Following the development of the case studies, school profiles, and design principles and patterns, upper-level undergraduate students in the Department of Architecture at Ball State University undertook nine different charter school design projects.⁵ These projects were based on programmatic needs and client interactions with specific charter school personnel and site conditions. In this evidence-based studio, the patterns and best-practice examples were used to focus the students' innovative ideas. The interdisciplinary group of students on the Charter School Business Fellows team served as consultants to the design studio. This parallel activity allowed for the effectiveness, validity, and relevance of the patterns to be tested in the studio projects, which helped us to improve ways that the pattern language is useful for all school stakeholders. In this paper, we present ten patterns and illustrative examples from our

larger research study, essential to the design and planning of innovative and responsive learning environments in the 21st century.⁶

PRINCIPLE 1: TEACHING AND LEARNING TO ACCOMMODATE THE NEEDS OF ALL LEARNERS

Charter schools are public schools of choice that receive more administrative and pedagogical autonomy and flexibility than district schools in exchange for meeting the performance goals specified in each school's charter. Because their approval requires them to meet a need in school communities, charter schools often serve a specific population, target an underserved neighborhood, or provide an innovative approach to teaching.⁷ Randall Fielding, founding director of an Internet resource for school design, makes this point clear. "Alternative education programs in the United States are established for learners that may not succeed in traditional learning environments. To reach a diverse group of learners, educators are looking at innovative approaches to curriculum, staffing, schedules, technology, and facilities."⁸ This shift in educational approaches requires a related shift in the design of learning environments.

Teacher-oriented, whole-group instruction taking place in individual, self-contained classrooms characterized the old "turf-centric" model.⁹ Active student participation and cooperative learning in flexible, diverse and dynamic educational spaces characterizes the new model. Optimal use of technology and easy access to web-based information facilitates new methods of instruction, "letting teachers become guides and coaches; allowing students to analyze, evaluate, and manipulate information; and permitting curriculums to be individualized."¹⁰ Personalization of teaching and project-based learning are fundamental aspects of the new model. In charter schools, the educational environment has become a more open, fluidly designed setting that enables a variety of activities to occur while weaving together virtual and physical learning spaces. We have selected two design patterns and exemplars to discuss under this first principle of teaching and learning to accommodate all users.

Pattern 1.1: Provide Different Informal and Formal Learning Settings

"Create learning environments that differ in size, scale, configuration, material quality, and activity

type (open learning studios, outdoor classrooms, breakout spaces, learning streets, and flexible-use areas) to provide a variety of multi-purpose spatial settings in which to learn. Design spaces to enable a range of activities from quiet, reflective personal study to large, hands-on, collaborative projects. Provide flexible, easily accessible, breakout areas where social interaction, incidental learning, and informal opportunities to discuss, display, and celebrate student work are encouraged."¹¹

Denver School of Science and Technology (DSST) is a 65,000 square foot middle and high school designed to create multiple spaces for learning.¹² The "Commons" is a double-height, open gathering space at the entry, with administrative offices located adjacent to it. Classrooms of different sizes and types are organized in clusters and arranged by grade level. Each classroom cluster centers on an open studio that serves as a flexible space for team presentations, informal meeting and integrated learning activities. A shared office space allows teachers to work together when planning lessons in cross-disciplinary teams.



Figure 1. This flexible studio space at the center of the classroom cluster in Denver School of Science and Technology illustrates the school's multiple and varied spaces for learning. (Source: Klipp Architects)

Adjacent project rooms provide space for hands-on, project-based learning. Outdoor courtyards, with direct access from each classroom, further extend the interior space, providing open-air learning environments. The "Galleria," a wide 'learning street' with niches set into its length, connects classroom clusters.¹³ Used for school congregations, experiments, science fairs, and group projects, this street becomes a dynamic, alternative learning space. Lounge furniture, vibrant displays, open views from

walkways above, and interior windows contribute to incidental learning and interaction opportunities.

Pattern 1.2: Enable Project-Based Learning and Real-Life Experiences

“Education needs to be connected to real-life, learning-by-doing applications, coupled with an interdisciplinary instructional approach. Integrated, project-based learning supports cooperation and sharing of ideas that will enable students to develop critical thinking skills, process material better, and use the strengths of a group to increase the amount of information absorbed and decrease the time it takes to learn a lesson.”¹⁴

The California Science Center Charter School in downtown Los Angeles, is located in Exposition Park, home of The Natural History Museum, The Aerospace Science Museum, and directly connected to an 80,000 square foot renovated Armory called the Wallis Annenberg Building for Science Learning and Innovation. The main hall of the Armory, known as the “Big Lab” and open to the entire community, is a daylit, two-story, multipurpose space used for a variety of hands-on science activities.



