Do children's emotions toward nature change while participating in the Oakland Based Urban Gardens program?

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ABSTRACT

Many environmental education programs focus on shifting attitudes toward the environment by increasing knowledge of environmental issues, supposedly leading to pro-environmental behavior. In addition to cognition, affect can play an important role in determining children's environmental attitudes. School gardening programs that are outdoors and hands-on are one way to integrate cognition and affect in the curriculum to foster a personal connection with the earth and engage a child emotionally in the subject material. I examined the influence of the Oakland Based Urban Gardens (OBUGS) program in Oakland, California on students' emotions toward nature. I assessed the strengths and weaknesses of the OBUGS approach to environmental education through interviews with OBUGS teachers and observations of third graders participating in the program. I found that students' behaviors in the garden changed positively while participating in the program, but was unable to conclude whether students' emotions toward nature changed. This study serves as an introductory investigation to contribute to the development of more effective environmental education programs that target children's environmental affect and lead to pro-environmental attitudes and behaviors.

KEYWORDS

cognition, environmental affect, environmental education, experiential education, school garden

INTRODUCTION

Environmental education (EE) programs aim to promote pro-environmental behaviors, which are behaviors that actively address environmental problems (Chawla and Cushing 2007). Many programs focus on shifting attitudes toward the environment by increasing knowledge of environmental issues, in the hopes that this will lead to pro-environmental behavior (Cachelin et al. 2009). However, learning about concepts does not always result in a change in attitude or behavior (Nordlund and Garvill 2002). The current reliance on cognition alone may actually hinder the goal of EE programs (Pooley and O'Connor 2000).

In addition to cognition, affect can play an important role in determining children's environmental attitudes (Pooley and O'Connor 2000). In this study, affect refers to children's emotions and feelings toward the environment (Kahn and Kellert 2002), while cognition refers to children's knowledge of environmental concepts. Cognition and affect are interconnected in the brain, so an EE program that ignores either can hinder learning. Environmental educators must influence a shift in attitudes and behaviors by cultivating positive emotional connections to the environment (Sevillano et al. 2007, Littledyke 2008). Feelings of connectedness include empathy, care, and a sense of one's impact and role in ecological systems. Feelings of connectedness with nature correlate positively with pro-environmental behavior (Nisbet et al. 2009). While an understanding of environmental issues is fundamental to developing pro-environmental behaviors, it is the personal connection to the environment that motivates a person to take action and look for solutions. Stephen Jay Gould put it best when he said, "We cannot win this battle to save species and environments without forging an emotional bond between ourselves and nature as well—for we will not fight to save what we do not love" (Gould 1991).

With urbanization comes a growing disconnect between people and nature. People become estranged from even the most fundamental aspect of life—food. Food is processed, commoditized, and comes in packages from shelves in a liquor store. The relationship between people, food, and the earth is completely lost in the commodity chain. A lack of understanding of where food comes from reveals a loss of cognitive connection, and with that follows a loss of affective connection to the environment (Littledyke 2008).

School gardening programs that are outdoors and involve hands-on food production are one way to foster a personal connection with the earth and engage a person emotionally in the subject material (Cachelin et al. 2009). Various schools and community gardens in the Bay Area

have implemented this strategy to teach about food systems by incorporating gardening into EE programs. The Oakland Based Urban Gardens (OBUGS) program runs gardening classes in elementary, middle, and high schools in Oakland, California. OBUGS was established to provide communities with access to fresh produce and teach about nutrition and ecology. The organization was not originally created to encourage positive emotions toward the environment, but changed affective relations to nature may be a result of experiential gardening, as kids plant seeds, nurture the growing vegetables, harvest, and cook the fruits of their labor and develop a personal connection to the environment. However, the effect of experiential gardening on changing children's affect has not been widely researched (Blair 2009). Understanding the influence of gardening on affect can help in the development of more effective EE programs that target the factors leading to pro-environmental attitudes and behaviors.

I examined the influence of the OBUGS program on participating elementary school students' affective attitudes toward the environment. I sought to answer the question: Do children's emotions toward nature change while participating in the OBUGS program? In addition, I studied OBUGS teachers' objectives and approaches to education to determine which aspects of the program target children's environmental affect, and to develop suggestions for effective environmental education.

