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A Grassroots Effort to Renew the Schoolyard: the Learning Garden

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Figure 1. Northview Learning Garden. Image by Kingery-Page.

Introduction

In the United States, the percentage of people living in urban settings has increased eightfold over the last century (Burdett and Rode 2007). In many cities, children have very limited exposure to 'wild' places or food production landscapes. They spend their days in school buildings and their meals are frequently composed of processed foods.

Like thousands of schools across the United States, Northview Elementary School in Manhattan, Kansas plans to infuse kids' lives with nature (fig.1) . Educators, community advocates, and parents gathered funds, drew plans, and constructed a learning garden because they saw its potential to affect students. The setting is the largest public elementary school in the community. Fifty-five percent of the students are from low income families. The school serves a neighborhood that is geographically isolated by a major highway; students are not able to walk to most parks, the zoo, or many natural areas.

However, just months after a team of professionals and volunteers completed the garden construction, the school district decided to remove the garden. A school building expansion, promised not to affect the garden site, resulted in demolition of the garden. The school district now plans to reconstruct the garden elsewhere on school grounds. This frustrating chain of events was disappointing to teachers who hoped to use the garden immediately, as well as to community members who volunteered to build the garden.

In order to better understand challenges like the removal of the Northview Learning Garden and to provide practical recommendations for other schools hoping to establish gardens, this paper documents the case of Northview and reviews research relevant to the establishment and success of schoolyard gardens.

Methods

The Northview Learning Garden case history documents the garden mission and grassroots development process. The case history is drawn from notes, plans, photographs, and conversations made and held by the authors between May 2008 and January 2010. All authors contributed to the Learning Garden planning, design, and construction in different capacities. Linda Teener, director of the UFM Community Learning Center, was part of the original team who imagined and raised funds for the garden. Katie Kingery-Page, assistant professor of landscape architecture at Kansas State University (KSU), designed the garden and helped with garden construction. Jon D. Hunt, also an assistant professor of landscape architecture at KSU, helped with garden construction and led art workshops to involve students in the garden design.

The authors conducted a literature search of online databases using the Google Scholar search engine with various combinations of the keywords schoolyard, garden, organization, structure, and challenges. Dr. Candice Shoemaker, professor of horticulture at KSU, and Bambi Yost, former researcher with Denver Learning Landscapes, provided additional resources. The authors systematically reviewed the literature, culling documented barriers to establishment of schoolyard gardens and recommendations for success of school gardens.

Learning Garden Background and Mission

Why would Northview School, or any other school, develop a schoolyard garden? Because schoolyard gardens enhance classroom learning and, when publicly accessible, provide a sustainable community amenity (fig.2,3).

Enhanced Classroom Learning

Many researchers have evaluated school gardens' direct and indirect educational outcomes. Research confirms that weekly use of school gardening combined with hands-on classroom curricula helps improve science achievement test scores (Smith and Mostenbocker 2005). A study of students using the National Wildlife Federation's Schoolyard Habitat Program, which combines nature-based activities and a carefully written curriculum, showed significant increase in standardized math testing scores (Danforth et al 2008).

According to several studies, students who garden express high motivation for hands-on activities, develop land stewardship values, improved attitudes and behavior (Aguilar et al 2008, Blair 2009 21, 35, Brink 2004 229, Brink 2005 4, Ozer 2007 855). "Youth who once ripped plants out of the garden for fun now weed, water, and protect the garden and orchard crops" (Ozer 2007 855). In addition, teachers comment that gardening "… allows them to get to know different dimensions of their students that would otherwise remain hidden in traditional classroom settings" (Pudup 2005 1238).

The Denver Learning Landscapes, a program to enhance public school landscapes, identifies four schoolyard garden types for enhanced classroom learning: habitat, cultivated, horticultural, and ecosystem (Brink 2004 214). With these garden types, teachers have opportunities to educate students through place-based learning, hands-on inquiry, and observational activities about flora and fauna, nutrition, science, math, art, cultural history, and other subjects. Habitat gardens are nature-like landscapes where children encounter the "'slow wonder' of our world" (Brink 2004 221) and a world that is in constant transformation, thus allowing steady and new stimulation for the school children (Blair 2009 19, 31). Students have opportunities to identify various insect species, larvae,

Figure 2. The Northview courtyard before garden construction. Image by Teener.