Figure 2. Elementary school children are engaged in hands-on learning in the renovated Armory “Big Lab” (Source: California Science Center Charter School)

Four main areas, each with a different scientific focus, make up this big lab: 1) *Exploration Grove* allows students to learn about ecology and earth sciences; 2) *Water Works* allows students to study water effects with pumps, fans, objects and an armada of miniature sailboats; 3) *Meg Tower* allows students to conduct experiments from a tall tower by dropping balls, balloons, parachutes, eggs, and other objects; 4) *Giant Wall* is a wall with holes

where students build structures to explore physical science and engineering.¹⁵ This adaptive reuse project, easily connected to the new charter school classroom building via a series of bridges, yields multiple opportunities for inquiry, exploration, and cutting-edge science experiments, and promotes extensive project-based learning activities in the charter school’s curriculum.

PRINCIPLE TWO: MAXIMIZE HEALTH, PHYSICAL COMFORT, WELL-BEING, SAFETY, AND SECURITY

In the past decade, concern has grown about a number of health and safety issues in learning environments, including air and light quality, youth crime and violence, and more recently terrorism. School planning and design research shows how to build safety into facility design by strategically located windows, entry points, and public gathering places.¹⁶ Schools that provide space for youth activities and after-school programs can be safer schools too, since most student violence occurs between the hours of three and six pm.¹⁷

The size of the student population and scale of the school building have an effect on safety, well-being, and student performance.¹⁸ Charter schools most often create small communities of learners. This helps to maintain supervision, encourage healthy social interactions among students, teachers, and administrators, and establish a sense of community and connectedness that promotes a safe environment. Randall Fielding is convinced that “a hierarchy of spaces and groups remains one of the most vital aspects of comfort and security. Thoughtful design of the site and facility enhances the sense of belonging by providing spaces for a layered hierarchy of groups.”¹⁹ Two patterns and examples of charter schools illustrate well this second principle.

Pattern 2.1: Ensure the Highest Reasonable Standards of Safety

“School design should embody natural surveillance (the ability to see what’s going on), natural access control (the ability to control entry and exit), and territoriality (the ability of legitimate users to control an area, while discouraging illicit users).²⁰ Openness and transparency aid in wayfinding, create opportunities for informal surveillance, and develop stimulating places to learn.”²¹

Perspectives Charter School, located in a lower-income neighborhood of Chicago, is designed with a circulation core at the hub of a double-stacked layer of classrooms, administrative offices, and support areas. Perspectives is an interior courtyard building with the main shared space used as a multi-purpose “Commons.” The walls of this two-story space convey the school’s core values. Surrounding the Commons is circulation on both floors, providing numerous overlooks and alcoves. Clear visibility into the school’s various spaces provides informal surveillance and aids in wayfinding.²²



Figure 3. The welcoming entry and open area at the heart of the wedge-shaped Perspectives Charter School illustrate well the concepts of access control, natural surveillance and territoriality. (Source: Perspectives Charter School)

The lowered awning, covering the main entrance, draws attention to the entry’s function and creates a link between the scale of the site and the building’s interior. A reception area allows someone to greet people and direct them to appropriate places within the school. The open circulation space surrounding the atrium and the strategically positioned administrative offices at the entrance aid in natural surveillance and establish a safer learning environment.

Pattern 2.2: Foster Communities of Learners within a Small School Culture

“Foster a small school culture to promote a positive image and a distinctive educational mission. Students need to identify with their school community and feel a sense of belonging, common purpose, and loyalty to the place. Create intimate learning communities where students are well known and encouraged by adults who care for them. This will help to reduce the learning gap disadvantages that

plague underserved student groups and the isolation felt in large, institutional settings.”²³

The directors of Imagine MASTer Academy in Fort Wayne, Indiana are working with architects to create a “cottage feel” for the seven campus-style buildings of their K-8 charter school, located on what was originally a Catholic orphanage. The campus layout gives MASTer Academy the opportunity to organize into semi-autonomous small schools, clustering classrooms, teacher’s offices, project rooms and flexible use spaces within each building. To create learning communities, faculty and administrators are exploring ways to group students that offer them the best opportunity to gain a rich learning experience. This may mean splitting subject areas by gender, developing multi-age level groups, looping (allowing students to return to the same teacher), or creating advisory teams (a core group of students working with an adult mentor).²⁴ Within each “schoolhouse,” a dedicated space is provided for students as a “home base.”²⁵ The campus environment, with landscaping, paths, edges, and outside interaction spaces, engages the whole school as a community of communities.