METHODS

Oakland Based Urban Gardens

Oakland Based Urban Gardens (OBUGS) is a private nonprofit organization that serves communities in Northwest Oakland and West Oakland in California. West Oakland has many low-income and minority residents, and has historically faced environmental injustices, including the absence of grocery stores and limited access to fresh and affordable produce. OBUGS seeks to build healthy communities through programs for youth from disadvantaged families focusing on nutrition, health, and science. OBUGS operates four urban gardens in Oakland to provide local communities with access to fresh produce. Residents can harvest the produce at the gardens or purchase from a weekly produce stand.

OBUGS also addresses the need for nutrition education by running gardening classes for elementary, middle, and high school students during school and in an after-school program. Students learn basic information about nutrition and healthy eating. Students also learn about

garden ecology, including plant biology and insect anatomy. After-school programs often involve cooking a healthy meal using vegetables from the garden. Outside of the structured lessons and activities, students explore and play in the gardens, where their minds can grow on their own time.

Study population

To examine the effectiveness of the OBUGS program on changing children's environmental affect, I observed a primary study population of a class of 16 third graders at St. Martin de Porres, a private Catholic elementary school in Northwest Oakland. I chose this class because they had been participating in the OBUGS program since kindergarten and were familiar with the program and the basics of gardening, but still had a lot of learning to do. The class contained 12 girls and 4 boys. The students were mostly African American, Hispanic or Latino.

I observed the lesson plans and activities for secondary study populations that included a class of kindergarteners at the same school as the third graders, and a class of second graders in the optional after-school program at Lafayette Elementary in West Oakland to examine how OBUGS operates in different schools and with different age groups. The kindergarten class had about 10 girls and 10 boys, most of whom were African American, Hispanic or Latino. The second grade class had about 6 girls and 10 boys, most of whom were African American.

Study design

Interviews with garden teachers

I interviewed the two OBUGS teachers who hold classes at St. Martin de Porres and Lafayette Elementary. Interview questions were aimed at gathering information about each teacher's lesson objectives and activities, opinions about the role of affect in learning, and observations of their students. These interviews allowed me to fill in the gaps of any changes in students' emotions that I could not detect in my observations, and to develop suggestions for effective pedagogical approaches to environmental education that lead to positive changes in environmental affect. I used an audio-recorder and took hand-written notes during the interviews. The following questions were included in the interviews:

1) What are the learning objectives and goals of the curricula this semester? Have these goals changed since you came to OBUGS, or have you revised them in any way?

2) Could you describe how the activities you lead in the class address the objectives and goals of the curricula? What are some examples of classroom and garden activities? What was successful

and what was unsuccessful in the lessons in terms of accomplishing the goals?

3) Do you try to foster positive feelings toward the plants and animals in the garden and/or out of the garden through your lesson plans? If so, how? What are some reasons why a teacher might focus on increasing knowledge but not on developing positive emotional connections to the subject matter, and nature in particular?

4) What are your opinions on the role children's feelings toward nature has on their learning?

5) Have you observed any changes in children's behavior in the garden throughout their participation in OBUGS? Have you observed any changes in the way they talk about the garden, how they act in the garden, or anything else? Over how long did you observe a change or no change?

Observations

To address my question of whether children's environmental affect changes positively while participating in the program, I observed third grade students during their participation in OBUGS once a week from October 2009 until May 2010 at St. Martin de Porres. I tracked changes in students' remarks about the plants and animals in the garden, their interactions with the plants and animals, and their artwork during the OBUGS class time.

To understand the structure and operations of the OBUGS program, I observed the lessons and activities carried out in the third grade class as well as in the secondary population of kindergarteners at St. Martin de Porres, and second graders in the after-school program at Lafayette Elementary. I attended the OBUGS kindergarten class, which took place one a week, from October 2009 until May 2010. I attended the OBUGS after-school second grade class, which also took place once a week, from January until May 2010.

RESULTS AND DISCUSSION

Overview

This study seeks to determine whether children's emotions toward nature change while participating in OBUGS. Positive emotional connections to the environment may be a precursor to pro-environmental behaviors (Nisbet et al. 2009). Effective environmental education programs achieve their goals of promoting pro-environmental behavior by integrating cognition and affect in their approach (Pooley and O'Connor 2000). I studied the OBUGS approach to education by interviewing teachers about their objectives, and observing the lessons and activities. I observed

students' speech, behaviors, and artwork to track any changes in their emotions toward the plants and animals in the garden.

