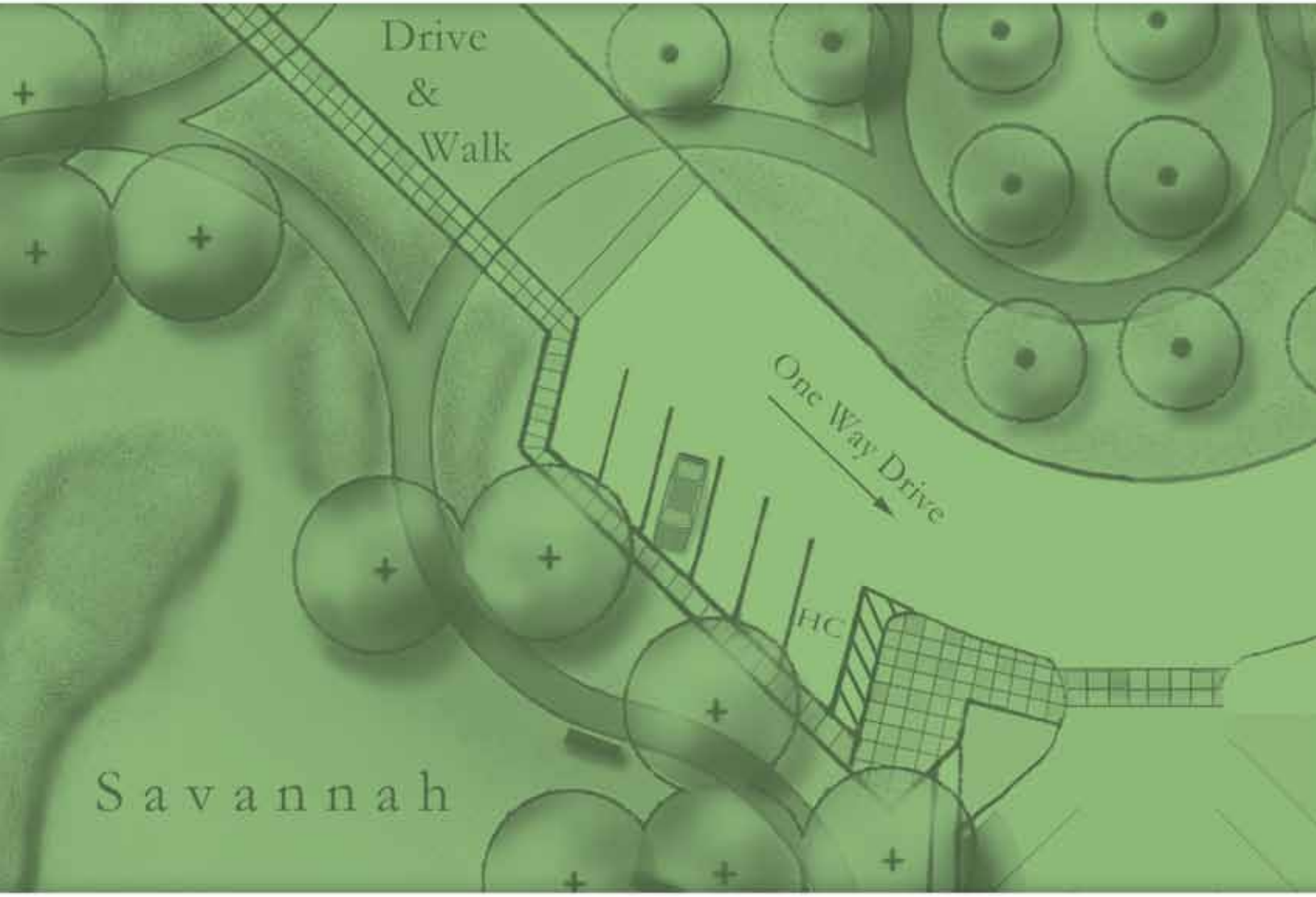
SCHOOLYARDS AS RESOURCES FOR LEARNING AND COMMUNITIES:

A Design Handbook for Kentucky Schools



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Introduction

Overview

The purpose of this handbook is to provide information that aids in the design and development of schoolyards in Kentucky. It describes the schoolyard concept and provides an outline for how to conduct a participatory schoolyard redesign process driven by community input. It discusses why participation is integral to the redesign, how to engage community members in the process, and lessons learned from the Louisville Schoolyards Project facilitated by the City Solutions Center in Louisville, Kentucky. The report describes various elements of schoolyard designs and provides examples of other schoolyard initiatives, particularly the Boston Schoolyard Initiative, the impetus for the projects in Louisville. It also outlines strategies for implementing the resulting design, particularly maintenance and sustainability issues, fundraising, and utilization of community resources. The report also raises the environmental questions that need to be considered throughout the various phases of the design and construction process.

The anticipated audience for this report includes school administrators, planners, architects, teachers, applied academic researchers, and any other individual or organization interested in developing schoolyard spaces. While this manual was developed to inform redesign projects in Kentucky, much of the information contained in this report is relevant to any participatory schoolyard redesign project, regardless of location.

Impetus for Schoolyard Redesign

The Importance of Schoolyards

Schoolyards are an underutilized resource at most schools considering that they can provide new and innovative learning opportunities for schoolchildren, as well as a social space for the surrounding community. Outdoor learning areas offer an opportunity for students to continually shape their environment. The schoolyard therefore becomes a dynamic, ever changing experience throughout the course of the day, changing seasons, and passing years. As early as 1916, John Dewey wrote about the importance of experiential learning, linking educational content with the learner's lived experience.[1] The emerging emphasis on the outdoor space as a context for experiential, hands-on learning has led to the development of numerous schoolyard redesign projects across the country, and internationally.

Schoolyards may include a number of features such as outdoor classrooms, native landscapes, play areas, walking paths, and spaces for school and community events

1 Dewey, J. (1916), *Democracy and Education: An introduction to the Philosophy of Education*, New York: Macmillan.

such as farmer's markets, neighborhood festivals, or picnics. Schoolyards provide a valuable opportunity for children to interact with and learn about nature, which is particularly relevant for children in urban settings who may not otherwise have such an opportunity. The book *Last Child in the Woods* by Richard Louv helps to crystallize the emerging and disturbing concept that a growing number of children are losing touch with nature, and that valuable life lessons can be learned from experiencing the outdoor environment. Louv proposes that direct interaction with nature is essential for healthy childhood development, and may help to address growing trends such as childhood obesity, attention disorders, and depression.[2]

Research on Schoolyards

There is a growing body of research linking outdoor learning with the development of environmentally responsible behaviors, improved mental health, reductions in behavioral problems, and other positive effects for schoolchildren. A study by the Mauricio Gaston Institute for Latino Community Development and Public Policy at the University of Massachusetts in Boston looked at the correlation between schoolyard improvements and standardized test scores. The results suggested that there was, in fact, a positive association between aggregate school achievement and schools that participated in the schoolyard initiative. The researchers proposed several reasons for the higher test scores at the schools with improved schoolyards. Among them was the possibility that the schoolyard improvements promoted innovative teaching approaches that accompanied the creative inclusion of non-traditional settings provided by the outdoor learning and activity areas. Increased performance could be attributed to an increase in student and teacher morale. The schools may also benefit from the effect of increased visibility and interest driven by the renovations, including stronger ties to partners outside the school district who may provide additional resources beyond the schoolyard projects. In addition, schools that received the improvements may also attract the best teachers and administrators.[3] In 2004, researchers from the National Foundation for Educational Research and King's College London in the United Kingdom conducted a review of the available literature on outdoor learning. They reported that schoolchildren participating in learning on school grounds and in community settings acquired greater confidence, renewed pride in their community, stronger motivation toward learning, and a greater sense of belonging and responsibility.[4] Together, these findings provide an impetus for the development of outdoor classrooms and multi-functional schoolyard spaces that have the potential to bring about positive change for both students and communities.

2 Louv, R. (2005), *Last Child in the Woods: Saving Our Children from Nature Deficit Disorder*, Chapel Hill, NC: Algonquin Books.

3 Lopez, R., Campbell, R., & Jennings, J. (2008), *Schoolyard Improvements and Standardized Test Scores: An Ecological Analysis*, Research Brief, Boston, MA: University of Massachusetts, Mauricio Gaston Institute for Latino Community Development and Public Policy.

4 Rickinson, M., Dillon, J., Teamey, K., Morris, M., Choi, M.Y., Sanders, D., & Benefield, P. (2004), *A Review of Research on Outdoor Learning*, London, UK: National Foundation for Educational Research and King's College London.

Schoolyard Redesign Projects

Schoolyard redesign projects have been undertaken at a number of schools, both here in the United States and internationally. This section outlines examples of several schoolyard design and development initiatives, describing their history, purpose, and function. By understanding how existing schoolyard projects have been developed, we can better design and plan new projects without "reinventing the wheel." In addition, each schoolyard is unique and serves specific purposes within each community. The projects listed here include the Boston Schoolyard Initiative; Learning Landscapes in Denver, Colorado; The Edible Schoolyard in Berkeley, California; and two schoolyards in Kentucky. The list of initiatives presented is certainly not exhaustive but provides a few examples of what a schoolyard project may look like in practice.

The Boston Schoolyard Initiative

The Boston Schoolyard Initiative began in 1995 as a public-private partnership and provides funding for the redesign and construction of six schoolyards each year within the Boston Public School (BPS) system. To date it has improved over 70 schoolyards in the Boston area, preschool through high school. The initiative is composed of three core elements: community organizing, teaching and learning, and maintenance and sustainability. Local foundations underwrite a $15,000 organizing and planning grant that provides funding for part-time organizers who conduct community outreach, facilitate public meetings, and bring resources and expertise to the redesign process. Participants in these processes include both potential users of the schoolyard and others that may be affected by its redesign.

Boston Schoolyard Initiative outdoor classroom at Gardner Elementary School

Each schoolyard is designed as a place for recreation, creative play, and academic learning. An outdoor learning space can provide unique learning opportunities for experiential or hands-on learning, as well as providing new ways of learning for students who do not perform as well in a traditional classroom setting. Learning spaces within the schoolyard are designed around the BPS core curriculum to insure that lessons learned in the outdoor spaces link directly to those taught in the classroom.