Figure 3. The finished Northview Learning Garden. Image by Teener.

Figure 4. Design illustration showing native plants, stone, and raised planters. Image by Kingery-Page.

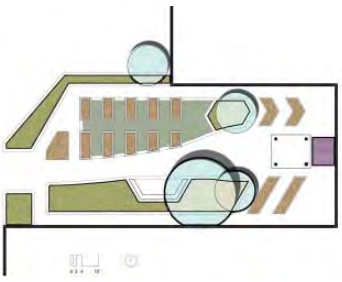

Figure 5. An early plan of the garden, showing native perennial beds and raised planters.

Figure 6. Casement Neighborhoods (black) separated from many Manhattan city parks (green) by Hwy 24.

and their host plants (Brink 2000 216, Moore 1995 75). Cultivated vegetable gardens give students prospect to learn about edible plants and nutrition (Brink 2004 214, Blair 2009 18, 31, Moore 1995 77). Vegetable gardens increase student desire to eat vegetables with peer assistance and persuading (Ozer 2007 853) while introducing the students to local food production and sustainable food methods (Blair 2009 18, 31, Pudup 2008 1235). Horticultural and ecosystem gardens educate students on such concepts as: native plant and plant identification, water harvesting systems, and environmental remediation (Brink 2004 215).

The Northview Learning Garden includes three of the garden types identified by Denver Learning Landscapes: horticultural, ecosystem and cultivated. The Learning Garden boundary is a mixed horticultural and ecosystem garden, containing plants native to the Kansas Flint Hills as well as ornamental plants donated by teachers and community members (fig. 4, 5). All the gardens' perennial beds are habitat for butterflies and insects, particularly the migratory monarch butterflies used in the third grade science curriculum. Several of the perennial beds are designed as raingardens, to improve drainage on the site. The garden contains 8 planters, some raised, two with wheelchair access, for cultivated gardening of fruits and vegetables (fig. 4, 5).

Sustainable Community Amenity

In his book, Seven Rules for Sustainable Communities, Patrick Condon presents what many urbanists have asserted about American cities: traditional grid patterns calm traffic flows and provide a pedestrian friendly street framework which allow people to access amenities on foot (Condon 2010, also Kunstler 1993, Jacobs 1993, and AASHTO 2004). In contrast to the street grid, suburban, dendritic patterns result in high speed arterials which divide cities and isolate pedestrians. Thus Condon's third rule for sustainable communities is to create an "interconnected street system" (39).

The Northview community, known as the Casement neighborhoods, has a locally interconnected street system but is disconnected from the city by an arterial highway (fig. 6). The Casement neighborhood is east of Tuttle Creek Boulevard, a stretch of Kansas Highway 24 (Hwy 24). Hwy 24 is a five lane arterial, composed of four traffic lanes and a divider/center turn lane of approximately fifteen feet per lane. The total pavement width at intersections of about 75 feet, a lack of pedestrian space in the Hwy 24 right-of-way, and the high speed of traffic (45-50 miles per hour, posted) add up to a formidable pedestrian barrier. Creating connectivity across this pedestrian barrier is not presently possible, without major renovation of street infrastructure. Therefore, creat-

ing as many local, neighborhood amenities as possible is the best route to enhancing the lives of Casement neighborhood residents.

Condon's seventh rule for sustainable communities is to "create a linked system of natural areas and parks" (111). While it is true that natural areas and parks serve pragmatic purposes (management of stormwater, mosaic of wildlife habitat, preservation of native landscape species), they also provide relaxation and play settings for the Casement neighborhood residents. Between 1956 and 2003, two city parks were designated in the Casement neighborhoods. The Learning Garden at Northview School is a linked component of this local green system

The Learning Garden is a living laboratory that supports teaching and learning. The garden design is universally accessible. The design is beautiful in its organization and material execution. The garden's goals range from teaching pragmatic skills (gardening and academic content) to encouraging a sense of wonder and connection to the regional landscape (fig. 7). The garden design features native plants and locally quarried stone of the region.