Figure 4. The campus-style environment of Imagine MASTer Academy in Fort Wayne, Indiana organizes the school’s academic program into small semi-autonomous schools. (Source: Google Earth)

PRINCIPLE THREE: BE ENVIRONMENTALLY RESPONSIBLE, CLEAN AND GREEN

Ecologically sensitive, “green” ideas are changing the design of educational environments. Randall Fielding notes, “With stretched capital and operational budgets, school organizations are looking to facilities to become more energy efficient in their

daily operations. Educators are consistently interested in sustainable ideas that are not only environmentally responsible and good for the bottom line, but ultimately work hand-in-hand with the educational process.”²⁶ The U.S. Department of Energy has estimated that at least 1.5 billion dollars per year can be saved through modest energy conservation modifications in new and existing schools.²⁷

“High performance schools” have implemented a wide range of ecological principles, including increased use of daylight, green roofs, natural ventilation, and recycled and local materials.²⁸ Daylighting is an important component in improving student performance, as one well-known study indicates that students with high levels of classroom daylighting show improved math and reading test scores.²⁹ Studies also indicate that physical comfort correlates positively with the ability to concentrate, student attendance rates, and teacher retention.³⁰ It is therefore essential to provide excellent air quality with natural ventilation, use of environmentally responsible building materials, local heating and cooling controls, acoustic control devices, and natural and task-appropriate lighting and illumination levels.³¹

In addition to conserving energy and providing effective indoor environmental quality, charter schools can actively teach stewardship of environmental resources through careful and conscious management of land, air, water, energy, and building materials. This helps students learn that taking care of their community is important and that their actions have an impact on the world in which they live. A landmark study on the cost of “Greening America’s Schools” shows that the 2% average premium for green buildings is well worth the benefits, which include reductions in water pollution, improved environmental quality and increased productivity of learning in an improved school environment.³² For this third principle of striving to be environmentally friendly, clean and green, we describe and illustrate two design patterns.

Pattern 3.1: Maximize Use of Daylight and Natural Ventilation

“Introduce daylight and natural ventilation into all learning spaces. Daylighting strategies should optimize natural light while avoiding glare, controlling heat gain, and balancing electric light. Effective use of shading devices and placement of openings and light shelves allows for greater penetration of day-

light into the room. Natural ventilation strategies should capture prevailing breezes and utilize airflow patterns to circulate fresh air through the use of operable windows, ventilation louvers, solar chimneys, and stack effect ventilation shafts.”³³

Ben Franklin Elementary School in Kirkland, Washington is a high performance school with abundant daylight and natural ventilation. In plan, three classroom clusters organize this 57,000 square foot learning environment into the form of an inverted “E.” The two-story, shared learning areas of the wings are oriented along an east west axis allowing better control of daylight. Light shelves and roof overhangs temper direct sunlight, minimize solar heat gain, and prevent glare on the south side of the building. North side openings allow indirect daylight into the classrooms and provide views toward a stand of Douglas fir trees. Courtyards between the classroom wings, landscaped with native plants and irrigated by rainwater collected from the school’s butterfly roof, provide for outdoor learning. The ventilation strategy allows air to flow by convection into rooms through low, perimeter louvers. Air is then exhausted via stack effect through a ventilation shaft. This passive ventilation strategy results in 10 air changes an hour, providing exemplary indoor air quality with low energy consumption.³⁴



Figure 5. Classroom spaces surrounding a courtyard in highlight the importance of daylighting and natural ventilation. (Source: Mahlum Architects)

Pattern 3.2: Utilize the Learning Environment as an Educational Tool

“Look at the potential of the building and environment to be used as a learning textbook. Green building features such as photovoltaic and solar panels, wind generated power, water collection systems,

green roofs, and solar chimneys aide in energy and cost conservation and become excellent teaching tools in the school's curriculum. By integrating environmental aspects of the building into the program, students understand and observe first hand the principles of ecology and interdependence."³⁵