The initiative has spurred a number of partnerships between schools and other organizations within the community. These organizational partners provide expertise, resources, and professional development opportunities for students, and include universities, museums, foundations, and city agencies. Organizational and community partnerships are also important in the maintenance of the schoolyards. To insure that the newly-developed spaces are sustainable and do not fall into disrepair, a *Shared Maintenance Protocol* is developed between the city and community

members to outline maintenance responsibilities. By centering the redesign process on community involvement, the organizers hope that community members and organizational partners will feel a sense of ownership in the schoolyard and have an interest in keeping it maintained. The maintenance protocols typically state that the city will provide baseline maintenance such as routine inspection and repairs of equipment, trash clean-up, lawn care, lighting, signage, and repair of hard surfaces. Community members and partners typically organize seasonal clean-up events, engage in planting activities, and report vandalism and suspicious activity in the schoolyard to authorities. Using this model, the Boston Schoolyard Initiative has been successful at building and maintaining schoolyards across the city, as well as organizing communities through the process.[5]

Learning Landscapes, University of Colorado, Denver

Learning Landscapes (LL) began in 1992 as a collaboration of interested individuals including parents, school members, neighbors and landscape architecture graduate students with a common interest in the rehabilitation of the Bromwell Elementary School playground in Denver, Colorado.[6] The LL program has developed into a broad-based public-private partnership directed by graduate landscape architecture students from the University of Colorado at Denver. The aims of the program are to create schoolyards that encourage outdoor learning, foster community ownership of the local schools, provide recreational areas for children of all ages, and create aesthetically pleasing environments that serve as assets to the school and local community.

Photo by Design Concepts
Learning Landscapes schoolyard redevelopment at Ellis Elementary School in Denver

Since the completion of the Bromwell Elementary School schoolyard in 1998, the LL initiative has transformed 52 urban public elementary school playgrounds in Denver into appealing, safe multi-use parks that are designed to fit the needs and preferences of the local community through a collaborative process.[7]

The original 23 schools that benefitted from LL were funded by the federal Community Development Block Grant program and were all located in underserved Denver neighborhoods. In 2008, Denver voters approved a general obligation bond that calls for every elementary schoolyard in the Denver Public Schools (DPS) system to be developed into a Learning Landscape. The LL program at the University of Colorado at Denver is funded by grant money from the Robert Wood Johnson Foundation, the National Institutes of Health, Live Well Colorado, the Denver Office of Economic Development, and others.

5 Boston Schoolyard Initiative, see http://www.schoolyards.org/.
6 Brink, L. & Yost, B. (2004), "Transforming Inner-City School Grounds: Lessons from Learning Landscapes," *Children, Youth and Environments*, vol. 14, no. 1, pp. 208-232.
7 Learning Landscapes, see http://learninglandscapes.org/.

One of the newest elements of the Learning Landscapes agenda is an urban farm pilot program. This initiative was developed because two LL sites had remaining acreage after the traditional LL components were implemented. Citing DPS sustainability initiatives, LL argued that the extra land would best be used as farmland. The farmers are working with DPS to select crops that can be served in the schools' cafeterias. The farmers must handle the food according to normal food service regulations and the food must meet the same quality standards as the other commercial vendors from which DPS would typically purchase their food.

If school systems outside of Denver are interested in implementing a program similar to LL there are several points to consider. According to Cate Townley, Sustainability Coordinator for LL, one must know who is going to use the space. The playgrounds should be open to the community after school hours. It can be difficult to get past the sticker shock of these types of projects so it is beneficial to have champions from the community who will help explain the benefits of these types of built environments in terms of health, physical education, science, and socialization. Bond funding has been incredibly successful in Denver. Maintenance and programming (events and activities) also must be considered, particularly in budgeting after construction.[8]

The Learning Landscapes initiative has helped Denver become one of the most park-accessible cities in the United States. The repurposing of old elementary and middle school grounds through bond funding into landscaped community parks during after-school hours has helped create neighborhood amenities with trees, playground equipment, gardens, and artwork.

The Edible Schoolyard, Berkeley, California

The Edible Schoolyard at Martin Luther King Jr. Middle School in Berkeley, California, began when restaurateur Alice Waters was quoted in a local article pointing out that the school, in her opinion, embodied everything that was wrong with our world and how our society treats children. The principal happened to read the article and reached out to Alice to find out what she would do to turn the situation around.[9] The conversation resulted in the establishment of the Edible Schoolyard (ESY) in 1995. The ESY is a one-acre garden and kitchen classroom program operated by the non-profit organization Chez Panisse Foundation at Martin Luther King Jr. Elementary. Once surrounded by a bleak, underutilized schoolyard, Martin Luther King, Jr. Elementary has become a destination for educators, health professionals, international delegates and many others, with the program hosting over 1,000 visitors a year.[10]

The mission of the ESY is to create and sustain an organic garden and landscape that is wholly integrated into the school's curriculum, culture, and food program. ESY involves students in all aspects of farming the garden and preparing, serving, and

8 Townley, C., email and telephone interview, May 14, 2010.
9 Waters, A. (2008), *Edible Schoolyard: A Universal Idea*, San Francisco: Chronicle Books.
10 The Edible Schoolyard, see http://www.edibleschoolyard.org/.

eating food as a means of awakening their senses and encouraging awareness and appreciation of the transformative values of nourishment, community, and stewardship of the land.[11] According to Shaina Robbins, ESY Program Coordinator, "Our mission has stayed the same throughout our 14 years and that is what has allowed us to be so successful."

In addition to this mission, the ESY has established a set of objectives for students that participate in the program. Students learn about how the food choices they make affect not only their own health, but also the health of the community and the environment. The lessons learned at the ESY encourage healthy and responsible food choices and environmental stewardship.

Robbins has some advice for schools looking to replicate what the ESY has accomplished: "Start small—it has taken us 14 years to get this big. Start small so you can start with a small budget. You have to create teacher and administration buy-in. You start with creating a few small lessons to show the teachers how this process will work and how it will benefit the students. You also have to address some basic sustainability and maintenance issues. Who is going to take care of the garden during the summer? Is this person a paid employee? It is very important to create a volunteer pool."

According to Robbins, "The students have labs for the majority of their classes and this allows the students to have hands-on models for their lessons. This hands-on learning is very helpful for the students' comprehension and retention. The program makes the kids explore what they eat and discover the differences between processed foods and foods fresh from the garden. The program improves the students' self-esteem by empowering them to make healthy choices."[12]

The ESY provides the students the opportunity to feel a sense of ownership and success. It demonstrates how the cycle of food works from tilling the soil to planting seeds to harvesting crops and finally to preparing meals. It teaches the students life skills including teamwork and active listening. The program also teaches the students about sustainability and the seasonality of food and demonstrates the connection between themselves, food, school, and community.

The Edible Schoolyard initiative is a bit different from the schoolyard redesigns mentioned throughout this handbook in the sense that the primary focus is on a garden and kitchen approach to improving children's health. This approach to redeveloping school grounds not only for learning but for integrating healthier dietary habits is timely and relevant in an age where today's children have a shorter life expectancy than the previous generation, and with childhood obesity becoming a national epidemic.[13] Many schools and school systems are unable to consider the retooling of their cafeteria and food services in the short term. However, the ESY model should

11 The Edible Schoolyard, see http://www.edibleschoolyard.org/mission-goals.
12 Robbins, S., telephone interview, May 13, 2010.
13 Ludwig, D. S. (2007), "Childhood Obesity—The Shape of Things to Come," *New England Journal of Medicine*, vol. 357, no. 23, pp. 2325–2327.

be considered when approaching a schoolyard redesign, even if simply to acknowledge the potential benefits of growing food on-site for educating children about the difference between an eggplant and a zucchini. Much can be gleaned from introducing a productive garden combined with creative approaches to the teaching of curriculum lessons.

Outdoor Classrooms in Kentucky

Providence Montessori School, Lexington, Kentucky[14]

Acknowledging their students' innate curiosity about nature, the Providence Montessori School constructed an outdoor classroom to develop an attitude of stewardship for the earth, nurture a respect for all living things, experience the interconnected relationships in nature, and learn the value of collaborative effort. The school's outdoor classroom includes a butterfly garden and a Native American organic vegetable garden, and each classroom has its own garden patio. Caring for the outdoor space is part of the learning process, as children take turns maintaining plants and bird feeders, and composting and recycling are an integral part of each school day. Providence also offers a Junior Master Gardener Program to its elementary students.

West Marion Elementary School, Loretto, Kentucky[15]

In 1998 a group of teachers and volunteers partnered with a local conservationist to establish an outdoor classroom at West Marion Elementary School. The project's goals included establishing a variety of habitats to attract wildlife using native plants, creating a setting that extended the learning environment beyond the classroom, providing meaningful experiences involving the parents and surrounding community, increasing schoolwide collaboration activities, and tapping into state resources for training and field trip opportunities. A committee led by teachers and the director of the school's Family Resource Center assessed and prioritized the needs of the school, students, and community. The committee conducted a parent survey to determine what volunteer and mechanical resources were available for the space, and partnerships with local organizations were formed to provide additional educational opportunities and resources for the project. The school received grant funding for construction of portions of the outdoor learning area, which includes a wetland, a hummingbird and butterfly garden, and an annual crop and warm season grasses, as well as a greenhouse.

14 Providence Montessori School, see http://www.providencemontessoriky.org/academics/outdoor-classroom.php.

15 West Marion Elementary School, see http://www.wmes.marion.k12.ky.us/outdoor_classroom.htm.

The Schoolyard Design Process

The Design Process

Creating a schoolyard that provides an exciting and challenging environment within which students explore, learn, and play is a wonderfully rewarding endeavor for everyone involved. As mentioned in the *Community Participation* section of this handbook, the gathering of stakeholder input is critical not only to the ultimate contextual appropriateness of a well-considered final design for the school's outdoor spaces but also to the establishment of a sense of shared successful participation by the design process's participants. Each player has his or her role to play in assisting the professional site designer in "getting it right." Each brings a unique perspective, concern to be addressed, wish to be granted and perhaps even a referential childhood memory that, taken together with those of all the other participants, give the project's designer inspiration and practical direction.

The management of the schoolyard design process is best rendered by a small Design Team generally having five to seven members. The project manager role is effectively handled by a consulting individual, rather than a school system employee, who is adept at coordinating the work of others, maintaining a record of the project's meetings and progress, and ensuring that clear and timely communication with all team members is established and maintained. The school system should be represented on the design team by one to three individuals, depending on the size and complexity of the school's administrative and teaching staff. A school representative with the authority to review and approve basic design concepts enables the process to move forward efficiently. A school system's environmental education coordinator and/or a teacher charged with overseeing the coordination of environmental learning within the school's curriculum are the other essential school representatives on the design team. The school system's architect or facilities manager provides invaluable practical input as a team member. The schoolyard's principal designer is instrumental in translating the analysis of existing conditions and the collective input of all stakeholders into one or more conceptual design solutions for the ultimate redevelopment of the schoolyard. Generally, a registered landscape architect best fills this role on the team. This profession's academic training and project experience typically provide for a balanced approach that understands site design, natural systems, architectural design, sustainability design guidelines, material choices, cost estimating, and aesthetics. Also suitable, if their professional experience includes similar project types, are certified planners and professionally registered architects. Finally, one team member must be adept at creatively facilitating broad-based stakeholder meetings, review sessions and public presentations. This task could be carried out by any one of the above described team members or may be someone's primary responsibility.