The two OBUGS teachers I interviewed try to foster positive environmental attitudes and values through their lessons, activities, and one-on-one interactions with the students. I observed a few positive changes in students' interactions with plants and animals in the garden. However, it is unclear whether the external changes in behavior represent internal changes in emotions toward nature. My interviews and observations helped me develop a set of suggestions for future OBUGS classes to target children's emotions toward nature.

Teacher objectives

Through my interviews with two OBUGS teachers I found that their teaching goals are different from the mission of the OBUGS organization. The OBUGS mission is to build healthy communities through programs for youth from disadvantaged families focusing on nutrition, health, and science. The organization runs various programs in addition to in-school and after-school garden, art, and physical activities, including a produce stand and a youth empowerment internship. The mission is broad so it can encompass all of the programs. Although it is not part of the organization's mission and is not formally included in a written curriculum, the teachers' goals of fostering respect for and understanding of plants and animals permeate their lessons and activities.

Both teachers seek to help students see plants and animals in the garden as life forms that must be treated with care and respect. They try to foster positive feelings toward plants and animals through their lessons and activities as well as through one-on-one interactions with students. Other objectives include learning about gardening techniques, cycles (weather and seasons, water, nutrients, and food webs) and nutrition (local and seasonal).

Originally one of the teacher's goals was based on her personal interest and subject matter from the classes she was taking at a university. Now, she finds out what students are interested in and incorporates it into the lesson. Both teachers have built flexibility into their lessons, so lessons may change focus depending on students' interests. For example, if a lesson is intended to be about gardening techniques, and students find a large potato bug while watering the plants, the teacher may tell the students more about the life of potato bugs and less about watering plants.

One of the teachers has shifted the focus of her lessons to address more science-related

goals, because the class had no other science lessons outside of OBUGS class time. Even with the shift toward more cognition-based goals in the lesson plans, the teacher continued to focus on fostering respect and understanding for all life, even "gross" worms, through one-on-one interactions with the students.

Approaches to lessons and activities

OBUGS does not use a formal written curriculum in its classes. Before the beginning of the school year, the teachers work together and decide the order of the blocks of topics they will cover. There is freedom and flexibility for the teachers to design their own lesson plans and activities each week. OBUGS has curriculum resources, such as Life Lab, to help guide teachers. Ultimately the lessons and activities the teachers carry out are their own creation, complete with their own unique hand-written worksheets.

At the beginning of each lesson the teachers assess what the students know and do not know by asking them questions about the topic. The questions also help to make the topic relatable to the students, as they recall their personal experiences with the subject matter (Woolfolk 2008). After introducing the lesson topic, the teachers explain the vital information, and then explain the activity. The activities usually involve application of concepts from the classroom.

Incorporating classroom learning objectives into the garden activities can make the garden a more integrated learning environment (Stoecklin, 2009). In OBUGS, students practice and apply their learning of skills like sorting, making observations, describing colors, using their senses, spelling, and counting. OBUGS teachers lead activities where students make observations of life in the garden, paying attention to where plants and invertebrates live and getting to know the individual creatures. Scavenger hunts for different leaf shapes, rolly-pollies, ants, etc. in the garden help students build observational skills, especially when students are given magnifying glasses and asked to draw and describe what they see.

Activities in which students mimic the life of nonhuman creatures may help students develop respect and a connection to the creatures. In OBUGS, students have performed the honey bee waggle dance, drawn scenes in the garden from the perspective of an ant, done a relay race to gather "nectar" (water) and "pollen" (flour) for the bee hive, pretended to grow from a seed into a plant, and danced in a circle as evaporation, condensation, and precipitation to represent the water cycle. The teachers have found that kindergarteners and first graders in

particular really enjoy physical learning activities. Physical activities may help students remember the take home message better (Woolfolk 2008), but it is not evident whether they have an effect on students' affective memories of the subject matter.

