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W. H. Keister Elementary School garden: Making environmental connections

Kinsey Elizabeth Browning

James Madison University

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W. H. Keister Elementary School Garden:

Making Environmental Connections

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A Project Presented to

the Faculty of the Undergraduate

College of Integrated Science and Engineering

James Madison University

_______________________

in Partial Fulfillment of the Requirements

for the Degree of Bachelor of Science

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by Kinsey Elizabeth Browning

May 2014

Accepted by the faculty of the Department of Geographic Science, James Madison University, in partial fulfillment of the requirements for the Degree of Bachelor of Science.

FACULTY COMMITTEE:  

Project Advisor:  Dr. Amy Goodall, Ph.D.,  
Associate Professor, Geographic Science

Reader:  Dr. Fletcher Linder, Ph.D.,  
Associate Professor, Anthropology

Reader:  Dr. Henry Way, Ph.D.,  
Associate Professor, Geographic Science

HONORS PROGRAM APPROVAL:

Barry Falk, Ph.D.,  
Director, Honors Program
“There was a child went forth every day,
And the first object he looked upon, that object he became,
And that object became part of him for the day or a certain part of the day,
Or for many years or stretching cycles of years. “

-- Walt Whitman

“There Was a Child Went Forth”

Leaves of Grass 1871
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Abstract

Development of Harrisonburg’s W.H. Keister Elementary School (KES) Garden was started during fall 2011. KES Principal Anne Lintner and several faculty members from KES worked with the James Madison University Integrated Science and Technology Department, three JMU Geographic capstone students, and the preschool – 4th grade KES students to create a vegetable and wildflower garden. The design of the garden was developed by the JMU Geographic Science capstone students with the objective to create a learning laboratory where KES children could learn about and explore the growth of vegetables and the life science of insects and birds that visit the garden. In this study, I address the importance and benefits of a school garden for increasing children’s connection to natural environments. Through literature review and field observations in the KES garden, I assessed how to improve learning opportunities and nature connection in the garden. By investigating case studies and my own observations, I present methods for increasing children’s interactions with the garden and make recommendations for further work.
Introduction and Objectives

As video games and smartphones, asphalt and bright plastic playgrounds have surely influenced activities with bicycles and soccer balls, and tree climbing for children, there is a well-based and growing concern for the limited experiences outdoor play. While on average children today are able to recognize many corporate logos, very few children can recognize many species of plants or animals in their local environments (Rilla, 2013). What Richard Louv coins “nature deficit disorder”, referring to the condition of “the human cost of alienation from nature, among them: diminished use of the senses, attention difficulties, and higher rates of physical and emotional illnesses”, can be easily observed in most classrooms across the country (Louv 2005, p 36). The new generation of “containerized kids”, as Jane Clark calls many of today’s indoor-ridden children, who spend their time indoors, with a television or computer, in strollers or highchairs instead of using their senses in exploring the natural elements (Rilla, 2013), and rarely given the opportunity to roam and discover the nature surrounding them.

Children growing in environments that lack access and interaction with natural outdoor elements “inevitably pose a threat to the future of the planet”, because they are missing learning the “intuitive values that can only be acquired by direct experience of the living biosphere” (Moore, 1990). Not having the opportunity for hands-on interaction and experience of outdoor connections with nature means missing opportunities to foster ecological literacy and care for the future state of the environment in the coming generations that will hold the responsibility for assuring its health. Though some children have access to quality outdoor home environments that fill many natural developmental needs, for others opportunities for interactions in natural settings are limited, and their primary chance for regular outdoor time is on school grounds. Many schools have landscapes that given the proper design, have the unique opportunity to provide
human-environment interactions to a large number of children who may or may not have the opportunities for such interactions in their home settings.

