Engaging Urban Students In a Schoolyard Beautification and Gardening Project

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Abstract

Community gardening provides many benefits for students like outdoor physical activity, an understanding of plant life cycles, food production and healthy eating (Blair, 2009; Whiren, 1995). Gardening also provides hands-on learning opportunities to draw parallels between what is needed for plants to grow and what students need to be healthy. When a college of education and university office of community service learning partner with a K – 8 school in an urban area, students and the neighborhood, all of those involved can benefit. Educators know that students learn by doing and that community involvement enriches the learning experience while teaching valuable lessons about giving back while helping others. This gardening project was part of a larger campus community gardening outreach project to address local food insufficiency concerns and provide education about sustainability via gardening. This successful project provides key insights into the need to make solid connections, in sequenced lessons, between what students' prior knowledge and what they see in their everyday lives, then tapping into their creativity. Diversity, plants, gardening, food, nutrition and related topics serve as vehicles to introduce concepts that integrate design and STEM education principles.

Keywords:
Community service learning outreach, gardening, urban students, STEM, elements of design, food issues

Learning Theory, Background and Introduction to the Project

Evidence supporting project-based learning, community involvement and getting children outdoors and active is supporting what previous generations of parents and master teachers have always known (Berger 2003). Playing outside, feeling connected with others in achieving a group effort and learning by doing are important components of a child's overall health and cognitive development. Community gardening combines many of these essential components and foster connections between classroom learning and learning beyond the classroom (Yost & Chawla 2009). As part of larger community gardening project that started late spring 2012, two 4^{th} grade classrooms at an urban K-8 school were selected to participate in a schoolyard beautification project.

The question that drove this project was: What educational theme could generate end-of-the-school-year interest for upper elementary students while beautifying their urban school grounds? Of course gardening, with lessons about plants and food issues were a good fit but there needed to be something engaging and unique. Could Elements of Design

provide a broad platform to integrate the lessons with other aspects of STEM education? Those ideas for the lessons provided the nexus, coming together neatly while still allowing for the tight time constraints of this project.

In the two 4th grade classrooms, there were 33 students, 17 boys and 16 girls, primarily African-American. Even with a very compressed timeframe and the end of the school year rapidly approaching, we wanted to have several opportunities to interact with the students and teachers, rather than taking a one-time "hit-and split" approach. In order to develop a series of engaging lessons that used a broad, novel approach related to gardening, it was decided that the initial visit would focus on Elements of Design combined with Plant Basics. We would also need to do some research on suitable plant varieties and weave in terms like heirloom, organic, compost, soils and plant needs, sun or shade drought tolerant to help the students better understand the types of plants that they would be planting and why.

Developing and Teaching the Lessons:

The classroom where the students were assembled did not have the technology necessary for a Power Point presentation, so a handout was prepared with key terms and images to demonstrate basic elements of garden design and to show examples of the diversity of plants. We introduced and discussed concepts and terms, using a very interactive question and answer approach, such as: seed needs vs. plant needs to grow and thrive, annuals vs. perennial plants, native plants vs. nonnative ornamentals, deciduous vs. evergreen, etc. Just after discussing how deciduous trees lose their leaves like the students lose their baby teeth, one student started gesturing for a tissue while cupping his hand over his mouth. Just like it was part of the lesson, right on cue, he'd lost a tooth! Talk about a teachable moment.

The first lesson focused on introducing plant and gardening terms using many everyday examples and drew heavily from students' prior knowledge. Naturally, this classroom discussion expanded on what the student were familiar with and wove in new terms like "perennial", "drought-resistant" and "native" plants. I felt that it was important for the students to understand why certain plants would have a better chance of surviving than others. We also talked about the "growing conditions" on their school grounds. Many parallels were made between what they needed to grow and what the plants would need — water, nutrients, space, light, warmth and so on.

