EVALUATION OF A GARDEN PROJECT CURRICULUM FOR 1\textsuperscript{ST} AND 2\textsuperscript{ND} GRADERS AT ANATOLA ELEMENTARY SCHOOL

A thesis submitted in partial fulfillment of the requirements For the degree of Master of Science in Family and Consumer Sciences

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DEDICATION

This thesis is dedicated to:

To my committee, thank you for your guidance and support throughout this project. It has been an honor to participate in such a rewarding program.

To my amazing parents, your support and success in life have taught me the value of hard work and dedication in achieving my goals.

To my wonderful husband, thank you for never doubting me and for giving me the opportunity to fulfill my dreams, I love you. You are an amazing father and husband and I am truly blessed to have you by my side.

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ABSTRACT

EVALUATION OF A GARDEN PROJECT CURRICULUM FOR 1\textsuperscript{ST} AND 2\textsuperscript{ND} GRADERS AT ANATOLA ELEMENTARY SCHOOL

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Using a pilot evaluation tool, the intention of this thesis was to evaluate lesson plans that were created for the purpose of establishing and maintaining elementary school gardens. These lesson plans included in-class and hands-on gardening curricula taught to first and second grade students at Anatola Elementary School in Van Nuys, California. This curriculum was just one aspect of a larger project, which further consisted of nutrition and physical education, and activity sessions, collectively aimed to address the obesity issue among children of lower income households in the Van Nuys, CA community. This program was based on similar grant projects that have been successfully implemented in other counties; such gardening lessons have shown to increase fruit and vegetable consumption among the students and, along with physical activity, have led to a decreased risk of obesity.

The proposed evaluation of the lesson plans was conducted twice per semester to gather teacher responses and feedback in regards to the progress of the lessons, and whether they were in accordance with the Los Angeles Unified School District (LAUSD) standards of teaching subjects, such as mathematics and science. In addition, the evaluation of the lesson plans was intended to make the project more teacher-centered.
and provide sustainability, so that future facilitators can implement the program once the grant project has ended.
CHAPTER I
INTRODUCTION

Background and Justification

The prevalence of childhood obesity has dramatically increased, where one in three American children and teens are considered either overweight or obese (American Heart Association Childhood Obesity [AHA], 2012). The obesity rate in the Los Angeles area varies by ethnic groups, with Latinos having the highest rates (Davis, Ventura, Cook, Gyllenhammer, & Gatto, 2011). This has become a public health issue because the conditions caused by obesity, such as insulin resistance and excessive visceral fat, place the Latino youth at risk of type 2 diabetes and cardiovascular diseases (Davis, et al., 2011). Low consumption of dietary fiber, usually obtained from fruits and vegetables, and the high intake of refined grains and added sugars, have been shown to be a contributing factor for this crisis among the Latino youth (Davis, et al., 2011). One of the reasons for insufficient fruit and vegetable intake is simply their lack of access at the local neighborhood grocery stores, as only 18% of grocery stores in certain Los Angeles communities are reported to have availability of good quality fruits and vegetables (Davis, et al., 2011)

An estimated 2000 schools throughout the state of California participate in elementary garden projects intended as a means of intervention in the obesity crisis (Ozer, 2007). The primary goal of the garden projects in elementary schools is to increase fruit and vegetable consumption, by allowing the children to become familiar with, and eat fruits and vegetables they have grown themselves (Ozer, 2007). There is data supporting the idea that implementation of school garden curricula coupled with
nutrition lessons has increased the willingness of young children to not only taste vegetables but also increase their fruit and vegetable consumption by as much as half a cup per day (Davis, et al., 2011).

A gardening curriculum has been established in two local Los Angeles County elementary schools, both located in the city of Van Nuys, California: Anatola Elementary School and Cohasset Elementary School. This gardening program is just one aspect of a larger project funded by a Housing and Urban Development (HUD) grant, which further consists of nutrition and physical education, and activity lessons coupled with a parent education component all collectively aimed to address the childhood obesity issue. The main goal of the nutrition and gardening component of the HUD grant is to increase fruit and vegetable consumption among children of lower income neighborhoods.