Given the amount of time that all children spend at school, the school landscape becomes an ideal place to provide children with opportunities for more interactions and learning experiences with nature. An effective way to providing those interactions is in the form of a school garden. After recognizing the fact that children in the city had lost touch with “agrarian lifestyles” and the many lessons that growing a garden can teach, the Waldorf School in Stuttgart Germany implemented in 1919 one of the first gardening curriculums (Eberbach, 1988). Since the early 1900s, schools across the country have included school gardens as part of their landscape, but over the years, the popularity of dedicating garden space at schools has risen and fallen (Blair, 2009). Recently however, with the multitude of environmental and child developmental concerns associated with limited time outdoors as well as further understandings and studies of the garden benefits for children, gardens are once again making an appearance as a popular addition to the schoolyard space (Blair, 2009).

Along with many developmental, physical, cognitive, social and mental benefits of elementary school gardens, the gardens bring also a sense of ownership, responsibility and pride (Cutter-Mackenzie, 2009). Vast amounts of research in sociology, psychology, geography and other fields show that children’s interactions with nature and garden spaces can lead to numerous developmental benefits and help to foster appreciation for natural environments (Blair, 2009). Studies carried out by Louise Chawla show that the majority of environmentally active adults across the globe relate their love of and motivations for protecting the environment to fond outdoor childhood memories (Chawla, 1999). In today’s American society, the occasions to create these lasting outdoor memories that foster environmental stewardship are steadily
As Catherine Eberbach states, “childhood is when fleeting moments cast lasting impressions; when exposure to environments profoundly shapes future environmental predispositions… introduction to gardens in childhood may foster associations that continue to adulthood” (p 1). Given today’s modern societal concerns and rise in urbanization, the role that a school garden can play in fostering positive impressions and connections regarding the natural world are increasingly critical.
Benefits of School Gardens

Gardens are becoming a popular project and learning tool in many schools across the United States, especially in the past few decades and with good reason. School gardens provide children with a number of proven benefits, including “positive influences on student health and well-being, environmental attitudes, academic performance, physical activity, and social skills” (Cutter-Mackenzie, p. 123). Studies across many fields, including sociology, psychology, environmental education, and geography have studied and confirmed the benefits of a school garden for young students; a comprehensive list of these benefits and their citations can be found below.
Table 1. Compilation of the cited benefits a school garden can provide children.

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Academic</strong></td>
<td>Scientific observation, science learning</td>
</tr>
<tr>
<td></td>
<td>2, 5, 8, 10</td>
</tr>
<tr>
<td>Ability to concentrate</td>
<td>4, 12</td>
</tr>
<tr>
<td>Ecological literacy</td>
<td>2, 6</td>
</tr>
<tr>
<td><strong>Physical</strong></td>
<td>Health, nutrition</td>
</tr>
<tr>
<td></td>
<td>1, 5, 6, 10, 11</td>
</tr>
<tr>
<td>Activity</td>
<td>11, 16</td>
</tr>
<tr>
<td><strong>Social</strong></td>
<td>Cultural learning</td>
</tr>
<tr>
<td></td>
<td>1, 2, 14</td>
</tr>
<tr>
<td>Positive values; sharing, responsibility</td>
<td>10, 16</td>
</tr>
<tr>
<td>Positive attitudes toward school</td>
<td>9, 10</td>
</tr>
<tr>
<td>Interpersonal relationships</td>
<td>4, 9, 10, 13</td>
</tr>
<tr>
<td>Sense of Community</td>
<td>2, 6, 14, 18</td>
</tr>
<tr>
<td><strong>Environmental</strong></td>
<td>Relationship with nature</td>
</tr>
<tr>
<td></td>
<td>1, 4, 7, 14, 17</td>
</tr>
<tr>
<td>Environmental awareness</td>
<td>1, 3, 5, 6, 8, 18</td>
</tr>
</tbody>
</table>

In her lengthy study concerning the impact of different elements of school grounds on children’s perceptions of nature and of the school, Wendy Titman identifies the central theme and role of culture as it relates to the social context in how children relate to outdoor places as well as the elements’ physical nature of the place. Given the wide range of different cultures and nationalities present at KES, the relationship between natural elements and culture is something to keep in mind in designing a space in which all children can learn.