Sidwell Friends Middle School weaves together a renovated existing building with a new recycled cedar-clad building, surrounding a constructed wetland courtyard. Wastewater is processed through the terraced wetland, which acts as a biological filter. The children have prepared video documentation of this process for their school's website.³⁶



Figure 6. All systems and elements are exposed and accessible to the students as a learning textbook at Sidwell Middle School. (Source: Kieran Timberlake Associates)

The green roof garden insulates the building, filters rainwater used for landscaping, and provides a site to grow vegetables and herbs used in the school cafeteria. The children have access to the green roof where they tend the garden, explore the solar chimneys used for the building's natural ventilation, and discover the photovoltaic roof panels that generate power for the building's electric load. The design of each area of the building and site was established from an educational, recreational, and visual perspective and refined through discussions with teachers, parents, and designers.

PRINCIPLE FOUR: BE PRACTICAL, COST EFFECTIVE, FLEXIBLE, AND ADAPTABLE

Charter schools are often created within difficult economic and time constraints. Taking advantage of available materials, simple construction processes, flexible-use spaces, and renovation and adap-

tive reuse of existing buildings can create remarkably innovative and cost-effective schools. The best school designs allow for spatial flexibility and adaptability so that the mix of learning areas easily adjusts as needs vary. "Flexible, open structural systems that allow spaces to be reconfigured over time will best accommodate change."³⁷

Renovation and re-purposing of existing facilities are important economic and sustainable ideas. "Existing schools should be renovated and preserved whenever possible, especially in cases where reuse preserves natural resources or valuable historic and cultural assets. Building reuse helps children and adults alike to embrace the social and cultural heritage of their community."³⁸ Adaptive reuse, an emerging trend in charter schools especially in urban areas where land is scarce, has involved the conversion of churches, movie theaters, shopping malls, and big box retail stores into schools.

Alternatively, students today are learning in non-traditional facilities that redefine the concept of "school." From a high-rise office building, to railroad-car classrooms, to an underutilized YWCA, to a nearby zoo, alternative spaces for educating youth represent an innovative public use of various occupied facilities.³⁹ Lease options available to charter schools in public places make unique partnerships and demonstrate that constrained situations can lead to excellent educational facilities. We present two patterns and examples for this fourth principle of being practical, flexible, and cost-effective in the design of educational environments.

Pattern 4.1: Think Renovation and Adaptive Reuse of Buildings

"Explore strategies for renovation of under-utilized, existing school buildings and adaptive reuse of suitable public buildings into learning environments. When renovating an existing school or re-purposing a building with another original use, challenge the preeminence of the classroom as a school's basic building block."⁴⁰

"Bronx Charter School brings art to life in former factory" in an adaptive reuse project in the Hunts Point area of Bronx, New York.⁴¹ Located in an industrial zone that has been experiencing significant growth, the school is a renovated and re-purposed 1917 sausage factory. The exterior of the building with its facade of colorful glazed bricks, celebrates the school as a place where the arts are embraced.



Figure 7. The open and light classroom spaces with the saw-tooth skylight additions of Bronx Charter School help transform this meatpacking factory into a vibrant elementary school in an industrial area. (Source: Bronx Charter School for the Arts)

The interior is filled with color and light from six saw-tooth skylights in a complete reconstruction of the roof. The scale, openness, detail and materiality of the Bronx Charter School for the Arts reflects a changing understanding of what educational facilities should and could be, as well as an openness to experimenting with the architectural form.

Pattern 4.2: Consider Non-Traditional Options for School Facilities

“Encourage schools to explore options for using alternative civic, retail, institutional, and other non-traditional, adaptable spaces that offer opportunities for learning. This supportive partnership of hybrid building types can be most advantageous for charter schools that do not have the ability to use existing school assets and built-in public funding.”⁴²

The creation of the Henry Ford Academy on the campus of the Henry Ford Museum blurs the line between school and museum for its 450 students. The Academy leads students to explore the world through the lens of the museum collections, setting them free on a 90-acre site that includes 82 historic buildings. Students investigate places such as Thomas Edison’s laboratory and the Wright Brothers’ bicycle shop as part of their project-based learning. They learn in a way that is engaging and interactive, and teaches them about how a cultural institution is run. Spaces at “the Henry Ford,” as the museum is known, are non-traditional; a student center created in a building formerly housing a carousel, multi-purpose spaces carved from a railroad depot, and railroad cars used as classrooms. Henry