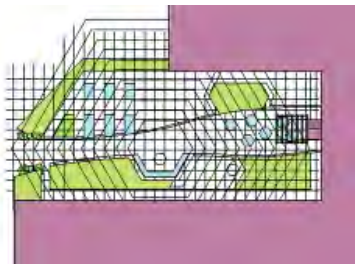

Figure 7. An early diagram of the garden geometry, which a 3rd grade teacher hopes to use to teach math concepts. Image by Kingery-Page.

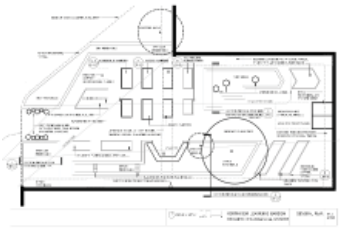

Figure 8. Final garden plan. Image by Kingery-Page.

Learning Garden Grassroots Development Process

In 2007, a group of Manhattan community residents, UFM Community Learning Center director, Kansas State University faculty, the school principal, and school faculty met to assess the possibility of creating a children's garden at Northview Elementary School. This team[1] created the original concept for the garden, programmed possible components and uses for the garden, and applied for a Caroline Peine Foundation Grant. Funding was received in the spring of 2008. Several persons from the initial planning team were no longer available, but the remaining members met regularly to push forward the garden vision.

Figure 9. Volunteers begin garden construction. Image by Kingery-Page.

At the request of a Northview parent, a KSU assistant professor of landscape architecture joined the planning team in May 2008. Working with the team, she developed three schematic designs based upon the program. The alternative selected by the team provided optimal flexibility – many types of gardens and a large central 'classroom' space (fig. 8).

Figure 10. Contractors complete a stone bench begun by volunteers. Image by Kingery-Page.

In fall 2008, the team secured more garden funding through the Center for Engagement and Community Development at KSU. With a construction budget in place, the final development team met on a weekly basis to finalize the garden design and plan for

1 The team quickly expanded to include several additional people: Dr. Richard Mattson, a professor of horticultural therapy at KSU, Dr. Rhonda Janke, a KSU professor and extension specialist in sustainable cropping systems, Sue Mountford, coordinator of Northview School's after school program, Paula Cooper, Riley County Master Gardener, Patty Zehl, KSU horticultural therapy graduate student, Master Gardener and president of the Manhattan Community Garden.

Figure 11. Volunteers take a break during construction. Image by Kingery-Page.

Figure 12. Youth building raised planters. Image by Hunt.

Figure 13. Volunteers spreading crushed limestone gravel. Image by Hunt.

Figure 14. Youth adding soil to raised planters. Image by Hunt.

construction. This team, which saw the garden through completion included:

- the school principal
- a 3rd grade teacher
- director of UFM Community Learning Center
- two university landscape architecture faculty
- a parent and PTO member, and
- the maintenance supervisor for the school district.

The team used a timeline of tasks to organize the remaining design work and staging of garden construction. The university professors and learning center director (authors of this paper) solicited local businesses for donations of planter materials, stone, and plants[2]. The local county parks agency[3] donated limestone boulders to include in the perennial beds. The team hired a local landscape contractor[4] to prepare the site and help volunteers install stone components of the garden (fig. 9, 10). The contractor also donated considerable time to meet with the garden team and resolve logistics of installation.

The entire garden installation process took a little over eight months, progressing slowly, one volunteer workday at a time (fig. 11-14). After site preparation and installation of the garden's stone work, unusually wet spring weather slowed the garden progress. The garden site, a shallow bowl with no drainage, was originally envisioned with several depressed planting beds to serve as rain-gardens. After the wet spring inundation, underground dry wells of gravel were added to speed water infiltration[5].