In another study, Amy Cutter-Mackenzie creates a culturally focused environmental education program as part of an Australian gardening program for low-income schools. The program provided well-documented education, social, and health benefits of growing food and of gardening, as it is used to learn also about culture, language, and environment (Cutter-Mackenzie). The school in this study, much like KES, was a culturally diverse school with a large portion of refugee and migrant families due to the local refugee resettlement office in Harrisonburg. Cutter-Mackenzie’s study showed “how a culturally diverse school with a high proportion of migrant and refugee families created an engaging garden space… and lead to a strong sense of belonging among students who were formerly dislodged from their birthplaces” (p 122). As culture is such a large part of one’s identity, we tried to take into account some of the cultures that have a strong influence at KES in the design of the garden. The garden in this Australian study as well as KES garden offer opportunities for learning English language as well as forming connections and attachments to the local environment, leaving the opportunity for “children’s gardening to transcend language and cultural differences”, as was the case in the Australian study (Cutter-Mackenzie, p 122). Harrisonburg is home to an Immigration and Refugee Program that since 1988 has resettled refugees from Afghanistan, Azerbaijan, Belarus, Bosnia, Burma, Colombia, Congo (Kinshasa), Croatia, Cuba, Eritrea, Iran, Iraq, Kazakhstan,
Kosovo, Russia, Rwanda, Serbia, Sierra Leone, Sudan, Tajikistan, Ukraine, and Uzbekistan within a 100 miles of their office (Church World Service), making Harrisonburg and KES a culturally and lingual diverse place perfect for creating the engaging garden space that Cutter-Mackenzie’s study so effectively carried out.

A garden also provides an educational environment in which most children can find something they are interested in or good at, be it worm finding, weed picking, seedling watering, or bug observing. A garden is a space where children “who might not shine in the classroom can shine” (Belz, 68). The garden is a space where children can learn through experimental, hands-on education, the local ecology, natural processes, the responsibility and empathy needed to nurture and care for a living organism. The localized nature of gardens provides a way to experience and learn about the local environment plants and animals in a very intimate and efficient way. Creating a garden that uses only organic materials like compost and avoids the use of synthetic chemical inputs helps also to diversify the local ecology and create natural habitats for birds, insects and animals, allowing children to interact with and learn about and admire the local ecology and natural processes.

“The garden is a setting where children can learn to empathize with plants and animals”, learn to care for them and develop a desire to protect them. (Belz, 67). In the multicultural garden study in Australia, it was noted that during the study, children’s relationships with the environment became more personal as “the majority of children shifted from seeing the environment as an object or a place, to a view characterized by the interconnectedness of humans and environment” (Cutter-Mackenzie, p 83). As long time teacher and gardener Claudia Marinai states, “Young children must learn to care for and respect the natural world during their first few years of life or risk never developing such attitudes” (Belz, 69). Offering the students a natural
space in which they can connect with nature and begin to foster the respect and outdoor
gardens that Lois Chawla cites lead to environmental concern and stewardship.
Garden sites on a school landscape have the potential to be a tool for children to learn many
necessary values to grow into responsible, conscientious and environmentally friendly citizens,
as well as a wonderful resource for teachers if they choose to utilize and integrate with their
lessons.
A Case Study: Keister Elementary School Garden

Designing a school and garden space in a way that encourages exploration and interaction with a natural world allows the garden to become more of an educational tool and to maximize the benefits the space can offer. By intentionally designing the school garden for children’s use and exploration, it goes from a setting that they can admire to one that “promotes their physical, social, emotional and cognitive development” (Eberbach, p2). In altering the layout and design of the Keister Elementary School Garden, the hope was that the children will be enticed to interact more with the natural settings outside of school as well, and grow to appreciate the wonders that the garden can show them. To design a garden specifically for these children is to go beyond simply putting them into a setting. It initiates the nature interaction and learning opportunities that encourages them becoming environmentally conscientious and strong functioning citizens.