The design process that is employed for projects of all sizes and complexities typically proceeds through a series of three steps: Inventory, Analysis, and Synthesis. These steps, more fully described below, are generally followed in the order listed;

however, it is important to understand that returning to a previous step or steps in order to verify facts, reconsider previous assumptions, or revisit stakeholders' input is both permissible and encouraged. This iterative approach to the design process will ensure the end product is well-considered, responsive to the opportunities and constraints of the school's site, and understanding of the various hopes, concerns, and even limitations that have been expressed by everyone involved.

Inventory

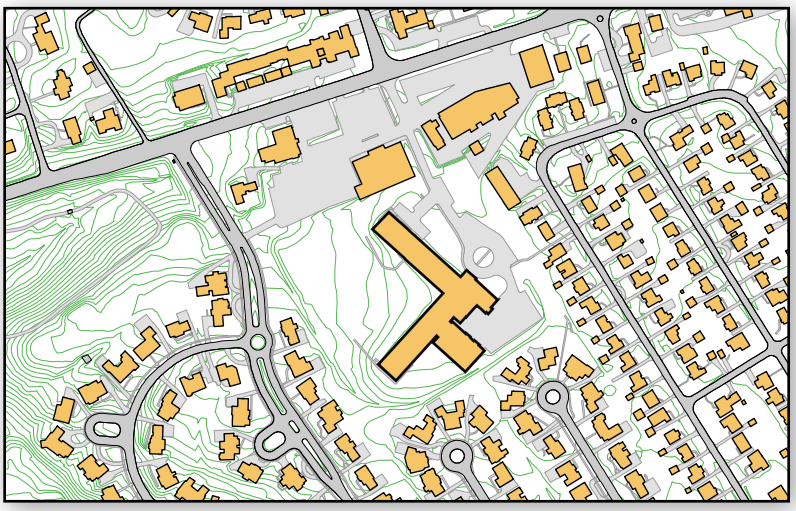
This step's aim is to gather as much useful information as possible relating to the upcoming project, within a reasonable amount of time, as possible. As listed below, the types of information to gather and the methods of collection are quite diverse. Some of these categories provide the perfect opportunity for engaging the project's community of stakeholders at this early phase. The act of critically "looking" at their school's existing outdoor environment, and having only the assigned task of documenting these existing conditions, allows teachers, administrators, participating students and parents, even local community business owners, the chance to objectively investigate what "is" and will perhaps encourage them to begin thinking about what "could be." A thorough collection of the following information about existing conditions will prove an invaluable resource throughout the design process.

Photographic Survey

This is a simple exercise involving walking about the schoolyard and photographing the various areas of the grounds, the entrances to the school, the conditions of existing sidewalks, driveways, and parking areas, the views of the school from the surrounding neighborhood and streets, and the various views from the school's grounds out to the streets and neighbors. This photo collection assists those involved with the image gathering in understanding the project's starting point and potential. Other project stakeholders can be shown this photo documentation as part of their introduction to the schoolyard's redesign initiative.

Site Survey and Base Map

A professionally-prepared survey of the school's property is essential. The surveyor's final base map should be drawn to an appropriate engineering scale, such as 1"=20' or 1"=50' so that the base map is approximately 24" x 36". Existing site elements to be located and drawn include, but are not limited to, property lines, adjacent roads, all building footprints, location of building entrances, sidewalks, driveways, parking areas, exterior



Base map example of Chenoweth Elementary, Louisville, Kentucky

steps and ramps, streams or bodies of water, trees labeled as to species, trunk diameter and canopy spread, shrub masses, direction of North, and site topography showing contours at one-foot intervals.

Stakeholder Input

Information regarding existing schoolyard use, current levels of broader community engagement, maintenance issues, environmental concerns and opportunities, and the wide variety of hoped-for future additions or deletions to amenities and activities provided by the school's exterior spaces is most effectively gathered through direct input by the full spectrum of the school community's stakeholders. A variety of information gathering techniques can be used to ensure the most far-reaching and thorough effort. Questionnaires, student drawings, and open-to-the public workshops, wherein participants collectively answer questions, draw their ideas, and exchange information with each other and the design team, prove to be most effective and engaging. There is an extremely high correlation between the level of community participation and stakeholder involvement during this Inventory phase of the design process and the quality and approval of the final conceptual design for the improved schoolyard and outdoor classroom spaces. See the Community Engagement section in this report for a more detailed discussion of community participation.

Site Physical Features

As a venue for natural systems exploration and learning, it is imperative that every schoolyard's classroom and garden spaces are sensitively located and designed. Inventory of the existing environmental factors of the entire school property ensures sensitive and informed decisions regarding the locations of specific garden types, the configurations of proposed new pathways, the selection of plant materials, and the ability of the various components of the new and improved schoolyard to relate to one another as a coordinated and integrated system. Among the information to be gathered and illustrated on a project base map are on-site existing vegetation, prevailing wind directions throughout the various seasons, solar orientation, seasonal shadows cast by existing buildings and major trees, natural storm water drainage patterns, soil types, views into and out of the site, vehicular and pedestrian connections to adjacent neighborhoods, relationship of the school's main entrance to the street, and existing amenities that are identified as either expendable, movable, or required to remain in place.

Though this area would make a great outdoor classroom, it is in shadow most of the year, a factor that must be taken into account in designing a successful use of the space

Analysis

The analysis of all the information gathered in the Inventory Phase, as described above, is at once a simple process but also one of utmost importance as the bridge between Inventory and Synthesis. The listing of existing conditions is a straightforward documentation of observable, measurable site characteristics. It is the design team's task to bring to bear their knowledge and experience as they evaluate all these given conditions in order to create for themselves a set of clues and guidelines that will help shape the final schoolyard concept plan. For example, the fact that a school building may be three stories tall is easily observable and recorded in the Inventory phase. The resulting shadow cast by the building throughout the day and its variations throughout the seasons needs to be evaluated and considered when determining appropriate use of the area cast in shadow. Shade may be a highly valuable opportunity if trying to find a good location for a summer picnic area or for a garden that will demonstrate the variety of native woodland floor or shade-loving garden plant materials. However, that same shade would be a limiting constraint when the site designer is attempting to identify appropriate areas for community vegetable growing plots or a native perennial butterfly garden. Similarly, a low-lying lawn area on the school's grounds that is identified as a trouble spot by the school's grounds staff or the physical education instructor who can never use the area after a rainfall, may become a prized opportunity for the location of a rain garden or native wetland rich in natural processes and educational and environmental stewardship potential.

Careful analysis of all the existing site characteristics helps the design team become familiar with the schoolyard and its intricacies. This familiarity, in turn, gives them both the knowledge of the site's weaknesses and greater design freedom to fully utilize its strengths.

Synthesis

The final step of this three-step design process provides the design team the opportunity to create a pragmatic response to the programmatic requirements of the school's site and environmental education curriculum. The "art" of creative site design comes into play in this stage as well. The site components, spaces, gardens, outdoor classrooms, and play areas must be designed as a coherent and integrated system. These outdoor rooms can be designed in such a way that passage from one to the next occurs along a continuous pathway that seamlessly leads the student or neighboring resident through the entirety of the schoolyard. Finding ways of using the same space for multiple purposes is challenging but especially important for schools with limited outdoor space. Choices of the shapes and sizes of spaces, the selection of specific plant materials, the application of both hard and soft ground surfaces, the arrangement of features and plants in either a sterile, lifeless manner or an inventive, artistic configuration can make the difference between creating a standard pedestrian response to programming or a vibrant, engaging environment that enlivens the students' interactions and provides a welcoming garden for use by the broader community. To encourage the integration of the school within the learn-

ing and recreational lives of its students, staff, and neighbors, it is critical to create a destination that provides stimulation for the inquisitive mind, entertainment for the recreation-seeking body, and respite for the soul.

Design Considerations

Throughout the Synthesis phase of the schoolyard's redesign process the design team will undoubtedly visit and revisit initial design solutions, stakeholder input, alternative arrangements of outdoor spaces and their contents, and even the specific choices of materials to be specified in the final schoolyard concept. The following categories of design considerations should come into play either at a specific point in the design process or as an overriding philosophy throughout the effort. They serve as a minimal set of checks and balances to help the design team comply with the practical aspects of a schoolyard redesign and to expand their responses into the realm of environmental stewardship and artistic expression.

Outdoor Spatial Design

There are two primary, seemingly conflicting considerations to keep in mind while planning for outdoor classrooms and gardens. Unfortunately there are few numeric guidelines that will direct decision-making in this area. The task is to create outdoor spaces and pathways that will amply accommodate the intended primary use, while at the same time being at a scale that promotes the desired level of intimacy with the subspaces of these outdoor rooms and the materials used in their creation.

Outdoor classroom at Gardner Elementary in Boston is approximately 2,000 square feet

- Outdoor classrooms and gardens for intense learning should be in the 1,500 to 2,500 square foot range. Smaller gardens of 400 to 500 square feet can be designed for specific learning environments.
- The primary outdoor learning classroom should be enclosed with a fence that allows views into and out of the space but controls ingress and egress via a secure gateway. The act of passing through a gate into this classroom confirms to the students that this is a special "room" that is dedicated to specific types of activities such as teacher-led conversations about plants and insects, raised-bed gardens, natural environments, and the various learning instruments contained here. This area is large enough to accommodate a class of 25 elementary school students yet small enough to be easily supervised. There is a freedom of movement and exploration encouraged within the recognized boundaries of this learning garden.

- Within all outdoor classroom and learning spaces should be opportunities for students to roam about a series of looping pathways. Dead end paths are to be avoided.
- Sitting areas for students working as a group should be no more than 50 square feet. Semi-circular areas of boulders or upright log seats should be arranged with a radius of 8 to 10 feet.
- Pathways within each of the learning gardens or classrooms can range from 3 to 5 feet in width.
- Walkways that connect the various outdoor spaces and that provide walking and recreational opportunities for community residents should be 8 feet wide.

Accessibility

Particular attention must always be made to guarantee equal, easy, and safe access to all parts of a schoolyard's series of outdoor rooms, gardens, learning areas, and play fields. Complete guidelines, including spatial requirements and recommendations for site design, can be found online at the U.S. Department of Justice's Americans with Disabilities Act (ADA) web site.[16]

The following recommendations serve to illustrate the general nature of design considerations that will insure an enjoyable and safe use of public schoolyards for all visitors:

- Avoid the use of steps and stairways throughout the site.
- If steps are desirable due to their potential to be used as built-in seating areas or for aesthetic reasons, always provide an alternate, ADA-compliant ramp access to all points of the site.
- Pathways throughout the school site should have a minimum clear width of 36 inches.
- Select ADA-compliant materials for use in the construction of paths and other use areas. Long runs of walkway should be hard surfaces, such as permeable asphalt or permeable concrete. Small use areas or gathering spaces may have more environmentally-friendly materials, such as fine mulch or finely-crushed compacted stone.
- Gateways should have latches installed at ADA-compliant height for use by visitors using walkers or wheelchairs.
- Garden elements such as raised plant beds, demonstration gardens, and work tables should be built at a height appropriate for wheelchair bound users.
- Parking areas closest to the most heavily used areas of the schoolyard should always contain the regulated number of ADA parking spaces and be designed with particular attention to proximity and safety.