Anatola Elementary has fewer students, but the demographics in both schools are similar, where the majority of the student population is of Latino descent and come from low income households. A total of eight in-class and hands-on gardening lesson plans for first and second graders have been created and implemented in the previous academic year at these institutions. A qualitative assessment was developed to rate the effectiveness of these lessons and measure their long term sustainability, from the point of view of the teachers. Historically, from an educator’s perspective, school gardening programs have been seamlessly integrated into several subject areas of the elementary school curriculum, such as science, mathematics, language arts, and social studies, while at the same time fulfilling state mandated standards of studies (Dirks & Orvis, 2005). Thus, the teachers’ input about these lessons was critical to help develop a manual that will allow for the continuation of the program in everyday classroom curricula and attain
the goal of increasing fruit and vegetable consumption among the school children.

In accordance with the Human Ecological Theory, gardening programs have shown to encourage students’ learning in academic, social, and health related domains (Ozer, 2007). The benefits of school gardens are countless, from increasing good nutrition awareness, to meeting state standard academic demands, and allowing for students’ psychological development in areas like building self esteem and creating an environment that encourages cooperation with peers (Ozer, 2007). Thus, to perpetuate these benefits, the program must be implemented correctly, where both students and teachers are engaged and have a desire to participate in the lessons.

**Statement of the Problem**

The purpose of this thesis was to evaluate the effectiveness of a manual that can be used by first and second grade elementary school teachers to help establish and maintain a school gardening program, using a pilot evaluation tool. The overall goal of this program is to increase fruit and vegetable consumption among the students, which can ultimately decrease their risk of childhood obesity.

**Objectives**

The objectives of this thesis at Anatola Elementary School are as follows:

1. To conduct a qualitative assessment of previously developed gardening lesson plans and determine their compatibility to state mandated academic standards.

2. To develop a manual of lesson plans, highlighting both an in-class and a hands-on gardening curriculum, intended to facilitate the long term sustainability of the project.
Limitations

1. The relatively small sample size and short duration of the project may not provide a sufficient data output for further analysis.

2. The assessment questionnaire used to enhance the school gardening manual is specifically geared toward first and second grade students’ curriculum and may not be applicable to other grade levels.

3. The manual targets low income Latino students particularly in the Van Nuys, California neighborhoods, and may not be applicable to populations in different locations.

Assumptions

1. All educators participating in this garden project have a firm understanding of California State teaching standards.

2. All current and future teachers are willing to implement these lesson plans and engage the students in all gardening activities.
CHAPTER II
REVIEW OF LITERATURE

The Need for and Benefits of Elementary School Gardens

A large percentage of our youth are growing up in urban and suburban areas, where they rarely come into contact with nature and gardening (Waliczek, Bradley, & Zajicek, 2001). Outdoor experiences are believed to provide positive psychological and physical benefits (Waliczek, Bradley, Zajicek, 2001). Additionally, children are being held captive by modern technological advances, where a great deal of instruction and entertainment are provided through computers and television shows, thus resulting in sedentary lifestyles with even less time spent outdoors exploring nature (Waliczek, Bradley, Lineberger, and Zajicek, 2000). Childhood obesity rates have increased to alarmingly high levels, with the greatest incidences found among the youth of minorities living in low-income neighborhoods (Kumanyika, & Grier, 2006). According to research, this sub-group of children watch more television and spend longer hours indoors in comparison to white, non-poor children (Kumanyika & Grier, 2006). During their time spent in front of the television, children are exposed to more commercials advertising low-nutrient, high-caloric foods (Kumanyika & Grier, 2006). The vast amount of fast food restaurants, run-down playgrounds, and unsafe streets in these poorer neighborhoods contribute to the higher obesity rates (Kumanyika & Grier, 2006). These circumstances merit the need for elementary school gardens across the nation, particularly in low-income neighborhoods. Student participation in garden-related activities has been linked to increases in fruit and vegetable consumption, and positive outcomes on psychological and academic performance, merely by creating a space for
children to have a hands-on learning experience.