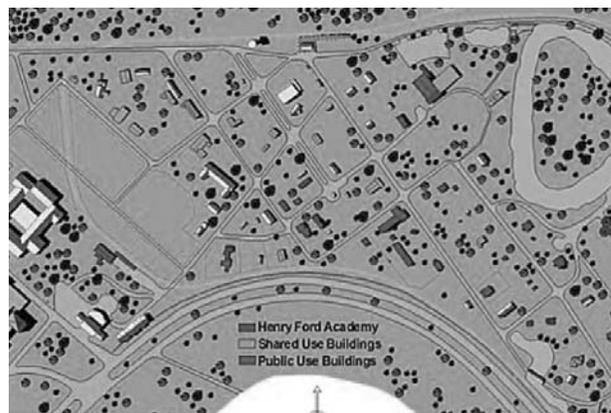


Figure 8. The Henry Ford Academy is located in the interactive Henry Ford Museum, taking advantage of the institution’s rich resources for hands-on, experiential learning. (Source: Henry Ford Museum)

Ford himself dreamed of such a collaborative learning effort, believing that young people can learn about their world by studying American inventions and ingenuity.⁴³

PRINCIPLE FIVE: SERVE AS A CENTER OF THE COMMUNITY

In reaching out to the community as partners in the education of our youth, charter schools have positively reconfigured the larger educational community. Blurring the traditionally rigid boundary between school and community, charter schools incorporate the neighborhood and its social, cultural, and natural assets into the students’ learning environment. Rather than building a comprehensive array of facilities and programs (traditional gymnasiums, sport fields, auditoriums, and swimming pools), they enlist community resources and utilize libraries, museums, zoo, parks, colleges, and even industry for extended learning opportunities. Charter schools sited on college campuses, within civic museum landscapes, and in dense urban fabrics, create dynamic synergies with curriculum and facility design.⁴⁴

Conversely, schools are becoming centers of civic participation and recreation as they integrate shared uses such as neighborhood health clinics, after school care and adult education programs, recreation centers, and other family life support services into their context for community use. Only a decade ago, educational models were built as stand-alone instructional facilities that restricted community access and required most knowledge

and materials to be dispensed from within the classroom. Today, schools serve both as symbols and centers of their communities, are designed to be more open, to showcase learning, to encourage community access, and to serve a variety of community needs.⁴⁵ We discuss under this fifth and final principle, two patterns and best-practices.

Pattern 5.1: Integrate School into the Fabric of the Community

“Develop the school in partnership with local community assets, making it an integral part of the neighborhood. Extend learning outside the school into the community, sharing the wealth of the community’s many learning resources. Service learning and school-to-work internships become vehicles to deliver quality programs to the recipient partners, while students gain important lessons in giving, are better prepared for the challenges of college, and sharpen and strengthen the social and technical skills they will utilize in the real world.”⁴⁶

Herron High Charter School in Indianapolis presents supportive partnerships both with the neighboring community and local institutions. Herron High was originally funded by a start-up grant from the Bill and Melinda Gates Foundation and the Indianapolis Facilities Fund. To supplement this, the school adopted an aggressive grassroots campaign, creating a planning board to address funding the school’s operation and future expansion.⁴⁷ The campus-like group of buildings, including the re-purposed Art Museum, which now houses Herron High School, and the classical “Main” studio arts building to be renovated into a middle school, was originally the Herron Center for the Arts. When the arts acad-

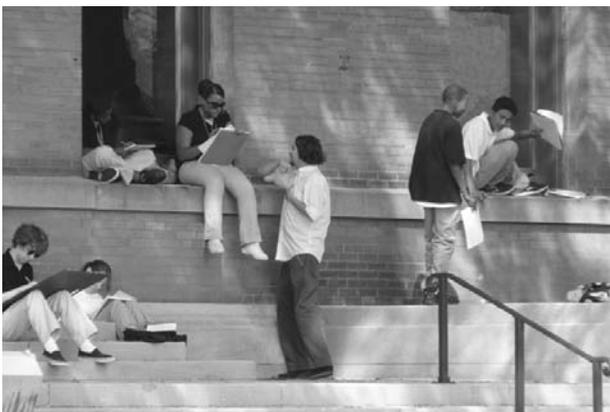


Figure 9. Located in the re-purposed Herron Art Museum, Herron High takes advantage of its location in downtown Indianapolis and shares resources in a lively give-and-take with the community. (Source: Alex Sulanke)