16 See http://www.ada.gov/.

Paving and Surface Materials

Closely associated with accessibility considerations is the appropriate selection of ground plane paving and surfacing. A full spectrum of paving materials chosen for inclusion in each schoolyard's redesign is desirable. Permeable asphalt, permeable concrete, finely crushed stone, and unit pavers such as natural brick or precast pavers that are laid atop a compacted sub-soil, crushed stone base, and sand setting bed layer cake, all provide a durable, sustainable surface that allows for safe, easy, ADA-compliant access. Some of these materials, if already on-site and scheduled to be removed, can be salvaged, cleaned and reused to further demonstrate the school's interests in sustainable and economically-responsible construction practices.

A variety of other, softer surfacing materials can be creatively employed to differentiate use zones, emphasize changes in environment, and to provide a built-in spectrum of materials that can be used in materials science lessons. For example; students can easily learn about the basic differences in physical properties of materials such as bricks, concrete, grass, or mulch by recording the surface temperature of each on a sunny day.

An example of the use of multiple surface materials and colors to create distinct areas within an outdoor classroom

The more durable materials such as brick and concrete would be most suitable for heavily traveled pathways or large areas designed to frequently accommodate large gatherings. Easily replaced or replenished surface materials, such as mulch and crushed stone, can be used in those smaller outdoor classroom settings where a change of ground texture is not only a lesson in material choices but a visual clue to distinguish the use of these areas from those of the larger grass play fields or asphalt courts.

One final consideration in surface material selection is the possibility of using the construction of parts or all of the redesigned schoolyard as an opportunity for participation by students, teachers, parents, local businesses, and local organizations. Saturday morning work sessions centered on spreading a new layer of mulch on a butterfly garden's pathways or installing a small brick terrace for use by wheelchair-bound students in the community garden can easily be supervised by one or two skilled construction-savvy school staff members. A day's participation in such events can lead volunteers to new friends, new skills, increased awareness of the school's importance to the community, increased personal commitment to the sustainable practices being demonstrated throughout the schoolyard, and perhaps even an on-going engagement with the school as a community resource and supporter.

Environmental Influences

Wind, sun, rain, snow, heat, cold, and seasonal changes and rhythms are all easy lessons that will be casually observed and intentionally learned throughout each student's time spent engaged in outdoor classrooms. School curricula provide opportunities for studying the effects of each of these natural phenomena.

Of special interest to the schoolyard site design team may well be rain and the contemporary efforts being made by water sustainability initiatives everywhere to better protect and utilize this most precious of natural resources. The incorporation of strategically sized and located rain gardens provides a beautiful natural landscape and an opportunity for learning about native perennials and current storm water management techniques, and serves to demonstrate a sustainable attitude adopted by the school and easily translated for homeowners' use.

Rainwater collection via above-ground cisterns or rain barrels can demonstrate an alternative technique for mitigating storm water runoff and utilizing the captured water for garden irrigation between rain events. The rain barrels can be incorporated into the schoolyard's outdoor learning areas as pieces of functional garden art. Each class or grade in the school can have its own rain barrel to design, decorate, monitor, and maintain.

Plant Material Selection

Six words can summarize the two most important considerations for a schoolyard's plant material: Native, Native, Native, . . . and . . . Variety, Variety, Variety!

As a demonstration of sustainable stewardship, it is obvious and critical that the natural materials used in the construction and implementation of a contextual site design be local and have minimal maintenance requirements once established. Abundant information resources for Kentucky native plants can be found on the internet or by contacting a local University of Kentucky Cooperative Extension Service staff member.[17] Another good resource and connection to additional sources of information and plants is the Kentucky Native Plant Society (KNPS).[18]

The redesigned schoolyard has the opportunity and obligation to display and incorporate a great diversity of plant and plant association types in order to make the environmental education curriculum as rich as possible. This is not to say that there should be one of every kind of plant native to Kentucky in the gardens. However, the design team's expertise and creative talents should be employed to introduce a wide variety of plant material types. Deciduous large shade trees, medium and small flowering trees, evergreen trees and shrubs, native flowering shrubs, perennials, grasses, and native plants suitable as groundcover should all be able to find a home in the various learning gardens and public spaces. Aesthetic choices and design sensibili-

17 More information is available at http://ces.ca.uky.edu/ces/.
18 More information is available at http://www.knps.org/index.php.

ties will dictate whether a particular plant is best utilized as a single showy specimen plant that represents the best of its type or if a thousand of a particular plant should be planted to emphasize its special place within the realm of Kentucky's native plant kingdom and its equally impressive suitability for creating a strong design statement that enlivens the schoolyard and makes it a community showpiece.

Outdoor Spatial Compatibilities

Schoolyards are inherently loud, active places. Parents' cars and the school system's buses arrive early and late in the day to deliver and pick up students. Cars and trucks appear throughout the day delivering visiting parents, tradespersons performing repairs, guest teachers and presenters, and supplies ranging from paper clips to prepared food for school lunch. Outdoor play time is optimally scheduled to give students access to the wide-open outdoors for healthful physical exercise. This is inevitably accompanied by laughter, shouting, running, bragging about who came in "first" or who kicked the ball the farthest, or exhortations to run faster to home base because the ball is being thrown in from the outfield.

How then can we design equally active, but buffered, spaces that are intended for activities of different kinds? The design team must be vigilant in arranging outdoor classrooms, learning gardens and active recreation areas in a manner that allows for simultaneous noisy physical activity and quiet, mental activity. Thoughtful spatial arrangement and separation of incompatible uses can mitigate the majority of these conflicts. Locating the outdoor classrooms away from traffic and parking areas is a reasonable response. So, too, is the intentional placement of community gardens, structured play areas and any areas designated to be used for community-wide events such as farmer's markets or neighborhood festivals in the more visible areas of the schoolyard, adjacent to the obvious site access points and primary circulation routes.

When the physical separation of use areas is impossible due to small sites or environmental factors, cleverly designed visual and noise buffers can take the place of distance as an insulator. Architectural elements such as walls or a garden shed or equipment storage building can be located to effectively insulate one space from another. Plant materials, such as a dense evergreen hedge or a massing of tall native flowering shrubs can also be employed to help minimize the sight and sound distractions of the kickball field from the butterfly garden.

Locating the quieter outdoor learning areas, such as a water garden or butterfly garden or native rain garden with bird feeders, adjacent to ground level classroom windows provides an additional resource for the classroom's students and teachers. These borrowed landscapes, when viewed through the windows, provide a daily connection to the world outside and the lessons thereof. Days of inclement weather that would otherwise cancel an excursion to the outdoors can be salvaged lessons in quiet observation techniques by using remote thermometers, rain gauges, and binoculars to monitor the activities in the garden from a warm and dry observation station.

Elements of Schoolyard Designs

There are numerous elements that make up the foundation of a good schoolyard design. Some features are essential while others may be important, but not completely necessary for a successful schoolyard. Ultimately, the dimensions and specific needs of the site as well as budgetary limitations will dictate what aspects of schoolyard design can be incorporated into the plan. The following elements have been found to enhance the outdoor learning spaces of schoolyards.

Design Elements

Enclosures

Gateways

The schoolyard entrance plays an important role in the perception of the schoolyard, the school, and activities that happen within. As the initial point of access to the schoolyards, special attention must be paid to the design and function of the primary entrance to elicit a sense that the schoolyard is a special and cared-for place. Though there are many ways to approach gateway design, creating a unique and artistic entryway that provides security, is exciting, and is welcoming are the most important aspects of the design. Groups like the Boston Schoolyard Initiative and Learning Landscapes commission artists to design special gateways for each project. The BSI takes the design even further and purposefully designs the entryways with smaller "portal" gates that adults and children climb through to create an even greater sense that the schoolyard beyond is a special place for children. These portals can be opened like a gate to allow access to visitors in wheelchairs as well as to get wheelbarrows and other larger objects in and out of the space.

Decorative gateway entrances designed to a child's scale help to signify that you are entering a special space for them

Fences

The schoolyards in Boston with the least amount of fencing have been the most successful at deterring vandalism. This may seem counter-intuitive, but it appears that restricting access to sites creates an invitation for mischief that an open and public space does not. With that in mind, each school site has its own issues and concerns. If a fence is needed for security or desired for aesthetics, thought should be put into how to incorporate the most appealing fence possible. Chain-link fences with smaller than typical grid size and coated with black plastic offer a high level of security while negating some of the less aesthetically pleasing effects of bare metal. Aluminum picket fencing can offer an architectural

enhancement to the site and blend with neighboring residential uses. Although considerably more expensive, iron fencing and the use of brick for foundation walls and columns greatly increases the appeal of the school grounds, even if just used judiciously along the most highly visible segments of the campus.

Structures

Shade Structures

Depending on the exposure to the elements of the particular schoolyard, shade structures and other buildings can provide relief from the sun or rain that will help extend the usability of the outdoor space during inclement weather. Shade structures can also provide organized meeting spaces for classes as well as the community during non-school hours. Structures can utilize organic material such as grape vines and other, preferably native, climbing plants to create a canopy over a wooden frame, or more solidly-built materials can be used such as polycarbonate panels, traditional wooden roofs with shingles, and other varieties of roofing material.

Post and beam station

Post and Beam Station

Post and beam stations are structures that support learning opportunities in physics and other curricular elements by providing the framework to attach educational equipment—such as pulleys, weathervanes, or thermometers—on different sides for temperature changes from shadow to sunlight. The BSI incorporates such structures in all of their more recent schoolyard projects. It serves as a simple, yet very useful tool to enhance and support learning opportunities.

Greenhouse

A greenhouse offers year-round use of the schoolyard for horticultural explorations, lessons in seedling preparation, plant propagation, and perhaps even the growing of tender native species that require a more protected micro-climate that cannot be provided anywhere else within the school's site. A basic hoop house, constructed of an aluminum or plastic pipe frame and heavy-duty plastic sheeting can extend the growing season of herbs and green leafy vegetables well into the fall. Early spring production of vegetable seedlings allows for the planting of typical summer crops earlier in the season so that students can see the growth, if not the harvest, of plants such as tomatoes, peppers, and beans before the end of a typical school's calendar year. A simple solar greenhouse, built with commonly available materials such as straw bales for insulation and black-painted water jugs for heat collection on sunny days in the non-summer months, provides all the advantages of a more traditional structure plus the opportunity for sustainability technology lessons.