Some activities integrate building knowledge with caring for garden life. For example, each student was given one snail to name and take care of in a small cage. The students got to exercise their observation skills by describing and drawing the color of their snails' eyes and shells, and describing the actions of the snail by watching it move around and interact with other snails. All but two of the students handled the snails gently and all expressed curiosity and affection toward the snails. Through these activities students might eventually extrapolate their positive experiences of caring for one particular snail to caring for all snails in the garden, and perhaps then caring for other creatures.

Activities that allow students to see the process of growth and see how life takes shape and form might be a way to integrate cognition and affect. A month-long experiment to determine the three things a pea plant needs to grow (soil, sun, and water) engaged students' curiosity and inquiry, as they made predictions for which conditions would produce the biggest pea plant. Students also conducted an experiment to determine if more mold grows on bread touched with unwashed hands, or on bread touched with sanitized hands. Students made predictions, and after a week got to view their results. In another activity geared toward demonstrating ecosystem changes in the context of the water cycle, students filled plastic containers with sand, soil, moss, and water, and decorated these miniature terrariums with sticks, flowers, and rocks from the garden. As the terrariums sat under the sun, water condensed on the inner walls, leading into the next lesson on the water cycle. The students' feelings of excitement to see the changes in plants and ecosystems may not have been the same as a personal connection to the subject matter, but it was at least a positive emotional response to the activities.

In addition to the lessons and activities, the teachers use one-on-one interactions with students as opportunities to emphasize the importance of caring for living things. One teacher relays this message by anthropomorphizing the subject matter in her lessons. In the pea-growing experiment, she told the students to treat their peas with care as if they were their babies. When students would resist returning rolly-pollies to the garden beds, she would ask how the students would feel if they were taken out of their home and school, away from their friends and families. When students accidentally pulled out entire plants from the garden beds, she would ask students

to apologize and say something nice to plants. This strategy is intended to help children treat other life forms as they would like to be treated. Anthropomorphism can be helpful in this regard, but it can encourage anthropocentric values of human superiority and dominance over other species, and potentially backfire on the original goals of fostering respect.

The other OBUGS teacher tries to avoid anthropomorphizing in the garden. Her objective is to foster respect and understanding of all life forms, regardless of how much or how little they resemble humans. Without imposing feelings and preferences on to a plant or insect, she simply says, "It's alive, don't hurt it." When students accidentally rip out plants, she explains that the plants die when they are removed from soil. She lets the students experience emotions related to killing a plant for themselves instead of telling them they should feel sorry.

The teachers' objectives are carried through to the after-school program, where they continue to work toward fostering respect for all life. However, during the after-school program, the goals are oriented more toward respecting other students and teachers. To address serious issues of consistent misbehavior and disrespect among the students in the after-school program, one OBUGS teacher is experimenting with a "kindness coin" system for rewarding kind behavior. However, instead of accomplishing the objectives of encouraging students to be nice, giving, and helpful to each other, this strategy often reinforces selfishness. Students would constantly beg for kindness coins, little clay tokens that could be exchanged for prizes at the end of the day, after giving their peers and the teacher insincere compliments. Students would argue with each other about who was helping clean up, and cry over not getting coins. Still in its beginning stages, this positive-reinforcement strategy is refined each week as the OBUGS teachers and volunteers see what works and what does not work to accomplish the objectives. The kindness coin experiment highlights the need to foster respect and care among students and teachers, not just for things living in the garden.

Successful and unsuccessful teaching strategies

Before teachers can begin to facilitate a change in students' perspectives and emotions toward a subject, they must be able to execute a successful lesson plan that engages each student (Woolfolk 2008). The teachers recalled what worked and what didn't work in their lessons in terms of accomplishing their goals. Through trial-and-error they found that successful lessons involved little or no lecturing, concise take-home messages, and age-appropriate worksheets.

The teachers found that lecturing to the students was unsuccessful in helping the students

learn the material. It did not foster curiosity, even if the students were listening, because they didn't experience the material for themselves in the garden. One teacher originally would wait until the entire group of students was silent and ready to listen before beginning the lecture. This would sometimes take up to ten or fifteen minutes, at which point the teacher contemplated leaving early and canceling OBUGS for that day. However, she began to learn that the students were rowdy and shouting because they were excited for OBUGS, not because they didn't want to participate. The teacher revised her lessons so there was less lecture and therefore less need for the entire class to be silently listening. Now there is more time for the activities and hands-on learning in the garden, and the students get what they want out of the lesson, not just what the teacher thinks they should be learning.