emy moved, leaving the buildings vacant, a group of neighbors, concerned with the future of this site, met to find the best reuse for these buildings. It was decided to create a neighborhood charter school. Herron High is located in a transition area between an urban residential neighborhood and a dense commercial area, providing numerous opportunities for partnerships with the school. The public library, recreational facilities, and local technical and community colleges are community partners, providing support to the school. The students have an open lunch period and eat in the community as well. Preserving this neighborhood icon, Herron High instills pride in the school and community’s shared traditions, and strengthens the neighborhood’s sense of purpose, identity and coherence.

Pattern 5.2: Be “More than Just a School”

“Make the school a community center in the minds of the citizens. Encourage community use by creating a welcoming, comfortable, and enjoyable place for people of all ages to congregate, providing spaces, times, and programs for community access to education as well as places to be used for receptions, meetings, and athletic events. Health and family life services and continuing education opportunities can all be accessible through one building, while the focus of every activity should be on the promotion of children’s learning.”⁴⁸

John A. Johnson Achievement Plus in St Paul’s East Side neighborhood is an elementary school of 350 students. It represents a unique public-private partnership with school, recreation, and community services all located in one convenient place. Achievement Plus provides “extended learning” op-



Figure 10. John A. Johnson Achievement Plus Elementary School receives the Medal of Excellence as the best example of a school that is the center of its community. (Source: Pam Harwood)

portunities (such as after school and adult education programs) and “learning supports” (such as health services and housing assistance for families), by working together with many community partners.⁴⁹

The East YMCA, attached to the school building, provides staffing and facilities for after-school programs as well as physical education classes for the school. Eastside Family Center operates a resource center in the school that assists families with housing needs, clothing, emergency food, medical insurance and provides family nights, parenting classes, adult education, and medical and mental health resources. East Side Learning Center, a ministry of the School Sisters of Notre Dame, provides one-hour tutoring sessions twice a week for each student as well as other children in the neighborhood needing personalized learning. Saint Mary’s Hospital started a health clinic at Johnson three years ago and Children’s Dental became a recent partner as well. Because of the many programs and services offered inside the school building, John A. Johnson Achievement Plus elementary school is “more than a just a school.” It is a neighborhood community center and vital social and economic resource.⁵⁰

CONCLUSION

The ten patterns we have highlighted in this paper provide compelling evidences of creative ways schools are reshaping the educational environment. New educational approaches in charter schools include promoting a small school culture where teachers have the opportunity to know students well, personalizing student’s development, facilitating student-to-student, adult-to-student, and adult-to-adult collaborative interactions, taking learning into the community, and fostering active, hands-on-learning and performance-based assessment. Teachers are coaching student’s development by intertwining personal and academic growth. Technology is mobile and ubiquitous. Learning is interdisciplinary and enriched by the available learning resources within the community. School’s doors open early and close late with extended seasonal hours approaching a full time, year round community learning center.

These new patterns of teaching and learning require new architectural patterns to support them. We must be creative and think beyond the tra-

ditional school of uniformly sized, forward facing classrooms, long, double-loaded corridors, isolated, teacher workspaces, and uninviting administrative offices. These recurring elements in school architecture reflect the message that “school is a place where young people comply with authorities who dispense information, not a place where they actively construct knowledge and create meaning.”⁵¹ We need to see group collaboration and focused individual work areas, flexible use spaces allowing teachers and students to adapt to their learning needs, comfortable seating around movable tables, shared office space within classroom clusters, students circulating in wide interior streets with abundant natural light, and welcoming spaces easily accessible to students and community.

We must confront the design assumption embedded in our schools that requires a comprehensive array of facilities and instead connect the school to its community whose assets provide facility and program opportunities. “Rather than retreat from the community,” we must “teach into it, reflecting a new philosophy of learning that emphasizes connections with the adult world.”⁵² Education is evolving rapidly and facility design and planning must be adaptable and flexible enough to create a range of educational models. We think these patterns have the ability to inspire designs that adapt for the future rather than replicate the past, and shed light on a wide range of issues that guide designers, administrators, teachers and parents to create schools that support all students in learning.