To recap this information I asked a few questions with prompts and using many examples, then followed-up to their answers so they were very clear on the new terms. The conversation went something like this:
"We've talked about so many different types of plants. Large trees, small sedums, plants that live one season and others that live for many years — there are Many different kinds of plants. Tell me some examples of:

"Tell me some foods that come from plants? Tell me some seeds or a nuts.
"Walnuts", Yes, give me another one. "popcorn" . "Good".
"Grasses? "Corn, yes, good a food from a grass. Can you tell me another? Yes,

your yard is grass. Any other food from grasses? Oats, good. Yes, cows eat grass",
"Flowers? Roses, yes. Sunflowers, yes. Yes, you can eat sunflower seeds, can you?"
"Ok, so we know some flowers are Annuals and some are Perennials? What is the difference?" "Yes, petunias are annuals. Why? Yes, they bloom and produce seeds in the same year. Good" "How about the seeds you put in the envelops to take home?" "Good, marigolds are annuals". Now tell me a perennial. Yes, roses, rose bushes live more than one year and come back the next year. Give me another one. Ok, so what are some of the plants I said would be good for your school? Ones that are native and we can find growing in nature in Ohio? Yes, daisies, good. And will they come back every year? Ok, I will bring some to plant in a couple of weeks. What should I bring with me? Daisies, yes, tickseed, ok, coneflower, ok, good"
"Evergreen trees? Yes, Christmas Trees. Give me another name. Yes, good, pine trees. Why are they called evergreen? Exactly, they stay green all year." Deciduous trees? Think about those "baby teeth" what happens with them? "Good, Maples, Oaks."

The students then demonstrated what they'd learned by taking a short quiz and drawing a garden sketch in the shape of the flagpole space in front of their school. Because much of this information was brand new to these children, the interactive question and answer, example-driven guided teaching methodology was essential to their initial understanding and enjoyment of the lesson. Even though much of this was new material, the 4th graders did very well with this part of the lesson. Some of the plants were familiar like daisies or roses and some of the names were just fun like Tickseed, so that made it easier to remember. Of course, with some prompting, they were most knowledgeable about different kinds of foods from different parts of plants and perhaps most surprisingly, they knew their vegetables!

Using Berger's (2003) approach for actively integrating subject areas and Science, Technology, Engineering and Mathematics (STEM) education, Design added a unique dimension and creativity to unite this plant/gardening lesson. To introduce the idea that design is about certain creative principles, I started to engaging students with questions to aid their thinking (and hopefully elicit a giggle or two) like:

- Who Does Design Work? An artist? car salesperson? plumber? architect? 4th Graders?
- What are some professions or some people who work with plants? Farmers? Botanist? Landscapers? Gardener?

We spent some time talking about what the new terms meant, making connections with conversations that went something like this:
"What is landscaping? Ok, someone who does yard work and plants flowerbeds. So, then tell me, what is a landscaper?" or "What is botany?" Well, many sciences end in –ology like

biology, the study of . . . yes, living things and someone who studies living things is a biologist. Well, the study of plants is called Botany, so what is a botanist?"

Strands related to the Elements of Garden Design concepts were woven throughout the lesson so a final activity was planned to reinforce the learning. We briefly revisited the new plant and garden design information just before they started to actually sketch their ideas, "just as a garden designer would do". Their design sketches (see example below) for the schoolyard gardens clearly demonstrated their understanding of the diversity of plants and elements of design.

Two weeks later, we had "Planting Day." During this time the we started with trash pick up, weed removal, as well as a short demonstrations for students and teachers about how to plant, why water was essential for new plantings and other basics to help the plants survive. The two classroom teachers brought additional hand tools and gloves and worked with us as we all got started. Even at 9:00 a.m. as their school day began, the temperature quickly reached a humid 90 degrees—it was indeed Hot, Hot, Hot!

We purchased and delivered to the school site 50 plants—hardy, native perennial flowers including Shasta Daisies, Purple Coneflower, Lavender, Tickseed, Coreopsis, Columbine, Black-eyed Susans, Spearmint, Peppermint, and St. John's Wort. We also planted varieties of daylilies to create the circle of plants that the 4th graders "designed" for the school entrance flagpole circle. In an inner area that was edged by some Knockout rose bushes, we removed dead Holly bushes and planted two Forsythia bushes. In a couple of shadier locations, we planted variegated Hostas. These plants were selected to illustrate to the students the infinite variety of plants and to demonstrate the hardiness of native, perennial plants.

School walkway beds had ground cloth covered with as much as a foot of mulch in some places. This made the digging especially difficult. By the time we finished at 11:30, several other staff members, teachers, and custodians (initially reluctant to get involved) came to work with children. The custodians turned on the outside faucets so the students could water the plants, which quickly became watering each other (including me) but with full sun and 90 degree temperatures, getting splashed was a good thing.