One of the landscape architecture professors worked with Northview's art teacher to hold drawing and sculpture sessions with fourth grade students, who worked on designs for a shade structure, proposed for phase two of the garden (fig.15). These art workshops, held during class time, increased student interest in the garden, which was beginning to take shape outside the school doors.

Although installation began in February, due to the very wet spring, much of the garden installation occurred after the school was no longer in session, from June to August. The team scheduled and led workdays to complete the garden construction. The installation process was intense, involving approximately fifteen workdays with volunteers from the Casement neighborhood, various university student and community groups, and a strong turnout of teachers, parents, grandparents, and youth affiliated with the

2 The list is too lengthy to include in entirety, but donors and grantors included: American Garden Association, Manhattan YES! Fund, Youth as Resources Grant, US Stone Industries, Master Landscape, Home Depot, and Lee Creek Gardens.
3 Riley County Parks
4 Master Landscape
5 KSU bio-ag engineering professor Dr. Stacy L. Hutchinson advised the team on this drainage solution.

school. In particular, the parent/PTO member of the team was a crucial organizer and participant in work days.

With the help of volunteers and a student intern, funded by the KSU engagement grant, the team completed many tasks, installing raised planters, planting perennials, mulching and watering during the hot months. A few cultivated vegetable crops were planted, so that students would see the intended use of the garden when they returned to school in August. In early August, the team made a final push to finish the garden. Over a series of well-attended volunteer days, the crushed stone pavement was laid, planters were filled with topsoil and compost, and final perennial planting was complete (fig. 16, 17). Through October, the garden intern continued the work of planting, watering, weeding, and mulching the garden's perennial beds, which made the garden feel truly 'finished.' The final cost was less than $16,000.

The garden intern commented that Northview students would frequently join her in the garden during recess hours, asking to help and genuinely having fun in the garden. However, other than the informal participation of kids at recess and a small planting project by a first grade class, no use of the garden occurred in fall 2009. Teachers, while interested, were not organized or prepared to use the garden. Northview's third-grade teacher, the landscape architecture university faculty, and the garden intern offered to hold training and orientation for teachers in the garden, but with the busyness of the fall school term, the training was never organized. Then winter came (fig. 18-20).

Figure 15: Student drawing for a shade structure. Courtesy of and with permissions through Northview School.

Figure 16: A teacher planting perennials. Image by Kingery-Page.

Figure 17: The garden in late summer. Image by Kingery-Page.

Figure 18: The garden in fall. Image by Kingery-Page.

Unexpected Developments

In December 2009, the school principal informed the garden team that the school district administration and their consulting architect were meeting to discuss the Northview building expansion. A bond issue to fund the expansion had not yet been passed as the garden was planned and designed, but its potential impact was considered by the garden team. The district maintenance supervisor suspected a classroom expansion could disturb the garden site. But at that time, the principal was assured by district leadership that the garden site was to remain intact, so the garden was installed as planned. In December, during the school expansion meeting, the principal learned that the consulting architect and construction manager wanted to remove the garden. The reasons the architect and construction manager gave were:

1) Keeping the garden might increase the cost of staging construction. *This was not substantiated by any estimates of increased cost.*

2) Minor work to be done to the building facades around the courtyard would require removal of the

Figure 19: Perennials in winter. Image by Kingery-Page.

Figure 20: The garden in winter. Image by Kingery-Page.

Figure 21: Spring planting with the Master Gardener. Image by Judy Burch.

garden. *However, the construction manager noted that the renovation work would require only twelve feet of clear space away from the walls. This clearance would impact only some planted areas and would require only temporary removal of a few planters.*

3)After construction of the building addition, the newly enclosed courtyard would be required to handle drainage of stormwater amounts equal to the typical 100 year storm event (approximately 7 inches of rainfall within a 24 hour period). *A site engineer had not yet been consulted, so meaningful discussion of this requirement was difficult.*

Although it was externally funded, the garden was built on school property. Ultimately, decisions regarding the garden were up to the district. The assistant superintendant expressed a clear intent to consider the principal's feedback in his decision. Two members of the garden team attended a meeting with the expansion architect and construction manager to advocate for the garden and support the principal. The result of the meeting was that the principal requested the district account for the garden as classroom space, albeit outdoors. If the garden was disturbed, it would have to be replaced—replaced by a contractor, not by the same volunteers who had spent hundreds of hours building the garden in the first place.