Learning not to lecture at students led to learning to be concise in front of the class and in one-on-one interactions. When a student was looking at a plant the teachers were tempted to tell him everything they knew about that plant, in hopes that he would absorb it while his interest was peaked and they had his attention. The teachers and I were prone to this action, but it may have been information overload for the students and not actually helpful for them. One of the teachers found it was more successful when she planned out what concise statement she would make before coming to class, so there would be one important idea the students would walk away with, instead of ten facts about calendula flowers.

Teachers also found that lessons were unsuccessful when the material was too hard or too easy for the age group. A worksheet for the snail anatomy lesson included lots of words that students had never learned before, and ended up being too advanced for a group of first and second graders still learning to spell. Teachers found that students were more engaged and focused when there was a bigger space on the worksheets for drawing, and it was not cluttered with unfamiliar, big words.

Observations of changes in students' speech, behavior, and artwork

Although many of the activities, lessons, and student-teacher interactions emphasized the importance of caring for living creatures and of the unique characteristics of different life forms that many students previously lumped all together under the category "gross," changes in students' affect was not obvious. The teachers and I observed positive changes in several students' speech and behaviors in the garden, and some changes in student artwork. However, it is unclear whether these behavioral changes signify emotional changes.

One of the teachers noticed the greatest change in behavior was among first-time participants in OBUGS, particularly kindergarteners, first, and second graders. At first, students would pull out entire plants just to get the flower, but after a few months of garden classes they began to handle the plants and animals more gently. Throughout the semester some students became more excited about tasting plants in the garden, or about being led around the garden.
The garden activities and lessons were all new to the students and they were excited about what they learned. Weeks after a lesson on snails, students continued to talk about snails and ask if they could look for them in the garden. The students' growing excitement about learning and exploring in the garden may reflect a shift toward positive attitudes about the garden.

The teacher observed that students who had harvested and tasted a certain plant would return to those plants again and again. When these students were given shovels, they would not go straight to where the plants were and dig them up; they would go straight to the dirt digging area without having to be reminded. Those students would become upset if the plants were suddenly gone because someone forgot to water them, or if someone accidentally pulled them out. Those students considered it important to take care of the plants because the plants provided them with something they liked, such as food or flowers. Although it seemed clear that the students cared about the plants, it was unclear whether this care was related to the satisfying utilization of the plant or an emotional connection to the plant. Also, because the teacher had only worked with these students for one year, it is unknown whether they developed this sense of care for the plants throughout their participation in OBUGS, or through other experiences.

Toward the end of March 2010 I observed students behaving more positively around the plants than before. Earlier in the semester I observed students handling pea plants very roughly, picking flowers and unripe pods. A few months later they reminded each other to leave the unripe plants, they handled the plants gently, and they asked me if it was alright to eat the flowers, before tearing them off for themselves. I told them to leave the flowers so they could turn into more peas, and they listened and seemed to understand. Although they may have just been following the garden rules better, their conscious efforts to handle the plants gently may reflect growing feelings of care for those plants.

I observed students' speech and behaviors around certain insects change positively throughout the school year. Earlier in the year I observed a few students actively seek out insects to squish. This activity became much rarer throughout the year, though I continued to hear a few

students make claims that they were going to squish the bugs. Earlier in the year I also observed most students quickly pick ladybugs off of plants when they saw them, but in March I observed one student tell her peer to let the ladybug be and leave it on the plant. In May, during an activity that involved releasing hundreds of ladybugs into the garden to eat the aphids, I observed many students become visibly upset and angry when their peers accidentally or purposefully harmed ladybugs. Even one student, who consistently refused to handle the insects, and said she didn't like insects because they are gross, became upset when she saw people harm them, and would tell those people to stop. These changes in speech and behaviors may reflect growing positive attitudes toward ladybugs, although no such visible progress was made toward ants or other insects, which some students continued to squish.