Artwork

Banners

Incorporating large images and messages within the schoolyard can help to build community awareness for events or other information as well as display artwork by students and others in the neighborhood, thereby developing a sense of ownership in the space. Learning Landscapes has developed a relationship with a local billboard company to obtain old canvas and utilize the unused side for students to create artwork that hangs in the schoolyards. Banners can also be used to let people know that the schoolyard redevelopment is underway with student art and site maps of the space, helping build excitement and let the neighborhood know what is going on.

Public Art

From the design of an ornamental gateway to the introduction of banners in the space, artwork enlivens the schoolyard and creates a complex environment that welcomes visitors and promotes a sense of pride. Beyond the gateway and banners, public artwork should be considered as part of the overall design of the site with areas set aside for works created by both the students and faculty as well as the community. Artwork can simply be aesthetic or become educational opportunities. Incorporating works of art by the students, faculty, and community provides an added incentive for everyone to watch over the schoolyard to reduce the chances of vandalism and other negative forces affecting the site.

Artwork illustrating the geology of Kentucky using different types of minerals found in those areas

Plants and Gardens

Gardens

Depending on the amount of space, ground quality, and other site specific factors, the introduction of a garden can add a great deal of visual interest, educational opportunities, and in some cases provide healthy, locally grown food to the school cafeteria. A prime example of the depth of possibilities gardens offer is apparent in the Edible Schoolyard program. The school uses the garden to an extraordinary degree not only to allow students the ability to watch the garden grow, but also to participate in the garden and further utilize the produce to learn about healthy diets, food preparation, and other associated learning opportunities.

Orchards

Organized stands of trees can provide a number of educational opportunities such as math exercises based on grids and measuring distances. Orchards can provide a welcome design element to soften entryways to school grounds and provide a sense of entering a forest. Native fruit or nut trees provide edible horticulture lessons. Particular attention should be paid to the appropriate tree variety selected. Form, size at maturity, neatness, disease resistance, and amount of required maintenance are factors that should be considered.

Shallow water garden at Chenoweth Elementary School in Louisville, Kentucky

Water Gardens

In some school districts water features are not possible due to liability issues and other policies. However, there are numerous configurations of water features that can offer a wide range of learning opportunities as well as aesthetic appeal. These can be as simple as a stone covered depression that collects water during rain events but is relatively free of standing water. More costly to install and maintain, but offering multiple science lessons, are small solar-powered pump re-circulating systems that include a naturalistic spring, water fall, stream, and pond complete with fish and frogs. Where possible, this inclusion of small streams and aquatic life can provide even greater opportunity for examination and learning. Securing the area around a water garden with a decorative fence provides safety and creates an individual outdoor classroom that is visually and physically separated from other outdoor activities.

Raised garden beds help to create manageable spaces

Raised Beds

Unlike in-ground gardens, raised beds are smaller, more controlled areas of exploration. Raised beds, typically constructed of untreated cedar for durability, offer a chemical-free structure to house soil and plant material. Heavy-duty plastic lining can be placed inside the structure before filling with safe, tested garden soil. Typical dimensions of a raised bed are 4 feet by 8 feet, but they can be modified to suit particular spaces and needs. By choosing raised bed dimensions that are multiples of 4, it is possible to maximize the usage of the wood and minimize waste since most standard lumber building materials are readily available in standard 8 foot lengths. Two-inch-thick boards should be used to provide the structural integrity to contain the soil without the need for excessive additional interior support. Nominal board widths of 4, 6, 8 or 10

inches can be used. If community volunteers or students are involved with the construction of the boxes, the 6- or 8-inch width boards provide the most efficient construction with an acceptable weight per board. The final height of the boxes can vary from a minimum of 12 inches to a maximum of 24 inches. On a 20-inch height box a 2- by 10-inch board attached to the top of the sides can provide a small seat for those planting, weeding, harvesting, observing, and learning in the raised bed.

Native Plants

Native plants provide a number of benefits to the schoolyard. Native plants are part of an ecological web that has adapted together and is capable of thriving within the local climate, including its extremes. Native species enhance our sense of place and provide the majority of a region's landscape character and bio-identity. They can be used as a tool for learning about biodiversity and historical uses of the plants. Native plants have developed to work with the local soil and water conditions, which can aid in the absorption and cleansing of water. Learning about and growing native plants can serve as a tool to promote a deeper understanding and respect for the land.

Trees

Native trees provide multiple long-term benefits to the schoolyard and its users. Most deciduous trees can take decades to reach their true splendor. They provide opportunities for learning about the yearly cycle of growth and the various aspects of flowering, fruiting, photosynthesis, fall leaf coloration, and even the aesthetic quality and structural form that are more evident in their winter bareness. Sustainability contributions of deciduous trees include water absorption after significant rainfall, cooling effects of shade, air cleansing action of carbon-dioxide uptake and oxygen production, and the "green building" component of shading windows in summer while allowing warming sunlight infiltration in winter. Evergreen trees provide similar plant studies lessons as well as providing a structural skeleton to outdoor space year-round. How properly placed evergreens serve to protect buildings and people from cooling winter winds can be demonstrated.

Furniture and Equipment

Wooden work table used for water-based experiments

Worktables

Worktables are an important part of schoolyard design when incorporating learning into the outdoor environment. These tables can be configured as needed for a particular site, but should be multi-functional. Easily constructed using standard building materials such as 2 by 4s and 4 by 8-foot plywood sheets (3/4 inch minimum thickness) this apparatus can be used as a garden preparation table, a platform for demonstrating characteristics of different soil types and even as a "water table" for learning about soil and rock erosion.

Boulders and wooden logs provide great natural seating opportunities for children to study and enjoy the outdoor learning space

Seating

The material and placement of seating is a very important aspect of the schoolyard. Consider using materials such as boulders and large logs for natural seating that adds variation and complexity to the site. Seating should be placed with consideration of the users, typically elementary school children. The spacing of the seating should create a circular area approximately 8 feet in diameter for this user group. This is a comfortable organization for young children to communicate with one another. Seating should also be placed in an organic fashion when possible to create areas of communication as well as being dispersed throughout the schoolyard to create places where students can observe their various surroundings.

Seating for adults, including teachers and others who may not use the boulder and log seating, can be placed in strategic locations, such as along extended walking paths, around tree trunks in orchards, and near water features and other gardens. Wood benches with backs are the most comfortable but require periodic maintenance and renewal.

Planters

Planters provide places to grow plants without the need for extensive green space. These can serve as ornamentation for entryways and areas where people gather as well as help delineate pathways and other features of the schoolyard.

Compost Bin

Compost bins can be built out of simple materials or can be purchased as tumblers and other variations. Open compost bins require thoughtful construction related to creating rodent-proof enclosures, especially if food waste is included in the bin. Children learn about the process of decomposition, but also about environmental awareness and sustainability practices, through the use of a compost bin. Studies comparing the native soil in an unimproved garden bed with that of a bed that has been enriched through the regular addition of compost created on-site will help students learn lessons of soil texture, soil nutrients, soil water-holding capacity and the advantages of letting natural decomposition of household and yard waste provide an invaluable resource. Augmenting the composting operation with red wiggler worms adds yet another science lesson to the mix.

Pathways, Paving, and Topography

Pathways

An important organizational tool for the design of a schoolyard is the use of pathways. These provide access throughout the site and delineate areas that are meant to be viewed and not trampled. Pathways can be designed to offer pedestrians the ability to gauge distances to promote healthy exercise such as the incorporation of a quarter-mile path. When developing pathways through the schoolyard, particular attention should be paid to creating loops and avoiding dead ends to provide complete access to the site. Pathway materials should be considered that allow for the greatest amount of access, including provisions for wheelchair access whenever possible. Path widths can vary from 3 feet in small garden zones to 8 feet where the pathway is used for main access, exercise, and strolling throughout the schoolyard.

A newly-installed concrete pathway loop at Cane Run Elementary School provides complete access for all students to the numerous planned learning zones around the approximately 10-acre schoolyard

Paving Material

The materials available for paving are numerous. Choosing the right material depends a great deal on the individual site, the particular learning area or garden within the schoolyard's collection of spaces, the required degree of accessibility, the preferred aesthetic look and quality, and even the construction budget available. Formal entrances to the school and schoolyard areas that anticipate heavy use are best served by hard paving materials such as concrete or asphalt. Keep in mind that pervious materials can contribute to the sustainability of the site by

limiting run off. Concrete can be scored in interesting patterns, integrally-colored to create a more artistic look than the standard plain white surface, and surfaced in a variety of styles and textures to avoid the ubiquitous standard broomed finish. Asphalt, too, can be colored or painted to create patterns, learning tools for math lessons, and running/walking lanes for physical education (see below). Precast paving units, such as natural brick and concrete pavers, can be used to provide solid, fully ADA-compliant surfacing. If constructed using a compacted sub-soil, crushed stone, and sand setting bed method, then this surface allows water to infiltrate through it, minimizing the amount of rain run-off and assisting in ground water recharge and irrigation of nearby plants.

Permeable concrete surface being installed at Cane Run Elementary School in Louisville, Kentucky

Softer paving materials provide visual clues about the different uses and behavior in different parts of the schoolyard. Shredded hardwood bark mulch and finely-crushed local stone provide walking surfaces that are more appropriate to the “softer” use areas of a schoolyard such as an enclosed learning garden, community garden or raised bed learning area, water gardens, and perennial or butterfly gardens.

Colored asphalt can provide additional opportunities for outdoor learning experiences

Asphalt Coloring

Though part of the goal of a revitalized schoolyard it is to reduce asphalt and replace it with green spaces, hard surfaces serve very useful purposes and often are desirable features in a schoolyard. A technique used in many schoolyard redesigns is that of coloring the asphalt. This could be done in several ways, but the focus should be to create interesting and useful features within the hardscape to soften the effect of the asphalt. Four-square and hopscotch courts, grids and lines for math lessons, a compass, running tracks and other features can be incorporated into the asphalt to extend the use and visual interest of the school grounds.

Topography

Variation in the ground plane can help to increase the interest of a space as well as serve as an organizational tool. The inclusion of berms (earthen hills) can create an elevated viewing point for areas around them. Slight slopes introduced into walking paths or small learning garden areas built on an elevated plain provide variation in the experience of walking that quarter-mile path or a sense of separation from the rest of the schoolyard.