The school district committed to rebuilding the garden after the building expansion is complete. The removal and re-installation of the garden was bid in spring 2010 and the bid awarded to a local contractor. The projected timeline for complete re-installation of the garden is fall, 2011. While the removal of this recently completed garden is obviously disappointing, Northview School needs the building expansion, and delaying construction with further negotiations was not seen as an option by the principal or the district.

The process of design, installation, and now removal of the Northview garden indicates a need for better communication with the school district on all school projects initiated in a grassroots manner by the community and individual schools. Following reconstruction, Northview School will still face the challenges of maintaining and utilizing the garden.

The bad news about the garden put a damper on spring activities. A hasty spring cleanup was done, but no one weeded the garden. Only two classes, a fourth grade class that annually gardens with help of a Master Gardener and an art class, used the garden (fig. 21). Two outcomes, the lackluster use of the garden by teachers in its first season and the removal of the garden to accommodate staging of a building expansion, prompted the following questions: when so many people seemed to want this garden, indeed they worked hard to build this garden, why was the garden

underused? What could the garden team have done differently? What barriers have other schools encountered to establishing gardens? What can Northview School do *now* to prepare for successful establishment of the re-built garden?

Barriers to Success of Schoolyard Gardens

A thorough literature review reveals several documented barriers to school garden establishment. The following summary presents these barriers.

Perceived challenges may prevent gardens from being established in the first place. A report commissioned by the Saskatchewan, Canada School Boards Association identified several challenges in planning and implementing school gardens: ensuring safety during installation, procuring funding, limiting liability, vandalism during and after construction, provision for maintenance, and balancing gardening with other demands upon the school grounds (Berlinic no date 7). However, only three of these perceived challenges, lack of funding, maintenance, and competing uses for school grounds, are shown to be barriers in studies of established school gardens.

Multiple sources document barriers to the establishment and use of schoolyard gardens. A significant *educational barrier* is lack of time for preparation and instruction (DeMarco iii).

> "[According to teachers]… one of the most time-consuming parts of school gardening was the time spent preparing for gardening activities. This preparation time included searching for horticultural information to assist them in the integration of school gardening into the curriculum, and acquiring the necessary tools and plant materials needed for school gardening projects" (DeMarco 141).

Lack of prepared curricula exacerbates the insufficient time for teacher preparation (141). Researchers with UCD's Learning Landscapes found that teachers aren't able to devote the time needed for "brainstorming possibilities" in order for school landscapes to be a success (Brink and Yost 2004 229). As an added barrier, instructional time is limited by "pressure to improve student test scores" (229).

Institutional or "logistical" barriers occur when an administration at the school or district level does not (or cannot) support school gardening, despite teacher interest. The support denied may be policy supporting school gardens, allocation of teacher time, stable (low turnover) staffing of teachers, funding, provision for maintenance, or dedication of space on the school grounds (Azuma et al 2001, Brink and Yost 2004, Carlsson and Williams 2008, DeMarco 1997 ii).

As early as 1995, the Los Angeles Unified School District promoted the idea of "gardens for every school"(Azuma et al 2001 2). In a 2001 survey of Los Angeles School, researchers discovered that of schools without gardens, about 15% once had school gardens, but had abandoned them (Azuma et al 2001). Reasons for abandonment included: "teacher overload…lack of funding…and the fact that space was no longer available" (5). The report on Los Angeles schools included two examples of 'space no longer available': the paving over of a garden for parking and loss of a garden to expansion of classroom space (6,7). In a case study of Los Angeles' 135th Street School, which lost its garden due to classroom expansion, the researchers state: "…Teachers and administrators at the school have expressed support in principle for the concept [of having a new garden], but also indicate that individual teachers feel too overwhelmed with other duties to take the initial responsibility and play the lead role…" (7).