The results of the planting that morning showed that the students understood and could apply the information they'd learned about elements of design by making the plantings similar to what they had quickly sketched at the end of the first classroom lesson. They placed the plants in patterns that used design principles such as placing taller plants behind shorter plants and arranging them in groups of 3's and 5's for more visual appeal.

The school carnival was the week following Planting Day, so some trampling did occur. With no rain and perhaps too little watering, I was not expecting to see much green to be there two weeks later when I returned for the follow-up debriefing lesson on the day before school ended for the year. On this third visit to the school, the second classroom visit, we talked about the Family Day Carnival and how the schoolyard plants were faring.

We started our third visit, second classroom lesson with a brief recap of our Planting Day experience. We congratulated them on watering the plants and about how good most of the plants were looking. For the most part, even with the School Carnival taking place the previous weekend, the newly installed plants were holding up nicely. We then quickly touched on the information from the first lesson and made list of all of the many different kinds of plants they'd planted and where the plants were located in the schoolyard. In each interaction with the 4th graders, we were very aware of the need to use relevant examples that made the connection to what they know of the world and to their physical needs. As an example, we emphasized why it was important to continue to water the plants during the summer by using the analogy that they get thirstier in the heat of summer and so do plants and other animals. A series of questions about the terms native, perennial, etc. led us to believe that the students did understand the meaning of the words and could give correct examples of the plants.

Discussion of Results and Insights

Responses on the first assessment indicated to some extent what the students learned that morning, but it also showed the that the majority of the students had very limited exposure to plants and gardening prior to our visit. The number of respondents changed and shifted, as students were absent during our first classroom visit but present for the last wrap-up lesson and vice versa, so the students and the students taking the quiz varied. Students also left some answers blank if they could not come up with an answer, so the number of responses varies as well. One interesting note was that several students responded with names of several vegetables, demonstrating their familiarity with a variety of vegetables.

Brief discussions during the two classroom lessons focused on what plant basics like what do roots do? And what is the function of stems, leaves, flowers, seeds, etc.? A very interactive approach was used with these 4th graders where analogies related to what they knew, themselves, their bodies/systems, their neighborhood and so on were employed to clarify or extend the learning. It became apparent quickly that they were eager to learn and that their experiences with plants and gardens was limited to what they saw in front of their school (10 newly planted Knockout Rose bushes) and Christmas (pine) trees. Of course, this rather blank slate meant these 4th graders were open to soaking up much of what was presented in the lessons on plants, gardening and elements of design.

From a teaching perspective, the number of responses to the questions on the first and the second assessment remained unchanged but what was more informative was the quality of the responses. There was definitely more diversity in the species and types of plants that

the students listed. Many of them moved away from putting "roses" for every type of flowers, bushes, and/or perennials.

One slightly disconcerting trend was that on the first assessment, all student responses indicated that they understood connection between farmers and plants whereas the responses to the same question on the follow-up, 3/27 answered "no". It is impossible to know the basis for the misunderstanding that lead to the three incorrect responses that farmers don't work with plants. It may have even been simply that those three students were absent during the lengthier first lesson or that they read too much into the question or something else about the question distracted them but there is no way to be certain.

Some insights of value to educators can be gained from three examples that happened during this short gardening project. The first example was that one female student stated that she loved daisies. Several Shasta Daisies were therefore purposely included in the plant selections for the project. Unfortunately, on Planting Day, we learned she was not allowed to participate for some unknown reason. During the second classroom visit the following week, we could only ask her if she noticed the daisies that were planted around the front entrance at her request. The best way to sum it up is that frequently things go awry even with the solid lesson planning and good intentions—we can't control outcomes, as is often the case when working with humans, plants, or the weather—we can only do our best and hope for the best.

Another interesting highlight of our planting day was that a student who was academically challenged turned out to be our "master gardener." He knew how to prepare the hole, cover the roots and water the plants because he had helped his mom plant their garden. This student was not there for either classroom lesson visit.

The third example was the boy who had serendipitously lost his tooth during the discussion of the meaning of the term deciduous. This student was there for both classroom lessons and for the planting day event but he was challenged academically and somewhat disruptive. Over the course of the school year, the other students had learned how to help him to stay on task and keep up with the lessons. Their classroom teacher had provided worthwhile guidance and set the tone in the classroom so that the students understood the "life lesson" that they could and should help someone who is struggling and that they could make a difference by lending him a hand.