The W. H. Keister Elementary School (KES) Garden was created two years ago, in Spring 2012 by three senior thesis students aiming to provide a garden that would help teach the children about the natural production of food and allow a space to support native wildflower habitat and butterfly biodiversity. Senior Geographic Science Students Rachel Frischeisen, Lisbeth Rasmussen, and Lindsay Cutchins installed the garden in 2011. Through the Keister Garden Fund, begun by Dr. Amy Goodall and Dr. Paul Goodall, as well as generous Capstone funding through the Department of Integrated Science and Technology at James Madison University, the garden has provided a space for the children and community to enjoy as a part of the Keister Elementary School landscape. Lindsay, Rachel, and Lisbeth used a survey assignment that was given to the children to determine what vegetables and plants the children would recognize in the garden. They then used the survey results in deciding what to put into the beds. In 2013 capstone students Kyle Schwizer and Erica Nordgren created surveys to determine
the butterfly and bird species that the children see inside and outside of the school landscape, and used the results of this survey to increase biodiversity by including plants that serve as habitats or otherwise attract the species selected by the children. They obtained the data from these surveys to determine what elements and plants to add to the garden plans to increase the interest and interaction. Further analysis of the responses from these surveys, seen below, was done to create a clearer picture of what plants and food items the children identify most with. Lisbeth and Lindsay conducted the survey and did the preliminary view, and further analysis was conducted to more clearly what plants should be included specifically for the KES student population when planning and designing the garden.

Figure 1. Survey created and conducted by Lisbeth Rasmussen and Lindsay Cutchins
Figure 2. Analysis of vegetable survey determining what foods the students prefer, chart showing vegetables with the highest percentage of yes responses from a sample size of 226, grades K-4

Many of the children attending Keister Elementary School are considered low income, and the most recent demographic statistics state that 55% of the KES students are eligible for free or reduced lunches (“Keister Elementary School”). Keister Elementary School is unique in that over 47 nationalities are represented, and along with that, about half of the students are learning English as a second language. As previously cited in Cutter-Mackenzie’s study proving the benefits of a multicultural garden, the variety of cultures and languages seen in Keister Elementary School further add to the value of the garden in teaching English, and cultural sharing. In designing the garden, all of the demographic and cultural factors were taken into account as well to create to most engaging space possible.

The garden location is also within walking distance of many families with children attending the school, putting it in a good position to offer children and their families’ access to appreciate the garden space outside of school hours as well. The satellite images of Figure 4 and
Figure 5 below show the location of Keister Elementary School, and the blue circle in the image to the right indicated an apartment complex where many of KES students live. The forest area between the complex and school has been studied and analyzed this year, for the recent implementation of an expansion of trails with the intent of decreasing the minor crimes in the area as well as allowing a safer, more pleasant walk for the children and families to get to the school.

Figure 3. Shows KES outlined in yellow and the garden site outlined in pink

Figure 4. Shown at a larger scale to include nearby housing, the blue circle indicates an apartment complex where many KES students live.
**Methods**

To improve learning opportunities and nature connection in the KES garden, a number of methods and garden design ideas were used to increase the students’ interactions in the garden. The garden design was created using organizational methods selected based on successful case studies, field observations and contact with the KES students as well as past KES surveys and other research. Designing the garden specifically for the KES students allows the space to provide the maximum amount of benefits previously cited as well as foster the greatest sense of nature appreciation and connection.
Methods to Improve Learning in the KES Garden

After determining that the most effective way to have continual child interaction with the garden was to alter the design and organize the garden in a more interactive and interesting way, a number of methods were used to create an engaging learning garden space. This includes the creation and addition of signs, a mailbox activity, taking down the current fence, and a school-wide Earth Day event; all aimed at getting the children more interested in and excited about the garden and nature. Using literature on garden design geared towards natural and environmental education and awareness, a new garden design was proposed to promote further interaction and exploration of the garden space by the children.

To help the children cognitively organize the garden and help with plant recognition, the garden was modified to include separate sections specific to the plant type. For example, there is an herb section, a fruits section, a vegetable section, a butterfly section, and a flower section. To include the children further in the garden and redesign, the art teacher at the Keister Elementary, Mrs. Johnston, helped to plan making signs to label each of the sections as well as a large welcome sign she designed to be placed near the garden entrance. Given a basic outline, the children enthusiastically helped to paint the signs. Including the children in this aspect of the garden redesign should also aid in creating a greater sense of ownership, pride, and association with the garden (Cutter-Mackenzie, 2009).