The fact that institutional support may exist in principle, but not in reality, highlights the constant financial stress on public education. The Manhattan and Ogden Unified School District, where the Northview School exists, laid off 27 teachers in 2010 due to a state budget crisis. The resulting increase in remaining teachers' workload will decrease time available to lead school

gardening. And not surprisingly, a 1997 national study of over 200 school gardening programs found that a strong lead person or persons is a critical factor in garden success (DeMarco 1997). The following section expands upon the 'lead person' and other recommendations for the success of school gardens.

Recommendations for Success

A key finding of DeMarco's national school gardening study was that "one of the most essential" factors in garden success is "…a person, or persons, who takes on the responsibility for school gardening. This person coordinates school gardening activities and administrates the funding and educational needs of garden education. It is this responsible party that lends the support and motivation necessary for pursuing and incorporating school gardening….[T]his person, or persons, was in most cases a teacher or a group of teachers"(1997 137). DeMarco's finding is echoed by others: "'Support may come in the form of (a) enthusiastic principals [and] (b) effective and credible lead teachers who promote school gardening through contagious student excitement rather than through personal power…'" (Vesilind & Jones quoted in Blair 2009 21). The study of Los Angeles schools concluded, "…most respondents attributed their successful gardens to the development of a school community link and/or to the role of dedicated teachers who recognize the value of gardening as part of their own approach to teaching"(Azuma et al 2001 9).

While DeMarco's study and the Los Angeles study both identified key "…logistical factors of a growing site, a water source, the availability of gardening equipment [and]adequate funding…", stories of success emphasize the 'lead person' above all else (DeMarco 1997 iii, Azuma et al 2001). Even if institutional support and logistical factors are in place, a garden won't thrive without a leader or team of leaders.

Other key factors in garden success include the above mentioned "school-community link," student "excitement" or "ownership" of school gardening," and use of gardening in school curricula (Azuma et al 2001 9, Blair 2009 21, DeMarco 1997). Recommendations for school garden success, in order of importance, include the following.

Designate a Lead Person or Persons

The lead person may be a teacher or teachers, organized into a committee or not, but clearly are responsible for the garden, its use, funding, and maintenance. If school administrators cannot allot the time necessary to teachers, hiring a "community-based instructor" is another option (Blair 2009 21).

Give Teachers Education

"…[E]ducating teachers should be the prime focus of efforts aimed at improving and expanding upon the use of school gardening. The education of teachers in the use of gardening as a teaching strategy [helps] build student ownership of school gardening" (DeMarco 1997 140). Education should be provided as in-service training or professional development, not as an added duty. Teachers need access to organized curricular ideas, rather than general possibilities, in order to avoid the pitfall of limited time to prepare (DeMarco 1997). Looking proactively to the future, teachers should receive gardening and plant science training as part of their professional education prior to beginning their careers, "…so that all teachers can feel prepared to use school gardening as a potent form of experiential education" (Blair 2009 21).

Build School-Community Links

Collaboration between the school, extension agencies and other experts, parents, and volunteers is critical to garden success (Azuma et al 2001, DeMarco 1997, Schmelzkopf 1995). "[Nurture] teacher, parent, student, and community support systems within an institutional commitment to… maintenance of these gardens over time" (Azuma et al 11). Participation of experts and volunteers helps to alleviate the major barrier of insufficient teacher time.

The planning, design and installation of a garden can initiate school-community links. A collaborative process on the design of the school garden "creates a broadly constituted base for funding that includes both public and private partners"(Brink and Yost 2004 223) while building community and community pride (Johnson 2008 47, Brink and Yost 2004 223). Denver Learning Landscapes constructs playgrounds during the academic year to encourage student and family involvement during 'Volunteer Days' (Brink 2004). Successful gardens function as alternative community gathering places and encourage community use during non- school hours (Brink and Yost 2004). "Most successful gardens involve: administrators, landscape architects, landscape designers, artists, students, community members, parents, teachers, maintenance staff, and outside professionals" (Johnson et al 2008 47).