Traditional Schoolyard Elements

Although not specifically aimed at providing environmental education opportunities, there are a number of site elements typically found in the traditional schoolyard that deserve mention and consideration for inclusion in any new or redesigned schoolyard. Playgrounds, multi-purpose grass play fields, age-appropriate sports courts—such as basketball, kickball, and four square, and standard distance running tracks—can all have a place in the designs for a school's reconfigured outdoor spaces. Where space is limited and a full complement of schoolyard elements is desired, it is possible to creatively design spaces that can serve double duty. Also worth noting is that the activities provided by pre-manufactured playground equipment, which is easy to select from a manufacturer's catalogue and install, can be economically and creatively provided by using natural materials such as logs, dressed timbers, river-washed rocks, and boulders. Creative play areas provide multiple valuable opportunities for exercise, exploration and learning.

Traditional schoolyard equipment like slides and other play equipment can still be incorporated into a redesigned schoolyard, though distinct delineations between the play and learning areas is recommended

Teaching Tools

While the design elements of schoolyards represent physical features that can be used for outdoor learning and recreation, teaching tools are more specific features that may be included in a schoolyard space that stem from a class's curriculum. For example, tools such as rain gauges, sundials, worm bins, soil sampling tubes, and rotting logs all relate directly to specific learning modules within a curriculum. These teaching tools may be permanent fixtures within an outdoor classroom or school garden, or may be supplemental and stored indoors when not in use. Choosing the appropriate and relevant teaching tools depends on the grade level, modules being taught, and the overall aims of the curricula at the school. Some examples of teaching tools and the modules they aid in teaching are listed here. The examples provided in Table 1 on the next page are from the Jefferson County Public School system in Louisville, Kentucky, and represent teaching tools for Kindergarten through fifth grades.

Table 1. Schoolyard Teaching Modules and Equipment by Grade Level[19]

Grade	Module	Equipment
Kindergarten	Animals	Worm bin, garden pond, dip nets
	Properties	Sorting tables/sorting squares/sorting tubes, seesaw
	Sunshine and shadows	Sundial
First Grade	New plants	Garden bed (timbers, soil, corner braces), hand trowels, watering cans
	Solids and liquids	Garden pond, compost bins, sorting screens, watering cans
	Air and weather	Thermometers, rain gauge, anemometer, wind vane, paintings or sculptures of moon phases
Second Grade	Insects	Insect field nets, bug boxes, insect identification guides, magnifying lens, insect aspirators, butterfly gardens, successional growth area
	Changes	Garden pond
	Pebbles, silt, and sand	Magnifying lens, screen sieve set, sorting pit with variety of aggregate sizes
Third Grade	Structures of life	Garden bed (timbers, soil, corner braces), hand trowels, watering cans, hand lens, identification quides, dip nets, fruit orchard, native grass/prairie plot, arthropod rock cover shelters
	Sound	Bird song identifier
	Earth materials	Soil thermometers, soil sampling tube, plastic trays, soil profile pit, soil color chart, rock garden
Fourth Grade	Food chains and webs	Bird feeder station, binoculars
	Land and water	EnviroScape nonpoint source material (riparian kit, groundwater component), garden pond with solar powered recirculating stream, erosion mound
	Motion and design	Trundle wheels
	Magnetism and electricity	Compass, orienteering course, magnet set, compass rose
Fifth Grade	Diversity of life	Compost bins, Kentucky forest tree trail, plant press, rotten log study area
	Weather and water	Complete weather station, Kestrel pocket weather station, wetland

19 Our thanks to Bryan Thompson of the Jefferson County Public Schools Center for Environmental Education for providing this information.

Community Engagement

Why Include Community Participation?

This handbook was developed from the perspective that engaging community members in the decision-making process is critical to the success of schoolyards. Here, we define community members as all stakeholders in the process, including but not limited to teachers, school officials and staff, neighborhood residents, representatives from area businesses and organizations, and local public officials. Community participation is important for several reasons:

- to insure that the project's outcomes serve the needs of both the school and the surrounding neighborhood;
- to provide local expert knowledge about how the school and neighborhood function;
- to provide local expert knowledge about the school curriculum and teaching methods;
- to build relationships among school staff and neighborhood residents, businesses, and organizations; and
- to promote community development and action from an environmental justice perspective within neighborhoods.

The Boston Schoolyard Initiative found that involving neighborhood residents and other community stakeholders in decision-making and planning resulted in outdoor spaces that were better utilized, monitored, and maintained by both neighbors and community groups. The relationships developed during the design processes between stakeholder groups and schools in Boston typically last well beyond the processes themselves.

Participants

The community engagement process is most successful when it includes numerous stakeholder groups in the schoolyard redesign. This includes representatives from the school such as teachers, parents, students, and school staff. In addition, neighborhood stakeholders should also be invited to attend, including: area residents, workers and business owners, and representatives from neighborhood-based organizations or groups. Public officials and representatives from government can be particularly helpful, as they have specific knowledge about regulations, financing mechanisms, and the feasibility of proposed ideas. Each stakeholder group is outlined in more detail below:

Public meeting for the Portland Elementary Schoolyard Project in the school's library

Meeting with teachers of Cane Run Elementary School to determine their needs and wants in a schoolyard redevelopment project

Teachers

This category includes not only teachers at the school where the redesign is to take place, but also teachers who have developed or worked with outdoor learning spaces at other local schools. Inviting teachers who have worked with outdoor learning spaces at other schools can help avoid potential problems with a design that can only be realized from experience. Teachers at the school of interest can provide useful information about various aspects of school life and functions. They also must be present to provide input on particular needs and schoolyard features that could link with their respective curricula to enhance learning opportunities.

School Administration and Staff

Administrators at the school level, such as principals, magnet and curriculum coordinators (if applicable), Family Resource Center directors (if applicable), and other school staff are important to include not only because of their knowledge of the school's daily operations, but also because they have unique decision-making power about school functions and provide an important link to the broader school system administration. School system administrators and staff are also integral to the process, including curriculum designers, architects, maintenance crews, community outreach coordinators, fundraisers, and other relevant individuals. Working closely with the school system's administration insures that the redesign process and final schoolyard plan are in concert with school policies and educational goals.

Public Officials

Public officials, representatives, and government employees include representatives from the city council, the planning department, the police department, utilities companies (sewer, water, electric, gas), the parks department, the local office of the Environmental Protection Agency (EPA) or other local environmental organizations, and the local housing authority (if the school is located in or near public housing). They can provide educational opportunities for students and community members, relevant contextual information about local regulations and projects, and often provide resources for the process or school in the form of volunteer labor, funding, or other types of outreach efforts.

Students

Students are often overlooked as a resource for design projects, but they will be the primary users of the schoolyard. Students from elementary through high school age all have important ideas that can contribute to a more enjoyable and successful schoolyard design, and they are often the most creative thinkers in the room at public redesign meetings. Even elementary students can have important input on which

learning and recreation features best suit their individual needs and learning styles. Participating in redesign processes such as these can also be empowering and provide a unique learning experience about civic engagement, collaboration, and design.

Area Residents

Neighborhood or area residents are also potential users of the schoolyard space. Community needs can be addressed through the redesign by creating spaces for exercise, events, and community gardening, among others. Residents can provide input on how the redesigned schoolyard can serve the broader needs of the neighborhood, as well as provide additional perspectives on maintenance, safety, and site history. Residents of the blocks surrounding the school may be particularly eager to get involved in the process, as the redesign may impact the view from their properties.

Business Owners

Owners and employees of businesses in the neighborhood should also be invited, as they may be able to provide resources for the project such as funding, volunteer labor, or materials. The process can also build relationships between businesses and the school, providing learning opportunities for students in the community.

Other Neighborhood Stakeholders

Representatives from other neighborhood groups or organizations should also be present. Staffs of neighborhood newspapers, libraries, museums, and other nonprofits have unique perspectives and resources to contribute to the schoolyard redesign and student learning.

The Participatory Process

The participatory process should be structured in a way that promotes collaborative decision-making, creative problem-solving, and the sharing of information among all parties involved. It is important to remember that both process facilitators and community participants each have valuable skills and knowledge to bring to the redesign process. The goal is to develop a schoolyard plan that serves everyone's needs, and this cannot occur without hearing and considering everyone's ideas. As is the nature of any collaboration, not all ideas can be implemented, particularly those that come into conflict with one another, but it is the responsibility of all parties involved to find common ground and agree on a redesign that meets everyone's needs to the greatest extent possible.

Participants discuss their breakout groups' ideas regarding specific issues of the schoolyard redesign

There is no one process that functions for every schoolyard redesign process. It will vary depending on time, funding, the scale of the redesign, and how easily consensus can be reached. Generally speaking, the process should include the following four components:

1. an **introduction** to the project, including the purpose, facilitation team, and timeline;

2. a **design charrette or workshop** where participants can engage in creative problem-solving to develop ideas for the schoolyard layout and features;

3. a **reflective component** where plans developed by facilitators and designers are presented back to the participants for feedback and changes; and

4. a **presentation or dissemination** of the final schoolyard redesign plan to all involved and other interested parties.

Some of these components can be accomplished simultaneously in a single meeting, while others may take multiple meetings to accomplish. Every effort must be made to insure a broad base of participation at community meetings. Strategies for accomplishing this will vary depending on the neighborhood or area where the school is located. However, community meetings should be public and open to anyone who is interested in attending to promote inclusion and a diversity of perspectives.

Environmental Education

A schoolyard redesign process that includes community members can provide a valuable opportunity for education and outreach on environmental protection and safety issues. While school staff and community members may recognize the importance of safe soil and site materials, they often do not know what questions to ask. By researching the history of the site, as well as nearby uses that could potentially contaminate the site, participants learn how soil contamination can occur. Discussions around these issues should include potential solutions to these problems, both site-specific and systemic. Education can also focus on lesser-known concerns, such as soil that is brought in from off-site for features such as raised planting beds or landscape manipulation. School officials may assume that this soil has already been tested, but this is often not the case. Off-site soil can be just as contaminated, if not more so, than soil already on the site. Discussions can focus on what types of materials that may be used in schoolyard construction need to be tested or assessed because of safety concerns. By integrating environmental education into the community meetings and the redesign process as a whole, participants learn that these are important issues that impact their children's health and safety, as well as their own. It can potentially serve as a catalyst for other environmental discussions both in the classroom and the community as a whole.

Implementation

Environmental Protection and Safety Issues

When executing a schoolyard redesign it is essential to insure that soil and other materials on the site are safe for use by the schoolchildren, as well as any other potential users of the site. As part of the hands-on learning process that makes outdoor learning spaces unique, children will dig, explore, and play in the soil. For those schoolyards that include a vegetable or herb garden, the soil will also be used to grow foods that schoolchildren or others may eat. This contact with soil and ingestion of foods produced in the soil highlights the importance of a schoolyard that is free of high levels of contaminates that may be harmful to human health. This section will outline the key environmental issues that need to be addressed when designing and constructing schoolyard features, and discuss the schoolyard redesign process as a valuable opportunity to provide environmental education to community members, school staff, and other participants.