Each of the garden sections is labeled in both English and Spanish in consideration of the large percentage of the children who are Spanish speaking as well as the school’s expanding Dual Language program. Along with the child-painted signs, small wooden signs with descriptions/instructions were also included to make the garden a more fun and interactive space for children and families. This was done because according to Valerie Beng-Jensen, the text used
in the garden should be “designed to reflect the purpose of the garden, represent the gardeners’ knowledge (garden literacy), and address the anticipated needs of the intended audiences or visitors” (p69). Adding signs to the garden has not only made it more visually appealing, but having the children aid in creating these signs gives them a greater sense of ownership and attachment to the natural garden area. Many of the children previously viewed the garden not as their own, but as a restricted space in which they are unsure of their role and allowances. The addition of signs created by themselves or their peers invites and instructs them on how to best interact with the space and create for them welcoming ideas of how they can and should interact with the natural elements.

Another benefit of this sense of ownership and pride in the garden is that the children may be more inclined to express their interest and involvement in the garden both to other children and to their families. The signs also serve as a way to spatially organize the garden layout and provide further understanding of what the plants are and what their purpose is. Including the instructional and smaller plant identification signs provide further interaction and learning for the children and families. Having this element in the space that is welcoming and explicitly invites the garden visitor to help tend and enjoy the garden leads to more confidence and willingness to help maintain a healthy garden as well. Including a pictures as well as instructional text on the signs also helps to make it “more accessible for newcomers to English, and to students who may not yet have a solid foundation in written English” (Bang-Jensen, p74). In any elementary school setting where children are learning reading and language use signs would be helpful, but especially useful at KES where a large amount of the student body is learning English as a second language.
To be fully child-oriented, a garden “must be fully accessible, transcending mere physical access and giving children permission to touch, explore, and alter the environment” (Eberbach, 1988). To promote interactions and exploring in the garden, instructional signs about how to interact with the plants and what activities are appropriate in the garden will be included in some of the garden sections. In a study done using children’s drawings of their “ideal garden” to determine what elements to include in a garden design, plant labels ranked sixth of all the elements drawn, with 12% of all drawings including labels (Eberbach, 1988). Including signs and labeling for the individual plants in the garden allows the children to interpret and learn from the garden independently, or to share the experience with their families as well.

Picture 1. KES students painting the garden Welcome sign during Art Club after school

Picture 2. A student painting the “Butterfly Section” sign
The specific design and layout for the vegetable plants was decided with the help of Mother Earth News’ garden guide, suggested by Lindsay Cutchins and Lisbeth Rasmussen, the first Keister Elementary School garden capstone students. Thinking of the large population of Latin American families and students that attend KES, in addition to the Spanish on the signs, a section of the garden will be reserved as the “salsa garden”, growing ingredients commonly found in salsas, including onions, tomatoes, cilantro, and a variety of peppers. In the other garden bed, there is also a “Mystery Garden” that the children will help plant, but have to wait and see what is produced to find out what the “Mystery Seeds” they have planted grow to produce. The “Mystery Garden” bed will ignite their sense of curiosity and in turn, they will be more interested in expanding their ecological literacy of the local ecology in attempts to determine what the plants in the garden may be.