Conclusions

The researchers encountered both educational and institutional barriers to the establishment of the Northview Learning Garden. The primary educational barrier was a lack of teacher time. The Northview Learning Garden began as a grassroots effort to renew the schoolyard. The desire for the garden originated with a community leader and the school principal. An inclusive group of parents, a teacher, community leaders, the principal, and 'experts' eventually planned and built the garden. However, throughout this process, teachers remained an underrepresented group. Only one teacher served on the garden team. While several teachers helped install the garden, only three attended more than one work day, and the most devoted teacher attended only one third of the workdays. After the garden was built, only three teachers used the garden. It is likely that greater teacher participation in the garden team would have improved use of the garden.

Some institutional barriers to the garden could not be addressed by the garden team. The Manhattan-Ogden school district has no policy regarding school gardens and thus no formal support for gardens. The district is under-going budget cuts and resulting layoffs. Remaining teachers have more responsibilities and less time. This status quo sets the stage for grassroots initiation of gardens and demands stronger school-community links.

However, the institutional barrier of 'no space' for the garden, resulting from a staging decision by the school expansion architect, may have been avoidable. While district administration was kept informed of the garden project, only the district's maintenance director was included in planning meetings for the garden. The literature reveals that removal of school gardens to make way for parking or classrooms is a common institutional barrier to garden sucess (Azuma et al 2001).Greater inclusion of school district administration in the garden planning and design might have prevented the unfortunate decision to remove the garden. While 'ownership' is typically referred to as it affects individuals, not institutions, involving district leadership in garden planning may create a sense of ownership of the garden at the district level.

Recommendations for Establishment of the Learning Garden

As the district prepares to re-install the learning garden, recommendations from the literature may improve chances of successful establishment. These recommendations, drawn from the

literature and tailored to the Northview School Learning Garden, are applicable to other school gardens as well.

• Designate a Lead Person or Persons: Make the garden a formal part of curricula at all grade levels. This step, as well as the designation of a 'lead person' must be initiated by the school principal. The experience at Northview indicates that a single teacher is not sufficient as the 'lead person.' The school principal could establish a garden teachers' committee, allowed to meet during school hours, to supervise the garden. This committee will be the center 'hub' in a 'wheel of spokes' extending to other teachers and community members. The committee should take responsibility for maintenance, curriculum and funding (DeMarco 1997).

• Give Teachers Education: Based upon recommendations in the literature, all teachers at Northview should be able to participate in in-service training on the garden and garden-related curriculum. The literature confirms what common sense suggests: most teachers do not have time for an effort that takes place beyond the requirements of their normal school day (DeMarco 1997). Providing in-service training will require support from the school district. Though the district did not feel invested in the learning garden initially, providing for teacher training will create investment.

• Build School-Community Links: Northview School has already initiated many community links to student families, university extension, university faculty, the Manhattan community garden, the Master Gardeners program, the UFM Community Learning Center, private businesses and several community-based volunteer programs. Strengthening these ties requires a more exerted and organized effort. The teachers' committee (see lead person, above) can begin by creating both a funding and labor 'endowment.' The committee can solicit individuals and organizations for commitments of cash, materials, and volunteer time.

Role of the University

Universities can provide help to school gardens in all phases: planning, design, installation and ongoing use. The garden team already accessed the expertise of several faculty members who donated a great deal of time to the logistics of the garden. However, the team has not yet tapped into faculty expertise needed to overcome educational barriers to garden success. Once formed, the teachers' committee should target university faculty and staff to help with teacher training and curricula for the garden.

Future Research

The researchers of this paper (members of the garden team) found themselves in a sometimes powerless role. Although their help was needed to establish the garden, they were not players in the school district decision-making process. During the most difficult moments, they decided to act as support and advocates for the school principal's desire to keep the garden. However tempted they were, they felt their professional roles prevented them from acting to organize resistance to the garden removal. More study of the role 'experts' play in schoolyard garden success is needed.