This project was not meant to provide comprehensive plant or gardening knowledge for these 4^{th} graders, but rather to expose them to information that they might not bump up against in their daily lives. The larger project is community outreach for community gardening to address food insecurity and to help with creating more savvy healthy food choices. Some responses were reminiscent of a free-flowing "word association game" but this was good because it allowed them to think outside the box and to use some creativity rather than trying to come up with just one right answer.

We were appreciative that these two classroom teachers were willing to allow us to come

into their room and work with their students at the very end of the school year. With that, unfortunately, Quiz #2 ended up being even more rushed than the first quiz. Overall, student responses indicated that they'd come away with more plants/gardening knowledge, even with little overlap of the students that were in there for the lessons and/or with different students in attendance for one or more of the three visits to the school.

Conclusions and/or Implications for Learning

As stated earlier, this project was one part of a larger university Campus Community Gardening Project to address gardening and food insufficiency in the Miami Valley area. This approach provided many opportunities for extensions and cross-curricular applications. In context of the larger project, this was engaging for the students and included ongoing gardening efforts in the locality near the university. Much of our efforts are in the locality near the university. Our work with these 4^{th} grade students at an urban partnership school was to also provide a basis for the students to learn about plants and gardening while also providing exposure to the professions that work with plants and gardening. We also incorporated design into the lessons with this Schoolyard Beautification Project to add an element of STEM education. Initially there were two Volunteers in Service to America (VISTA) Summer Associates working on this project and they both helped with the School Beautification Planting Day. One VISTA Summer Associate continued through the summer with the university Campus Community Gardening Project planting, tending and documenting the progress of four different garden sites on campus and in nearby communities. The VISTA Summer Associate also worked with two other urban gardening projects in Dayton. One of the primary goals of the larger project is educational outreach and that was continually happening. Several preschool and summer camp groups, scouting groups and other community service groups toured and helped with the various garden locations. In addition to the 33 4^{th} graders and their teachers, well over 100 students, teachers, volunteers and more were served by the larger project.

Final Thoughts

In many respects, including the focus on design principles, this project embodies the underlying tenets of STEM Education coupled with Hands-0n Project-based learning. It was beyond the scope and timeframe of this project, but one extension of these two lessons could be to do some exploration with the students about STEM careers like engineering. It was apparent from the responses that these urban 4^{th} graders had little or no understanding of what an engineer or an architect does even after our discussion. More exposure to possible career fields, perhaps speakers or job shadowing would help students to see and hear from real people in those professions and interact with them. Interactions, hopefully in person and with enough time to see that these are real, live people not just mad scientists in a movie or on TV, could foster positive thinking about the possibilities of pursuing college majors and STEM field careers. It might also be beneficial for students to hear from college students who are preparing for these professions what education is needed to pursue STEM careers and a better understanding of what STEM professionals do

in their work would be valuable outreach.

It was our hope that the information and conceptual understanding that these 4th grade students gained about the diversity of plants and the hands-on experience of planting would spark a greater appreciation of gardening and by extension, the natural world. Connecting children and their families to nature through gardening and outdoor play is a priority for health professionals as well as educators. Recent statistics tell part of the story http://parksandrecreation.org/2012/August/Statistics-of-Play/ as does the ongoing research compiled by Richard Louv's Children and Nature Network (http://childrenandnature.org). Ramey (2010) also draws attention to the importance of outdoor play and explorations in nature for the emotional, mental and physical well-being for children and adults. It was refreshing to see the enthusiasm and energy of the students for this gardening project, just as the research would predict. They were good workers without hesitation, remarkably well behaved (even at the very end of the school year) with no displays of "attitude". These 4th graders were willing to listen, learn and do.

As stated earlier, the research is quite clear in stating positive connections between active outdoor learning like gardening and children's wellbeing (Blair 2009). Incorporating STEM education and elements of design with the benefits of gardening produce remarkable results in the course of this three lesson unit for a group of urban 4th graders at the end of the school year.

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References and resources

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List of Plant and Gardening Terms:

Perennial
drought-resistant
roses
flowers
annuals
deciduous trees
evergreens
native plants
ornamentals
vegetables
food
gardening
planting
landscaping
Botany
Garden Design
Hardy
Shasta Daisies
Purple Coneflower,
Lavender
Tickseed
Coreopsis
Columbine,
Black-eyed Susans
Spearmint
Peppermint
St. John's Wort
Diversity
varieties
Daylilies
Forsythia Bushes
Hostas
Soil
nutrients
water
space
warmth
sunlight