ENDNOTES

1. Business Fellows (Ball State University, 2007): <http://www.bsu.edu/students/careers/fellows/>. “Business Fellows is an innovative program putting Ball State faculty and student expertise into action to benefit Indiana organizations and communities across the state.”
2. John Zeisel, *Inquiry by Design* (New York: W. W. Norton & Company, 2006).
3. Christopher Alexander, Sara Ishikawa, and Murray Silverstein, *A Pattern Language* (New York: Oxford University Press, 1977).
4. U.S. Department of Education, “Six Design Principles,” *Schools as Centers of Community: A Citizens’ Guide for Planning and Design*, (Washington D.C., National Clearinghouse of Educational Facilities (NCEF), 2000), http://www.edfacilities.org/pubs/scc_Six_Design_Principles.pdf

5. Pam Harwood, Syllabus for ARCH 301 and ARCH 401 (Ball State University, 2007, 2008).
6. Pam Harwood and John Hudson, eds., *Charter School Patterns of Innovation: A New Architecture for a New Education* (Muncie, IN: Ball State University, 2007).
7. National Association of Charter School Authorizers (NACSA). Invitation to NACSA's 2008 Conference. Indianapolis: National Association of Charter School Authorizers Conference.
8. Randall Fielding and Prakash Nair, "Patterns of Innovation: Design Share Awards Program," <http://www.designshare.com/index.php/awards/> (accessed May, 2008). DesignShare is an on-line resource for innovative school planning and design. <http://www.designshare.com/index.php/home>
9. Randall Fielding, "Best Practice in Action: Six Essential Elements that Define Educational Facility Design." *CEFPI Planner* (December 2006): 1-7.
10. U.S. Department of Education, "Six Design Principles," 12.
11. Pam Harwood, *Charter School Patterns of Innovation*, 3.1.5.
12. Great Schools by Design, "Schools Designed for Learning: The Denver School of Science and Technology," Video and Resource Guide presented by American Architectural Foundation, Knowledge Works Foundation and Target, 2006.
13. Prakash Nair and Randall Fielding, *The Language of School Design: Design Patterns for 21st Century Schools* (Minneapolis: Design Share Press, 2005), 97-101.
14. Pam Harwood, *Charter School Patterns of Innovation*, 3.1.8.
15. California Science Center Charter School and Amgen Center for Science Learning, <http://www.californiasciencecenter.org/> (accessed May, 2008).
16. Tod Schneider, Hill Walker and Jeffrey Sprague, *Safe School Design: A Handbook for Educational Leaders Applying the Principles of Crime Prevention Through Environmental Design (CPTED)* (Chelsea, MI: The Association of Educational Publishers, 2000).
17. Prakash Nair, "30 Strategies for Education Reform," (Minneapolis: DesignShare.com, 2003).
18. V. Bergsagel, T. Best, K. Cushman, L. McConachie, W. Sauer, and D. Stephen, *Architecture for Achievement: Building Patterns for Small School Learning* (Mercer Island, WA: Eagle Charter Press, 2007).
19. Randall Fielding, "Best Practice in Action," 3.
20. Tod Schneider, et. al., *Safe School Design*.
21. Pam Harwood, *Charter School Patterns of Innovation*, 3.2.13.
22. Stephen Kliment and Bradford Perkins, *Building Type Basics for Elementary and Secondary Schools* (New York: John Wiley and Sons, 2001).
23. Pam Harwood, *Charter School Patterns of Innovation*, 3.2.14-15.
24. Prakash Nair, "30 Strategies for Education Reform."
25. Prakash Nair and Randall Fielding, *The Language of School Design*.
26. Randall Fielding and Prakash Nair, "Patterns of Innovation."
27. U.S. Department of Energy, "Energy Smart Schools: Energy Efficiency and Renewable Energy" (Washington D.C.: U.S. DOE, 2008). <http://www.eere.energy.gov/buildings/energysmartschools/>
28. Sustainable Buildings Industry Council (SBIC), *High Performance School Buildings: Resource and Strategy Guide* (Washington, D.C.: Sustainable Buildings Industry Council, 2004).
29. Heschong Mahone Group, "Daylighting in Schools: An Investigation into the Relationship between Daylighting and Human Performance," (Fair Oaks, CA: Heschong Mahone Group, 2002).
30. Jeffrey Lackney, "33 Principles of Educational Design" (Washington D.C.: National Clearinghouse for Educational Facilities, 2003). <http://www.edfacilities.org/>
31. U.S. Department of Energy, *The National Best Practices Manual for High Performance Schools* (Washington D.C.: U.S. Department of Energy, 2007). <http://www.doe.gov/bridge/>
32. Gregory Kats, Greening America's Schools: Costs and Benefits. (Washington D.C.: A Capital E Report, 2006). <http://www.cap-e.com>
33. Pam Harwood, *Charter School Patterns of Innovation*, 3.3.21.
34. David Sokol, "Field of Vision: Case Study on Benjamin Franklin Elementary School." *Architectural Record: Schools of the 21st Century* (January 2007).
35. Pam Harwood, *Charter School Patterns of Innovation*, 3.3.22-23.
36. Sidwell Friends School Website, "Green Middle School Tour," <http://www.sidwell.edu/> (accessed June, 2008).
37. U.S. Department of Education, "Six Design Principles," 13.
38. *ibid*, 13.