It is recommended to consume five fruits and vegetables on a daily basis, yet on average only 6.8% to 20% of all children and adolescents meet this recommendation (Lineberger & Zajicek, 2000). Campaigns such as the 5-A Day program have increased awareness among consumers in regards to this recommended amount, yet many families do not have direct access to fresh fruits and vegetables to fulfill their nutritional needs. One noted benefit to school gardening projects that are coupled with “farm-to-school” programs, is that they are a great means of exposure to sustainable living options (Ozer, 2007). The “farm-to-school” program allows participating schools to purchase produce from a local farm and allocates a time for the students to visit the farm, which gives them the experience to witness where their food comes from (Ozer, 2007). Along with these efforts, several studies including one conducted by Ratcliffe, Merrigan, Rogers, and Goldberg (2011) have found that elementary school garden programs can potentially improve participating students’ knowledge about nutrition and different varieties of vegetables, while increasing their preferences for vegetables. Hilgers, Haynes, and Olson (2008) also found that these students had maintained these preferences during a 6-month follow-up. Similarly, a school in California witnessed a 10% increase in fruit and vegetable consumption among students who participated in nutrition education coupled with a hands-on gardening program (Hilgers, Haynes, & Olson, 2008). The effectiveness and benefits of school gardens have caught the attention of California state legislators who have passed legislation to promote such programs throughout their local districts and counties (Smith & Motsenbocker, 2005). One such intervention program is the “LA Sprouts,” which targets Latino youth, a population known to have a high prevalence of
obesity (Gatto, Ventura, Cook, Gyllenhammer, & Davis, 2012). In their study, Gatto, et al. (2012) researched a 12-week gardening, cooking, and nutrition intervention program through “LA Sprouts” where 104 Latino youth participated; the majority of the participants were considered either overweight or obese. The experimental group, otherwise known as the “LA Sprouts” group consisted of 34 participants, who were provided with a weekly 90-minute culturally sensitive intervention program, whereas the control group, which had 70 participants, received a shorter version of the intervention. The results indicate that the intervention group through their cooking, nutrition, and gardening classes had an overall increased preference for vegetables when compared to the control group (Gatto, et al., 2012).

It may seem as though other states would attribute California’s pleasant weather and terrain as the ideal location to establish these school gardens, while viewing their harsher climates as a hindrance. In reality, cities like Las Vegas, Nevada have found much success in establishing school gardens despite their drier weather and unique soil composition (O’Callaghan, 2005). They have tailored the curriculum to show students how their native plants survive, while exposing them to the different plants being sown throughout the world (O’Callaghan, 2005).

Some researchers report finding the effectiveness of school gardens in regards to increased fruit and vegetable consumption to be with a change in attitude, rather than in behavior (Lineberger & Zajicek, 2000). Lineberger and Zajicek (2000) studied third and fifth grade students across five Texas elementary schools. The teachers followed a nutrition and hands-on gardening curriculum with hopes of changing student behavior toward increased fruit and vegetable consumption. Ultimately, their results showed that
after gardening, students’ attitude toward vegetables became more positive, but no change was observed in their attitude toward fruits (Lineberger & Zajicek, 2000). More so, they discovered that a change in attitude did not correlate to a change in their behavior; i.e. the students verbalized a liking for vegetables, yet there was no significant increase in consumption (Lineberger & Zajicek, 2000). The researchers were not surprised by their findings knowing that a change in eating behavior is difficult to accomplish, as certain evidence points to food preferences affected by a person’s surrounding environment (Lineberger & Zajicek, 2000; O’Connell, Henderson, Luedicke, & Schwartz, 2012). Case in point, O’Connell, Henderson, Luedicke, and Schwartz (2012) found that in a preschool setting, there is a direct peer effect for increased vegetable consumption. They discovered that during lunch time, each child’s consumption of vegetables was dependent on their surrounding tablemates’ consumption. Children chose to eat more vegetables if their friends followed the same pattern (O’Connell, Henderson, Luedicke, & Schwartz, 2012). These findings can help future researchers more precisely understand the needs of a community setting and thus focus their efforts in order to maximize the results of their interventions (O’Connell, Henderson, Luedicke, & Schwartz, 2012).