![Diagram of the garden with sections labeled](image)

Figure 5. Redesign of the garden, including the garden sections and placement of signs. The beds along the South, East and West edges are reserved for native wildflower and butterfly biodiversity planting.
Catherine Eberbach states that in designing a garden, to maintain the interest of elementary school children, “incorporating appropriate activity into children's gardens is crucial” (p40). To do this, an ever-changing “Mailbox Activity” will be implemented. A new printed activity (worksheet, drawing, instructions, game etc) will be put into the mailbox at regular but unforetold intervals for the children to enjoy during their recess hours, to foster a sense of curiosity and excitement about the garden space. The mailbox activities inherently have a sense of mystery and excitement that comes along with opening and finding what is “hidden” inside. It also can provide social interactions within the garden as the children work together in discovering what is inside and completing the activity. The interactive activities that will be available in the garden can also be used by teachers or by other studies to obtain information on what outdoor and natural elements the children gravitate towards or connect with. Valerie Bang-Jensen suggests, “a mix of natural and people-made elements (to) attract children of all abilities, providing excellent opportunities for child-to-child interactions and shared experiences that integrate children naturally” (p9). These worksheets, activities and instructions provide a fun and interactive way to get the children’s curiosity and wonder about the garden and natural processes. These activities could also be tailored to certain lesson plans, curriculum objectives, or be as simple as drawing a picture of something they see or like.

For the continued plans and maintenance of the garden, a general map of the garden and the current plants was created along with a comprehensive list of plant suggestions based on literature about school or children gardens including How to Grow a School Garden, Roots, Shoots, Buckets and Boots, Plants for Play as well as a number of online sources. Many of the suggested plants were also a part of the survey previously given, and they include the feedback and statistics from the vegetable survey alongside the rest of the information.
Field Observations

Throughout the process, due to the nature of the place of study being a garden site, there is also a required amount of garden maintenance and planning to be done. This includes working with authorities and staff (as well as children) at the school for upkeep of the garden site and to manage it in a way that makes it easy to involve in curricula and learning activities. This also provides a way of attracting the children to investigate and enjoy the garden on their own. During regular maintenance, some observations were obtained on the effectiveness and overall functionality of the garden.

One of the problems that the garden faced in the past was the issue of deer and other smaller animals making a meal of the plants in the garden, resulting in the death of some plants. To resolve this issue Dr. Amy Goodall and Dr. Paul Goodall installed a fence surrounding the garden space along the outer edges of the beds. Though this was effective in keeping the plants from being eaten, it did cause a few unforeseen problems for the garden layout. To enter the garden space, an adult needed to open the fence by rolling back the fence material to one side. With the students’ lack of independent accessibility to the garden space could have been perceived as an “off limits” area. Another issue the fence posed was that of accessibility to the outer limits of the garden beds. The garden beds were designed originally so that they were approximately the width of two children’s arm lengths from each side. With the fence surrounding the outer areas, only half of the outer beds were within the children’s’ reach without stepping on the beds and potentially harming the plants.

During one day of regular after school garden maintenance while a number of children and their families were out on the grounds, two baby shrews were discovered in the compost pile. Though the idea that animals were making homes in the garden proved thrilling to the
children there, the shrews were causing issues with the watermelon harvesting. By the time each melon seemed ready to harvest, more often than not, it would be turned over only to find that a creature (presumably the shrews) had bitten into and hallowed out the entire melon. They did seem to leave one certain type of melon alone more so than the other varieties, and that has been taken into account in the current redesign plans.

Figure 3. Hallowed out watermelon presents evidence of rodent activity

Also during that day of maintenance, the students and their families helped to harvest the peppers and some of the strawberries and tomatoes, which they expressed much excitement in doing. Another source of interest for the children helping to harvest was the insects throughout the garden (all types) as well as the evidence of insect bites on some of the vegetables they harvested.

Figure 4. A student presenting his freshly picked banana pepper with a small insect bite in it
Earth Day

To incorporate the children further in the garden, an Earth Day event was planned to include all 398 students to get some organized hands-on activities and to help put all of the plants into the garden. Doing this required vast amounts of organization. Each teacher interested in involving their class that day signed up for a thirty minute time slot during the day, which Mitch Yoder, a teacher at KES who works extensively in the garden space and has put in place plans to expand it, helped to organize. Each teacher was then tasked with organizing the children into four groups; one group to dig the soil, one to plant the seedling or seed, one to add worms to the soil, and a last group to water. Using biodegradable peat pots with seedlings already started in them helped to make the process a bit easier to organize on the day as well as more hands on and visual for the children. In case there was excess of time or not enough to do with one of the groups, extra seeds were on hand as well as tags for the garden that the children could write on to label the plants they had just planted.