Literature review of barriers to the success of school gardens indicates several areas for further research. "In particular, more needs to be known about the principal's effect [in the success of school gardens]" (Blair 21). "Additional studies are necessary on how educators can best remove barriers to implementing and keeping school gardens running. Studies have not [adequately] addressed school-garden continuity or failure…" (Blair 21). As more schools try to

reach the ideal of 'no child left inside' answering these questions is crucial. Case studies, both single and comparative, and further surveys of teachers and principals involved in school gardening are needed.

References

AASHTO. 2004. *A Guide for Achieving Flexibility in Highway Design.* Washington, DC: American Association of State Highway & Transportation Officials.

Aguilar, O.M., T.M. Waliczek and J.M. Zajicek. 2008. Growing environmental stewards: the overall effect of a school gardening program on environmental attitudes and environmental locus of control of different demographic groups of elementary school children. *HortTechnology* 18: 243-249. Accessed on-line June 15, 2010 http://www.ashs.org

Azuma, Horan, and Gottlieb. 2001. *A Place To Grow And A Place To Learn: School Gardens in the Los Angeles Unified School District, a Survey, Case Studies, and Policy Recommendations.* California: Center for Food & Justice, Urban & Environmental Policy Institute, Occidental College.

Berlinic, Kelly. No date. *School Community Gardens: School Ground Greening.* Saskatchewan School Boards Association.

Blair, Dorothy. 2009. The child in the garden: an evaluative review of the benefits of school gardening. *The Journal of Environmental Education.* Vol. 40 (2): 15-38.

Brink, Lois A. No date. *Denver's Learning Landscape Alliance: Restoring the American Schoolyard.* Denver: University of Colorado.

Brink, Lois A. and Bambi Yost. 2004. Transforming inner-city school grounds: lessons from learning landscapes. *Children, Youth and Environments.* Vol. 14 (1): 208-232.

Burden, Dan. 2000. *Streets and Sidewalks, People and Cars.* Sacramento, CA: Local Government Commission, Center for Livable Communities.

Burdett, Ricky and Philipp Rode. 2007. The urban age project. In Burdett, Ricky and Deyan Sudjic eds. *The Endless City*. London: Phaedon Press Ltd.: 8-31.

Carlsson, Liesel and Patricia Williams. 2008. New approaches to the health promoting school: participation in sustainable food systems. *Journal of Hunger & Environmental Nutrition*, Vol. 3(4): 400-417.

Condon, Patrick. 2010. *Seven Rules for Sustainable Communities.* Washington, D.C.: Island Press.

Danforth, P.E., T.M. Waliczek, S.M. Macey and J.M. Zajicek. 2008.The effect of the national wildlife federation's schoolyard habitat program on fourth grade students' standardized test scores. *HortTechnology* 18: 356-360 . Accessed on-line June 15, 2010 http://www.ashs.org

DeMarco, Laurie. 1997. *The Factors Affecting Elementary School Teachers' Integration of School Gardening into the Curriculum.* Phd. dissertation. Virginia Polytechnic Institute and State University.

Jacobs, Allan. 1993. *Great Streets.* Cambridge, MA: The MIT Press.

Johnson, Lauri Macmillan and Kim Duffek. 2008. *Creating Outdoor Classrooms: Schoolyard Habitats and Gardens for the Southwest.* Austin: University of Texas Press.

Kunstler, James H. 1993. *The Geography of Nowhere*. New York: Touchstone.

Ozer, Emily. 2007.The effects of school gardens on students and schools: conceptualization and considerations for maximizing healthy development. *Health Education & Behavior*, Vol. 34, No. 6: 846-863.

Pudup, Mary Beth. 2008. It takes a garden: Cultivating citizen-subjects in organized garden projects. *Geoforum.* Vol. 39: 1228-1240.

Schmelzkopf, Karen. 1995. Urban community gardens as contested space. *Geographical Review*. Vol. 85 (3): 364-381.

Smith, Leanna L. and Carl E. Motsenbocker. 2005. Impact of hands-on science through school gardening in louisiana public elementary schools. *HortTechnology* 15: 439-443. Accessed online June 15, 2010. http://www.ashs.org