Aside from an increase in fruit and vegetable consumption, elementary school gardens have shown to benefit children of certain age groups and populations on a psychological level. Research confirms that most people who garden for the joy of growing their own produce also receive benefits to their self esteem and well being during the process (Waliczek, Bradley, Lineberger, & Zajicek, 2000). Historically, gardens were believed to be a positive influence for children’s socialization and
interpersonal relationships (Waliczek, Bradley, Lineberger, & Zajicek, 2000). More recent research shows that outdoor settings help build on these attributes, in addition to teaching children motivation, independence and delayed gratification (Robinson & Zajicek, 2005). In their study, Waliczek, Bradley, and Zajicek (2001) discovered that students of various age groups who participated in a gardening curriculum showed differing scores with regards to their interpersonal skills; older students within the ages of 12 and 13 showed a more positive score for that category, as opposed to the younger children. This large difference in interpersonal skill scores was postulated to be due to the fact that the older students, who were under minimal supervision, were able to socialize with more ease in the garden area versus the younger students who were under stricter care (Waliczek, Bradley, & Zajicek, 2001). Teachers and parents involved in gardening activities with children have noticed a boost in those students’ self esteem and a decrease in their stress levels (Waliczek, Bradley, Lineberger, & Zajicek, 2000).

Another study by Robinson and Zajicek (2005) found elementary school gardens to positively influence their participants’ group work capabilities and self understanding. In addition, working positively within a group setting has been shown to improve other life skills like problem solving and communication, in addition to building better relationships and acceptance toward culturally different classmates (Robinson & Zajicek, 2005).

Gardening provides an environment where students of different backgrounds can cooperate and work together toward a common goal. Surprisingly, elementary school gardening programs have shown to level the playing field when it comes to children with disabilities or special needs. These children seem to prosper and perform tasks as
successfully as other students of the same grade level who are enrolled in the regular school program (DeMarco, Relf, & McDaniel, 1999). Gardening and plants are also believed to help with the concentration and behavior of children with attention deficit disorders (Hilgers, Haynes, & Olson, 2008).

Gardening programs have also been used as beneficial intervention tools with at-risk youth; they have been shown to provide a neutral environment where important social skills can be taught, with the hopeful intended outcomes of decreasing childhood violence and delinquency issues (Robinson & Zajicek, 2005). Cammack, Waliczek, and Zajicek (2002) studied juvenile offenders who participated in the “Green Brigade” program, a community based program where a combination of gardening activities and landscaping principles are taught to juvenile offenders who in return are given a chance to earn minimum wage to help pay their court fees. Additionally, these activities provide a service to their local communities by beautifying the areas through landscaping. This treatment group of minors, when working with plants in a coeducational setting, showed higher interpersonal relationship scores when compared to all male groups who worked on other features of gardening that did not involve plants (Cammack, Waliczek, and Zajicek, 2002).

Arming our students exclusively with the social skills they need to prosper in life is not sufficient; we need to prepare them for academic success as well. Proper nutrition plays a key role in the healthy growth, development, and learning capabilities of our children (Lineberger & Zajucek, 2000). As previously discussed, elementary school gardens have led to an increase in fruit and vegetable consumption among participating students. In addition, student participation in garden projects have also shown to improve
academic achievement scores (Klemmer, Waliczek, & Zajicek, 2005). Thus, aside from nutritional benefits, whereby students can enjoy growing and eating fresh fruits and vegetables, teachers can also take advantage of garden settings to teach their students subjects like science, mathematics, and topics such as ecosystems (Waliczek, Bradley, Lineberger, & Zajicek, 2000).