Figure 5. A student holding a worm she was given during Earth Day.
Figure 6. Earth Day planting. Juice bottles with holes drilled through the lid were used for watering.
Conclusion

It is helpful that there are such dedicated teachers willing to put extra effort forth, to ensure continued success of the garden space, but further integration of the garden with curriculum activities or events could also be beneficial. Working in a garden has been shown to provide children with a sense of belonging and can also be a tool for language and cultural learning. The garden provides a structured outdoor setting for the students, teachers and community members to interact with and enjoy the process and products of a native wildflower butterfly habitat and fruit and vegetable beds. Redesigning a garden that invites curious wondering, nature play and learning through design elements maximizes the benefits of the space for the children, school and community. The new design allows the space to be utilized and enjoyed to the fullest by the children on their own or with their family or class, and can promote and foster a sense of responsibility and affection for the natural world and environment that the children can carry with them to grow into environmentally conscientious citizens. The garden redesign and activities suggested and implemented in this study also take into account the student and family demographics and cultural and language differences present at the school.
Further Recommendations

The KES garden has proven an enjoyable space on the school grounds for students as well as family and community members in the past years. Partly due to the success of this garden, this year a third grade teacher, Mr. Mitch Yoder, organized an expansion of the community garden that has now doubled the bed space for planting. The mid-April groundbreaking day also brought much of the community together to build raised beds and spread mulch on the forest trails. Numerous local companies have donated bed materials, soil, child-sized gardening tools, a water tank and many other supplies. With the recent expansion of the community garden that has now doubled the bed space for planting, there has been a significant increase in interest and attention to the garden spaces. During the groundbreaking event, the current fence that surrounded the original garden space was removed and a larger wooden fence that will provide easier access into the garden is to be put up in the near future.

To ensure successful continuance of the garden as a learning tool, frequent and clear communication with the KES principal and KES staff is necessary for proper organization. Though other designs and layouts may be better suited for different purposes in the garden (a teacher implementing it into their curriculum for example), it is suggested to keep sectional signs and plant labels in the garden as it makes for easier and more informative interactions. The addition of more signs, including a “Garden Rules” or “Garden Etiquette” sign and more instructional and descriptive signs would be highly beneficial, especially for visiting families.
Appendix

Outdoor Elements Survey

In delving into the literature of children, place, and nature, and in developing a survey tool, it became clear that there are limited studies concerning how to efficiently determine what elements of the garden the children show most interest in. The studies, like Children’s Experience of Place conducted by Roger Hart (1979) and Special Spaces: Special People: The Hidden Curriculum of School Grounds by Wendy Titman (1994), on determining such are highly complex, long lasting and results that are difficult to relate to a larger population. The initial intent was to create a method for designing and maintaining the KES garden by determining the elements of the outdoor landscape most attractive and enticing to the children based on their responses.

Because direct observation is not only an arduous and often inefficient process, a survey (possibly multiple) or paper assignment given to the children would be a more effective way to provide quantifiable data on what outdoor elements the students prefer. By picking a variety of elements and features of the outdoor environment at KES, the results would make it clear what elements the children identify with, or that elements hold the most (positive) meaning for them. This data would provide valuable information on what elements to include when designing the new layout of the garden. Including a number of elements relating to different parts of their outdoor environment, including the constructed play settings would make it possible to determine if the natural elements of the outdoor landscape register as more attractive than the manmade elements in the place, and especially to see if (and which of) the garden elements register. This data could be useful in deciding what elements kind of elements to include when planning the garden alterations.
After further discussion with the principal at KES, the survey was not implemented. Given the time constraint of the study as well as discrepancies between the JMU Institutional Review Board which required parent permission and the objectives of the garden for KES, it was suggested that efforts would be put to better use elsewhere, and that the data derived from the survey would not be as useful assuming that the children would respond to what is most visually appealing or colorful, not what they truly believe would be nice to see outdoors.
Bibliography