Know Your Risk of Soil Contamination[20]

Soil contamination can pose a substantial health risk to schoolyard users. While soil may be contaminated from a previous use of the school site, contaminates can also arrive from neighboring or nearby properties by way of air particulates, water runoff, or groundwater running beneath the soil. In addition, soil that is brought in from offsite is not always safe. All soil on schoolyard property, regardless of its origin, should be tested and, if necessary, remediated to avoid potentially serious health problems. In order to determine the potential risk, and type, of soil contamination it is important to research the history of the site, test the soil, and then proceed to remediate the soil if necessary.

Know the Site's History

Researching the past uses of a school site can help determine the probability and type of soil contamination. For example, most schools in urban areas should at minimum be concerned about lead in the soil, while suburban schools may need to pay attention to lingering herbicides and pesticides that might have been used on former farmland. A site that was previously industrial or home to a type of business that used chemicals or pollutants such as a dry-cleaner, gas station, auto repair shop, or garbage dump should be examined carefully. Even if a site has always housed a school, materials that could contain contaminants such as lead in paint, PCB's in caulking, or asbestos in floor tiles, insulation, or roofing used during construction processes and remodeling can be a source of soil contamination. Attention must also be

20 For more information about soil contamination and remediation, as well as a list of resources and agencies, see Turner, A. H. (2009), *Urban Agriculture and Soil Contamination: An Introduction to Urban Gardening*, Practice Guide #25, Louisville, KY: University of Louisville, Environmental Finance Center, EPA Region 4, available at http://cepm.louisville.edu/Pubs_WPapers/practiceguides/PG25.pdf.

directed to neighboring or nearby properties, which can also affect the schoolyard's soil. Soil contaminates can travel through the air, in water runoff above ground, or in water moving below ground from other properties in the area. Determining what types of contaminates may potentially exist in the schoolyard can help determine what types of soil tests are most appropriate for the site. Even performing the site history can be integrated into a learning opportunity for the students and community members. Students and local residents can use their local libraries and court records to examine Sanborn maps and deeds which are often the first documents used to determine past use of the property and the potential for a history of contamination. The surrounding residents are also a good source of information about a site's history. By including them in the redesign process, one can often get information about a site that might not be in official documents.

Soil Testing is Important

Schools should always test the soil in areas where schoolyard features will be constructed. Even if it is decided to do gardening in raised beds, the other uses of the schoolyard property need to be considered as children and others will continue to have contact with the soil and precautions should be taken. The school district may have a soil policy that will determine if you are permitted to grow edible food in anything but a raised bed or container with imported soil. Even if the soil is imported, the source of soil for raised beds and containers should be examined and the soil should be tested.

There is no single method for testing soil that is appropriate in every context. There are different ways of testing soil depending on what the area will be used for. Generally, soil testing involves a process of selecting and mapping soil sampling sites, collecting and packaging the soil samples, and sending them to a laboratory for testing. The number, location, and depth of the soil samples will depend on what the areas of the schoolyard will be used for (i.e., play areas versus gardening areas). The cost of soil testing varies and is dependent on the number of samples and what contaminates are being tested for. Most areas have local or regional soil testing laboratories, such as the University of Kentucky Soil Testing Labs and Microbac Laboratories Inc. in Kentucky. The University of Kentucky Agricultural Extension Office can assist with implementing a soil test. An additional source for assistance with site assessment is the Kentucky Department of Environmental Protection through their Brownfields Program. While the Kentucky Brownfields Program's focus is not schoolyards, they can help direct schools to additional resources.

Soil Remediation

If soil testing reveals levels of contaminates that are considered unsafe, there are a number of remediation options depending on what the site will be used for. While there is no single measure for what levels of contamination are considered safe, many institutions and states, as well as the U.S. Environmental Protection Agency, have their own guidelines for determining what levels are acceptable. Remediation options are numerous and particular to the needs of a specific site depending on the

type of contamination, what the areas will be used for, and what is cost-feasible for the project. All of the options for remediation of seriously contaminated sites should be done in consultation with an environmental contamination specialist.

- Capping: Creating a barrier to the contaminated soil is possible depending on the kind of contamination you are dealing with. If the contaminant is not mobile and will not travel with water, then putting down some sort of barrier with an appropriate layer of new soil can provide protection from exposure.
- Soil mending: This technique allows for the removal of contaminants from the soil, essentially cleaning or "mending" it. Soil is typically removed from the site and "washed" off-site or at a plant. Once the soil is clean it is returned to the site. This process can be expensive and requires the appropriate disposal of the chemical residue following washing.
- Composting: Compost can be added to the soil, which is a quick and inexpensive fix but generally does not remove the contaminants. For some contaminants this is appropriate because it lowers the bioavailability of the contaminant (the ability of plants to absorb it) by diluting its presence in the soil. This technique can also be used in creating raised beds, where plants can grow in the compost without the roots entering into the contaminated soil below.
- Phytoremediation: This is a process where plants are used to extract or transform contaminants in the soil. It must be done carefully with consideration to what will be done with the plants used in the process.

An important point to note is that the current state of research about uptake in plants, and bioavailability of contaminants in general is not conclusive. There remains debate about what levels of exposure to a variety of contaminants are safe, what to do with plant material used in phytoremediation, the extent of exposure routes, and efficacy of composting as a remediation tool and how necessary testing really is for all sites. Despite this uncertainty in the research community, it remains important to continue to ask questions about the soil safety and quality of each site and not to take safety for granted.

Stewardship and Maintenance

One of the most important considerations when developing a plan for a new schoolyard design is how it will be maintained. Schoolyards that include outdoor classrooms and learning areas typically include unique features that school maintenance staff is not used to dealing with, such as water features, painted concrete surfaces, or decomposing logs. Some features, such as raised planting beds, will be maintained as part of the teaching and learning process for students. However, others will require additional effort. Since school budgets are often strained without the added time and expense of maintaining these unique outdoor features, one solution is to partner with area residents and organizations for help.

The Boston Schoolyard Initiative has successfully addressed this issue by developing a *Shared Maintenance Protocol* with the neighborhoods surrounding the new schoolyards.[21] These protocols serve as an agreement on who will perform what maintenance tasks and how often these tasks will be performed. Three primary groups are involved: the schoolyard group (those who participated in the redesign process), students and teachers, and the school system's office of facilities management.

- Schoolyard group: This group can organize volunteer opportunities such as schoolyard clean-ups, replacement plantings, repainting of murals/maps/games, watering during holidays and vacation periods, and reporting and vandalism or suspicious activities.
- Students and teachers: Supervised by teachers as part of their learning experience, students may participate in watering, planting, painting, and picking up litter on school grounds.
- School facilities management: The school system performs the "baseline" maintenance of the schoolyard, such as inspections, repair and maintenance of play equipment, removal of trash and graffiti, lawn care, snow removal, lighting, signage, and sweeping and repair of hard surfaces.

School officials, teachers, residents, and other participants will need to meet and agree on a maintenance plan that suits everyone's needs. The more a community is invested in, and uses, the newly-redesigned schoolyard space, the more likely they will be willing to help maintain it and keep watch over it. This is another example of why resident and neighborhood stakeholder involvement in the design process, as well as allowing residents access to the schoolyard space, is critical to the success of the project.

21 Boston Schoolyard Initiative, see http://www.schoolyards.org/.

Case Studies:
The Louisville Schoolyards Project

The two case studies presented here are part of the *Louisville Schoolyards Project*, a partnership between Jefferson County Public Schools (JCPS) and the City Solutions Center (CSC) at the University of Louisville. The purpose of the project was to create conceptual redesigns for two schoolyards in the JCPS system, Portland Elementary School and Cane Run Elementary School. Both are magnet schools with a focus on environmental studies, and it was hoped that the redeveloped schoolyards would reflect and enhance the environmental curriculum at each school, as well as help to reconnect the schools with their surrounding communities.

The City Solutions Center was contracted to produce a conceptual site plan for each of the two schoolyards for Jefferson County Public Schools. The final reports for each school included not only site plans but additional relevant information about the schools and their surrounding neighborhoods, cost estimates for labor and materials, and recommendations that emerged from the community meetings and the redesign process. It is important to note that the use of the site plans was at the discretion of the school system; they could be developed partially, in their entirety, or not at all. The plans served as recommendations only and did not carry the weight of official JCPS development plans for the schoolyards.

Portland Elementary School

Portland Elementary School is located in the Portland neighborhood west of downtown Louisville, Kentucky. The surrounding neighborhood is relatively urban in character, comprised mostly of small single-family historic homes arranged within a street-grid layout. Portland Elementary School has been in continuous operation longer than any school in the state of Kentucky. While the original structure was built in 1853, it has undergone several additions and renovations. The school property forms an entire city block but the site feels compact when compared to newer suburban schools. Its urban setting gives rise to unique traffic, safety, and parking concerns that needed to be examined and addressed through the redesign process.

Current entryway to Portland Elementary School, Louisville, Kentucky

The redesigned schoolyard at Portland is intended to serve as a space for student learning and engagement through the provision of outdoor classrooms and learning sites, but also to provide opportunities for recreation and community events. Thus, the final redesign must serve curricular needs as well as community needs.

Figure 1: Portland Elementary School Conceptual Site Improvement Plan

To determine the particular needs of Portland Elementary School students and teachers, as well as those of the Portland neighborhood, the City Solutions Center facilitated a community-engagement process to gather input on the needs and preferences of both the school and the surrounding community. The process included a series of open community meetings to 1) introduce the project, 2) present case studies of other schoolyard redesigns and outdoor learning spaces, 3) engage participants in a design workshop (or *charrette*) to develop ideas for the Portland schoolyard, and 4) receive feedback on the draft version of the redesign plan before it was finalized. Participants at the meetings included neighborhood residents, teachers, school administrators, neighborhood business owners, and representatives from city government, among others.

The resulting site plan is shown in Figure 1 on the previous page. The schoolyard site design proposal incorporates lessons learned from the Boston Schoolyard Initiative, feedback from various groups during the planning process, and site-specific attributes assessed by the planning team. The relatively traditional outdoor space consisting of a mostly open plan with a mix of asphalt parking and a playground offered opportunities to develop areas for unstructured physical activity while also defining small, resource-rich activity centers. These varying pockets of activity address the desire for outdoor learning while promoting a number of secondary and tertiary uses. Through the careful application of pathways and transitions, the overall site plan brings together a wealth of opportunities for learning and recreation for the community as well as the students and teachers at the school. The site has been organized into seven distinct areas of activity, though they can, and are intended to, work as a system.[22]

Cane Run Elementary School

Cane Run Elementary School is located in the Shively neighborhood in Louisville, Kentucky. Shively is primarily suburban and comprised of small post-war and ranch-style homes. Portions of the neighborhood are industrial and home to several large chemical and manufacturing companies. The schoolyard is approximately 10 acres, large even by suburban standards, and much of the property is underutilized green space. The current school building was constructed in 1972 and is currently undergoing a number of "green" renovations, including a geothermal heating and cooling system, solar-tube lighting, and other features that enhance the energy efficiency and environmental sensitivity of the building.