In contrast, students destroying things in the garden does not always indicate a fundamental lack of respect or care for those things. All students have bad days, and might express their anger in the garden. A student might have developed a personal connection to something in the garden, but I may not have been able to observe this if he was having a bad day. Long-term assessment and tracking of students' learning and behavioral changes would account for bad days and social conflicts.

I observed a few changes in children's drawings of garden scenes throughout the year. Children's drawings can be analyzed to attempt to understand their beliefs and emotions toward a particular subject (Freeman and Mathiason 2009). I observed more scribbling in the beginning of the school year than later in the year. Scribbling may have represented anger, although not necessarily directed toward the garden subject of the drawing. In the second half of the school year I observed students depict plants in the garden in a neutral or more positive manner, with a yellow sun and bright colors and the occasional heart or rainbow. I did not perform a formal or in-depth analysis of drawings, so I cannot make any conclusions about children's emotions from my observations.

The changes I observed in speech, behaviors, and artwork may have been influenced by specific lessons and activities that targeted children's cognition as well as affect. The activities that started out with a specific focus, such as finding rolly-pollies to look at under a magnifying glass, and ended with free exploration of the garden seemed most successful in engaging students' curiosity and excitement. Unstructured activities like this may facilitate hands-on, active learning where students are motivated to explore and make new discoveries (Louv, 2005).

These activities also integrate cognition and affect, as students learn on their own, and develop personal connections to the garden.

Revisiting the research question: Do children's emotions toward nature change while participating in the Oakland Based Urban Gardens program?

The OBUGS teachers design many of the lessons and activities to engage the students emotionally in the subject matter. Observing, mimicking, and taking care of plants and animals in the garden are a few of the strategies used by OBUGS teachers to accomplish their goals of fostering respect and understanding for all life forms. The OBUGS teachers and I did observe some positive changes in students' speech and behavior throughout the school year. Students began to show more care for plants and animals in the garden by handling them more gently. Given the short-term nature of this study, it is unclear whether or not these external changes in behavior represent internal changes in emotions toward nature. This study serves as an introductory investigation into the effect of the OBGUGS program and experiential gardening on changing children's emotions toward nature. Future studies can implement long-term assessments to track changes in children's emotions and determine which aspects of the OBUGS program target affect and influence the changes.

Suggestions for future OBUGS classes

Given the limitations of the non-profit organization, such as little funding and high staff turnover rate, there are areas of the environmental education program that have room for improvement. Currently, OBUGS classes are oriented toward increasing cognition and engaging affect. OBUGS can incorporate a wide variety of strategies that environmental educators have used to engage students emotionally. The successful and unsuccessful strategies described in the interviews can be used to improve the structure of future OBUGS classes. In addition, I present a set of suggestions for the context and content of future OBUGS lessons and activities to better target students' emotions and lead to a shift toward positive environmental affect.

Context suggestions

Effective classroom management is vital to the success of any educational program. Currently the OBUGS teachers spend a lot of time trying to capture everyone's attention and get students to listen quietly. This takes a lot of time away from the lesson and from being in the garden. The teacher once had to stop the activity in the middle of the class to settle everyone down and have a discussion about what it means to be a good listener. There is an abundance of

guides to classroom management, and it would benefit the teachers to reassess their approach and incorporate other effective strategies. I suggest that instead of waiting for everyone to be quiet, the teacher can present the lesson and directions to the activity from a different angle.

One strategy could be to spark everyone's interest and excitement at the very beginning of the class with some demonstration, model, or graphic. Students would then begin to talk about what they see and ask questions about it. The noise level at this point would be very high, but the goal is no longer about having everyone be quiet so they can listen to the teacher; the goal is to have everyone inquire about the subject and build off of each other's ideas. The teacher could then assess what the students know, believe, and have questions about. Without giving away all the answers, the teacher could give a brief background about the topic and introduce the activity, and then leave the rest up to the students. Activities in which students develop their own questions and discover possible answers through hands-on exploration and sensory experiences can result in deeper learning than when teachers try to impart knowledge on them (Stoecklin 2009).