39. American Architectural Foundation (AAF) and Knowledge Works Foundation, *Report from the National Summit on School Design: A Resource for Educators and Designers* (Washington D.C.: AAF, 2005), 34-37, 46-50.

40. Pam Harwood, *Charter School Patterns of Innovation*, 3.4.36.

41. American Architectural Foundation, *Report from the National Summit on School Design*, 48.

42. Pam Harwood, *Charter School Patterns of Innovation*, 3.4.31.

43. Steven Bingler, "Less Is More: Learning Environments for the Next Century," *New Horizons for Learning*. http://www.newhorizons.org/strategies/learning_environments/bingler.htm

44. Darren Springer, "Integrating Schools into Healthy Community Design," *Issue Brief NGA Center for Best Practices* (May 2, 2007): 1-9. <http://www.nga.org/>

45. American Architectural Foundation (AAF) and Knowledge Works Foundation, *Design for Learning Forum: School Design and Student Learning in the 21st Century* (Washington D.C.: AAF, 2007), 34-35.

46. Pam Harwood, *Charter School Patterns of Innovation*, 3.5.38-39.

47. John Watson, Interview with developer of Herron High School in Indianapolis, IN, October, 2007.

48. Pam Harwood, *Charter School Patterns of Innovation*, 3.5.40-41.

49. John A. Johnson Achievement Plus Elementary School Website, <http://johnsonel.spps.org/> (accessed August, 2008).

50. Great Schools by Design, "Schools as Centers of Community: John A. Johnson Achievement Plus Elementary School," Video and Resource Guide presented by American Architectural Foundation, Knowledge Works Foundation and Target, 2005.

51. V. Bergsagel, et al., *Architecture for Achievement*, 8.

52. *ibid*, 118.

Ball State University Student Business Fellows:

Kelly Flanigan, Architecture; Sarah Hockemeyer, Graduate School; Brittany Pohl, Psychology; Jovan Dixon, Psychology; Matt Van Soest, Architecture; Matt Goyak, Architecture; Kim Vo, Teachers College; John Hudson, Graduate School; Eric Gerding, Architecture; Dan Smith, Business College; Alex Sulanke, Urban Planning; Alcario Samudio, Architecture; Nick Swinehart, Architecture; Brittany Rasdall, Graduate School, and Neil Weber, Architecture.

Special Thanks to our Community Sponsors:

Dr. Larry Gabbert, Director, Office of Charter Schools, Ball State University-Sponsored Charter Schools; Keith Marsh, Assistant Director, Ball State University-Sponsored Charter Schools, Peter Tschaepe, Accountability Compliance/ Finance Coordinator, Ball State University-Sponsored Charter Schools.

Jason Bryant, Regional Director of IMAGINE Charter Schools, Imagine MASTer Academy; Guy Platter, Principal, Imagine MASTer Academy; Robert Guillaume, Principal, Anderson Preparatory Academy, Janet McNeal, Principal, Herron High School; John Aytekin, Director, Indiana Math and Science Academy; Kevin Handley, Principal, Paul Runyon, Galileo Charter School; William Ignatowski, Principal, Danielle Sleight, Charter School of the Dunes; Dr. Gwendolyn Adel, Principal, Thea Bowman Leadership Academy; April Goble, Principal, KIPP LEAD College Preparatory Academy.