New entryway at Cane Run Elementary School, Louisville, Kentucky

22 For more information about the Portland Elementary Schoolyard Project please view the full report at: http://citysolutions.louisville.edu/pdfs/PortlandElementarySchoolyard_web.pdf.

Similar to the Portland Elementary project, the schoolyard redesign at Cane Run Elementary is intended to serve as a space for student learning and engagement, recreation, and community events. The City Solutions Center facilitated a community engagement process similar to that of Portland to gather school and community input on the redesign of the schoolyard. The community meetings were open to the public and provided an introduction to the project, presented case studies of other schoolyards, engaged teachers and community members in a design workshop, and received feedback on the proposed redesign plan before it was finalized. Participants at the meetings included representatives of the same groups as for the Portland project.

The resulting site plan for Cane Run Elementary is shown in Figure 2. The schoolyard site design proposal incorporates lessons learned from the Boston Schoolyard Initiative, feedback from various groups during the planning process, and site-specific attributes assessed by the planning team. The open and expansive outdoor setting the schoolyard provides at Cane Run Elementary offers numerous opportunities to develop areas of unstructured physical activity while also defining small, resource-rich activity centers. These varying pockets of activity address the desire for outdoor learning while promoting a number of secondary and tertiary uses. As for the Portland plan, the overall site plan brings together a wealth of opportunities for learning and recreation for the community as well as the students and teachers at Cane Run Elementary. The site has been organized into six distinct areas of activity, though they can and are intended to work as a system.[23]

23 For more information about the Cane Run Elementary Schoolyard Project please view the full report at: http://citysolutions.louisville.edu/pdfs/CaneRunElementarySchoolyard_web.pdf.

Figure 2: Cane Run Elementary School Conceptual Site Improvement Plan

Conclusions

Creating a schoolyard is not simply about beautification, or even just about providing a learning space for schoolchildren outdoors. Schoolyard development projects and the resulting outdoor spaces can provide a wide range of benefits for children and communities. While educational benefits may be the primary reason for beginning a schoolyard project, other benefits are often realized.

Educational Benefits

Outdoor learning can build confidence, provide a stronger motivation toward learning, and result in a greater sense of belonging and responsibility.[24] Research has also demonstrated a positive correlation between school achievement and schools that have participated in a schoolyard initiative.[25]

Public Health Benefits

Recent research shows that green outdoor spaces can reduce crime, foster psychological wellbeing, reduce stress, boost immunity, enhance productivity, and promote healing.[26] When school gardens or orchards are present, access to fresh fruits and vegetables can improve the health of schoolchildren, teachers, and community members. In addition, children are often more physically active when learning in an outdoor environment, which provides exercise that is beneficial for disease prevention and physical fitness. Schoolyards also may include walking paths or tracks that community members can access after school hours for exercise.

Environmental Benefits

Learning in outdoor classrooms links children to their natural environment and teaches them about environmental stewardship and natural ecosystems. Environmental improvements to the soils on the site, development of elements of ecosystems, and an increase in plants that can help with water retention, storm water management, heat island effects, and access to fresh foods are all positive environmental outcomes of a successful schoolyard and garden.

Social Benefits

When the community is involved in the schoolyard design and development process, a renewed sense of ownership and pride often forms around both the schoolyard

24 Rickinson, M., and others, *A Review of Research on Outdoor Learning*, cited above.
25 Lopez, R., and others, *Schoolyard Improvements and Standardized Test Scores*, cited above.
26 Maller, C., Henderson-Wilson, C., Pryor, A., Prosser, L., & Moore, M. (2008), *Healthy Parks, Healthy People: The Health Benefits of Contact with Nature in a Park Setting*, Melbourne, Australia: Deakin University, School of Health and Social Development.

and the neighborhood as a whole. Community-based projects such as these can serve to build strong social networks and ties that are key to the success of any school and neighborhood.

Financial Benefits

Surrounding communities can benefit financially from having access to a schoolyard garden that can lower the cost of, and improve access to, fresh vegetables. Redeveloped schoolyards also tend to be aesthetically pleasing and show investment in neighborhoods. These improvements can raise the value of the adjacent properties and potentially attract other types of neighborhood investment. Schoolyard initiatives themselves, because they bring together organizations and government agencies during the design process, can also result in financial resources being dedicated to the school and community to which they otherwise would not have had access.

Resources

This section provides a list of resources in the state of Kentucky and elsewhere that may be of benefit to anyone developing a schoolyard project. Included are organizations and programs to help address environmental issues, foundations and organizations that provide guidance and expertise on outdoor classrooms and landscapes, and opportunities for grants and other funding sources for projects. Some of the agencies and organizations identified here offer grant programs to provide funding for various aspects of schoolyard development, including design, community development and improvement, construction, purchase of materials, and technical assistance.

Safe Soils: Site Assessment, Soil Testing, and Clean Up

Government agencies and universities can both be of particular help when addressing issues related to site contamination. They can often provide historical maps and property records to help identify previous uses for a site, provide technical assistance for soil testing and clean up, and have useful information for creating safe and sustainable outdoor spaces.

- University of Louisville, Center for Environmental Policy and Management: http://cepm.louisville.edu.
- Kentucky Division of Compliance Assistance, Kentucky Brownfield Program: http://www.dca.ky.gov/brownfields/.
- Kansas State University, Technical Assistance to Brownfields (TABs) communities: http://www.tabez.org/.
- Kansas State University, Sustainable Gardening Initiatives on Brownfields Sites: http://www.epa.gov/brownfields/trta_k6/k6_08_ksu.htm.
- University of Kentucky, Agricultural Cooperative Extension Service: http://ces.ca.uky.edu/ces/.
- Cornell University, The Cornell Nutrient Analysis Laboratory: http://cnal.cals.cornell.edu.
- University of Massachusetts, Soil and Plant Tissue Testing Laboratory www.umass.edu/plsoils/soiltest.

Outdoor Classroom, Greening, and Gardening Assistance

There are numerous organizations at the local and state level that can provide assistance in laying out outdoor classrooms and schoolyard gardens. These organizations tend to be specialized and are beneficial for specific elements of schoolyards, such as establishing a community garden on school property, and may be most helpful with what types of elements, plantings, and landscapes are most appropriate for local ecological conditions.

- University of Louisville, City Solutions Center: http://citysolutions.louisville.edu/.
- University of Kentucky Integrated Pest Management, Starting an Outdoor Classroom: http://128.163.2.27/Ag/IPM/teachers/outdoorclassrm/getstarted.html.
- Kentucky Department of Fish and Wildlife Resources, Creating an Outdoor Classroom: http://fw.ky.gov/navigation.aspx?cid=279.
- Operation Brightside, Louisville, Kentucky: http://www.louisvilleky.gov/Brightside/.
- Kentucky School Gardens Network: http://faweb7.stfrancisschool.org/garden/.
- Louisville Metropolitan Sewer District, Rain Barrels and Rain Gardens Information: http://www.msdlouky.org/aboutmsd/rainbarrels.htm.
- Kentucky Environmental Education Council: http://keec.ky.gov/.
- City of New York Department of Parks & Recreation, Green Thumb, *Growing School and Youth Gardens in New York City: A Guide to Resources 2009*, available at http://www.nycgovparks.org /sub_about/partners/greenthumb/school_garden_resource_guide.pdf. While this guide is focused on New York City, it provides an list of resources for schoolyards and gardens including an extensive list of national grant opportunities.

Private Foundations, Corporate Sponsorship, and Other Grant Programs

Some private foundations provide grant funding for organizing a schoolyard initiative, or for materials and construction of outdoor classrooms, raised bed gardens, or other features. Corporate sponsorship from local businesses can be particularly beneficial as they can provide funding for materials, volunteer labor for construction and maintenance, and field trip opportunities for schoolchildren.

- The Home Depot Foundation: http://www.homedepotfoundation.org/.
- Lowe's Foundation, Toolbox for Education Grants Program: http://www.toolboxforeducation.com/grants.html.
- The Outdoor Resource, Outdoor Classroom Grants, http://www.outdoorresource.org/node/118.
- National Gardening Association, Grants for School and Youth Gardens: http://www.kidsgardening.com/grants.asp.

Schoolyards as Resources for Learning and Communities: A Design Handbook for Kentucky Schoolyards

August 2010

This report was written by John W. Vick, J. Michael McCoy, Patrick Piuma, Lauren Heberle, Jeremy Dyer, Bradley Coomes, and Steven C. Bourassa. This report was produced through a partnership between the City Solutions Center and the Environmental Finance Center at the University of Louisville. Photographic contributions by Patrick Piuma, J. Michael McCoy, and Jeremy Dyer unless otherwise noted. Site plan renderings on pages 38 and 41 created by Michael McCoy.

City Solutions Center

Formed in 2008, the University of Louisville's City Solutions Center is a partnership with the NewCities Institute and the Kentucky League of Cities. Working together with the NewCities Institute, the City Solutions Center extends U of L's urban mission across Kentucky by providing hands-on consulting to help communities engage citizens to define challenges, develop buy-in for solutions, and create implementation plans for measurable results. The Center draws upon existing faculty, staff, and student expertise throughout the University of Louisville to provide resources to assist Kentucky's communities.

For more information about the City Solutions Center visit our website at: http://citysolutions.louisville.edu or contact:

Steven C. Bourassa, Ph.D.
Director, City Solutions Center
426 W. Bloom Street
Louisville, KY 40208
Phone: (502) 852-5720
E-mail: steven.bourassa@louisville.edu

Patrick Piuma, M.U.P.
Associate Director, City Solutions Center
507 S. Third Street
Louisville, KY 40202
Phone: (502) 587-7015
E-mail: patrick.piuma@louisville.edu

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The Environmental Finance Center is a project of the Center for Environmental Policy and Management at the University of Louisville serving EPA Region 4. Their mission is to provide technical assistance, education, and expertise to local, state and tribal governments, businesses, and non-profit organizations so that they may expand services and implement innovative approaches to answer the "how to pay" questions when addressing environmental issues. They specifically help institutions and organizations simultaneously address environmental, economic, and social concerns, the three legs of sustainable development. Topics they cover include, but not be limited to Climate Change, Sustainable Development, Urban Agriculture/Community Gardens, Greening Institutions in Policy and Practice, Green Infrastructure Development (water and energy), Air Quality, and Urban Ecosystem Development and Protection.

Environmental Finance Center, EPA Region 4
Center for Environmental Policy and Management
University of Louisville
103 Lutz Hall
Louisville, KY 40292
http://cepm.louisville.edu/

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