Garden design can have a big impact on students' learning experiences (Altman and Wohlwill 1978). The St. Martin de Porres garden is right between two major distractions: a play structure and a busy street. The teacher would frequently lose the students' attentions when trucks, ambulances, or police cars with sirens drove by. The play structure was always tempting students away from the garden. In contrast, the fence surrounding the Lafayette garden is overgrown with plants, so it is more secluded and there are less outside distractions. The St. Martin de Porres garden can borrow from Lafayette's design by creating more vegetated barriers between the street and the play structure. In addition, the Lafayette garden has large bushes that students can hide in and create an entire private world of their own. A few changes in garden design can provide more space for exploration, spontaneous learning, and emotional development (Kohlstedt, 2008).

In addition to the one hour garden class every week or every other week, OBUGS can be incorporated into the rest of the school week to enhance students' learning. It is limiting to only be with the students once a week, because one hour is often not enough to fully ensure learning of the concepts. Week-long classroom experiments and ongoing garden bed observations, where students could measure changes in plant growth, would integrate the OBUGS lessons with classroom learning objectives and California science and math standards. Nature-based

education can improve student performance in school and on standardized tests, and foster development of problem-solving and critical thinking skills (Louv 2005). This greater classroom involvement with the garden might also encourage more positive attitudes and a sense of pride for the garden (Kohlstedt, 2008).

Even the most innovative, exciting, hands-on activities can fail to reach students and have a strong effect on them if pre-existing social conflicts are not resolved. Tension from conflicts at home, between students, between teachers and students, and even between teachers and principals often pervade classrooms and lower the quality of the learning experience. In some classes, the primary teacher has indicated to the OBUGS teacher that they are more concerned with emphasizing kindness and improving behavior than teaching California State Standards, because students need to respect each other before they can begin to respect the life of a broccoli plant or a centipede. Future OBUGS classes can address this issue by incorporating strategies to build community and respect within the classroom and the school.

Content suggestions

A more in-depth introduction to the interconnectedness of life may set the groundwork for a change in environmental attitudes. I suggest that food webs be incorporated into more lessons throughout the school year, rather than just one or two. After a few engaging, hands-on lessons and activities, a student may begin to understand the importance of a plant or animal's role in food systems and ecology. With time, this understanding may lead to an appreciation for living things, a desire to protect these things, and eventually motivation to take action to protect the environment. Teaching about food webs and the interconnectedness of life addresses the goal of environmental education by increasing knowledge of the environment and promoting pro-environmental behaviors (Chawla and Cushing 2007). A crucial step in-between increasing knowledge and promoting positive actions is to develop an appreciation for life.

In addition to incorporating concepts of food webs and interconnectedness into more lessons, the teachers can present explicit take-home messages. Whenever a student would say worms are gross, or try to cut a worm in half, I would tell him that we should be nice to worms because they make the soil out of which our food grows, so without worms we would have no food. Usually the student would continue to say worms are gross, but with constant and concise reminders of the important role worms play in our food system, perhaps the students will have a change of heart. The effects of explicit lessons like this are not always obvious or immediate, but

they may help build the framework for the development of positive environmental attitudes.

Teachers can design their lessons and activities to target the students who have the most learning to do. From my observations there tended to be at least one person in a group of students who thought the activity or subject matter was gross. Often the other students would repeat that person's words, leading to a domino effect and the entire class excitedly exclaiming "gross!" and refusing to participate any further. Eventually the students would return to the activity, because they actually thought it was interesting and were only copying and following the crowd. But there was always that first person who screamed who still would not participate and thus missed out on the lesson and activity. This student was set in her ways, determined that insects are disgusting and should die, even if she was generally a caring and intelligent individual. The OBUGS lessons could target this one type of student, because she is the one who could experience the greatest affective change.

A common theme across the OBUGS classes I observed is that when students were asked if they had a question, more often than not they would end up telling a story instead of posing a question. The teacher would usually thank the student for the story and remind them that it was a story and she asked for questions. From these instances it is clear that the students are excited about the topic and want to tell people about their experiences. As it is now, these stories take time away from the lesson and activity, so they are discouraged. However, if the teachers set aside time for story-telling and encourage students to share their experiences, the students may be more able to relate to the subject matter and more motivated to learn about it. Think-pair-share is one cooperative learning technique in which students reflect upon a question, pair up with a partner, and share their thoughts (Lyman 1981). The OBUGS teachers can implement an adaptation of think-pair-share to conjure memories and stories of experiences and elicit emotional connections to the subject matter.

Finally, teachers must posses the attitudes and values that they are teaching to be truly effective in facilitating a change in their students' attitudes (Palmer and Philip 1994, Moseley and Utley 2008). Teachers who are aware of environmental issues and motivated to take action may be more influential on their students. Conversely, teachers who try to impart values that are not their own on to their students may be less effective at facilitating a change.

Although a sense of connectedness with nature is important to my values and perspectives, and I would like to share it with others, it is not necessarily shared by the broader

community. My suggestions reflect my values and personal opinions on what is important to learn. However, these perspectives may differ from those held by the Northwest and West Oakland community members, because specific experiences and lifestyles have helped develop our definitions and perspectives of the environment. In order for OBUGS to be successful in serving the community, it must continue to engage, employ, and work directly with community members throughout its programs, to find out what they want out of the organization, how they can contribute, what they want their children to learn, and how they want to see their community grow and flourish.

I am not suggesting that OBUGS should change its program to focus on facilitating children's positive environmental values. I am presenting a set of suggestions that OBUGS can consider in designing future lessons and activities that positively influence children's emotions toward nature, should the teachers choose to go in that direction. These suggestions are based on my interviews and observations and are thus specific to the OBGUS program and the study populations. However, these suggestions are flexible and can be tailored to other environmental education programs and other populations.

Limitations

From my interviews and observations I can infer that OBUGS classes influence positive changes in children's behaviors and attitudes surrounding the plants and animals in the garden. However, I cannot conclude whether these changes are due solely to participation in the program, or to a combination of other factors and experiences. It is possible that students experience changes in attitudes and emotions throughout multiple years of participating with OBUGS. I only observed students throughout one school year, so I could not determine the long-term effects of experiential gardening. It is also possible that students expressed their changing emotions in different ways that I could not observe—whether it was through their interactions with their family, their behaviors during play time, their performance in other classes, or any number of activities outside of OBUGS class time.

The teachers' observations of changes in students' behaviors during their first year with OBUGS may indicate that they experienced a rapid change in affect when they began participating in the OBUGS program. If this is the case, my observations did not capture this change because I did not measure students' emotions before they started participating in OBUGS. This study did not account for the different emotional and cognitive developmental

stages of the study populations. Different age groups may be more receptive to emotionally engaging activities and may experience more affective changes than other age groups (Kahn 1999). Consequently, observations of no change in behavior does not mean that children did not experience positive emotional changes throughout the program.

Finally, I cannot conclude from my observations of external changes in behavior that students experienced internal changes in emotions. Future studies that are designed to measure and assess emotions, rather than just behaviors, will better address the research question.

Future Directions

This study serves as an introductory investigation into the effects of experiential gardening on changing children's emotions toward nature. I observed changes in students' behaviors after participating in the program throughout the school year, but was unable to conclude whether students experienced changes in emotions toward nature. Future studies can determine which specific aspects of the lessons and activities are most influential in changing students' environmental affect.

Long-term assessment is needed to track students' learning and behavioral changes. One-on-one interviews with selected students starting at the beginning of their participation with OBUGS can determine students' knowledge, beliefs, and attitudes. Regular and recurring interviews throughout the students' OBUGS experience may reveal changes in their emotions toward nature that behavioral observations alone could not detect. Future studies may utilize various types of developmentally appropriate behavioral and emotional assessments, such as analyzing artwork, play, school portfolios, written responses, and interactions with peers, teachers, and family.

CONCLUSION

Effective environmental education programs target both cognitive and affective domains by increasing knowledge of environmental concepts and engaging a person emotionally in the subject matter. Greater environmental awareness and sensitivity can motivate a person to take action and seek solutions to the issues facing our planet today. However, environmental educators do not need to transform children into ethical environmentalists with complete and deep understandings of their role in earth systems and cycles. Indeed, for most people this is a lifelong learning process. It is important to expose people to environmental values and experiences when they are young, so they can begin to develop an understanding, appreciation,

sense of wonder, and desire to protect the natural world. OBUGS is one program that offers early exposure to positive environmental values and experiences through experiential gardening. Further research into the influence of experiential gardening on children's emotions toward nature will be instrumental to the development of effective environmental education programs.

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