The intent of elementary school gardens is not to establish plush landscapes, but to offer a connection for topics learned in the classroom to everyday life scenarios (Smith & Motsenbocker, 2005). School gardens can be viewed as hands-on laboratories where students can experiment and learn science concepts in an unpredictable, natural setting (Smith & Motsenbocker, 2005). Teachers who have incorporated the school garden into their curriculum and allowed their students to explore in the garden on a weekly basis have witnessed an increase in students’ science achievement test scores and an overall improvement in their academics (Smith & Motsenbocker, 2005; Klemmer, Waliczek, & Zajicek, 2005).

As with the inconsistent results related to changes in behavior, the effectiveness of elementary school garden programs on academics is inconclusive. The results of Klemmer, Waliczek, and Zajicek (2005) show that third and fifth grade students who participated in a hands-on garden curriculum in addition to their traditional classroom instruction saw an increase in their science achievement test scores when compared against those students who were only taught using traditional classroom methods. However, Pigg, Waliczek, and Zajicek (2006) report that the garden curriculum did not improve the science and math test scores of their fifth grade students. This lack of consistency between studies indicates that more research is needed to revise and improve
the garden curriculum on specific subject areas like mathematics and science to assure their effectiveness, and potentially result in increased academic test scores (Pigg, Waliczek, & Zajicek, 2006).

In summation, elementary school gardens can help us invest in the future of our youth by equipping them with the necessary skill sets they need to succeed in life (Robinson & Zajicek, 2005). Garden programs offer students the opportunity to take on responsibility and complete tasks that differ from their usual homework assignments (Robinson & Zajicek, 2005). Once these tasks are completed successfully, the experience can help raise morale and self esteem to the point where students want to participate in more school and social activities, ultimately resulting in higher school completion rates and overall higher achievements in life (Robinson & Zajicek, 2005).

The Importance of Integrating School Gardens into the Curriculum

With all the noted nutritional, social, and academic benefits a gardening program can offer our young children, it would be most advantageous to incorporate it into the elementary school curriculum. Offering the program through a school setting allows for the utmost amount of outreach, because a single teacher has the chance to impact a multitude of students at once, whereas a parent will most likely garden with a few children at a time (Waliczek, Bradley, Lineberger, & Zajicek, 2000). With regards to using the garden for nutrition education, in order to maximize outcomes, it is recommended that the curriculum be taught at the elementary grade levels, because it is during this timeframe that children are most impressionable and show more flexibility and openness to new ideas (Lineberger & Zajicek, 2000). In addition, by 15 years of age most eating and exercise habits that continue through a person’s life are already
established (Lineberger & Zajicek, 2000). Therefore, it is imperative to capitalize on and take advantage of this very influential stage. And ultimately, between their time spent in the classroom and in after school programs, many students average about 40 hours per week in the school setting, making it an ideal environment where good nutritional attitudes and behaviors can be promoted through education (Robinson & Zajicek, 2005). In their study, McPherson, Montgomery, and Nichaman (1995) show that 95% of children report to have learned about nutrition from their teachers, 86% from their parents, and 73% from doctors and nurses. With schools being the primary source of nutrition education, it is critical for the health of our youth to establish a nutrition education program within the proposed elementary school garden curriculum (Hilgers, Haynes, & Olson, 2008).

Incorporating nutrition education into the curriculum of elementary school garden programs is not only beneficial for the physical health of participating students, but it can play a major role in increasing academic achievement by giving courses like science, mathematics, and environmental education a hands-on approach (Hilgers, Haynes, & Olson, 2008; Pigg, Waliczek, & Zajicek, 2006). In their curricular style, many educators are trying to follow the constructivist theory, which postulates hands-on learning practices to be an effective teaching strategy, as it provides tangible experiences and allows for better understanding of concepts taught in the classroom (DeMarco, Relf, & McDaniel, 1999; Skelly & Bradley, 2000). With this theory being followed by teachers across the United States who are seeking alternative creative and engaging teaching methods, the use of school gardens as a tool for hands-on education has increased over the past decade (O’Callaghan, 2005).
Research shows that garden projects, if implemented correctly, can have a positive impact on academics, with the biggest influence being on the sciences (Klemmer, Waliczek, & Zajicek, 2005). This feature is particularly important for elementary grade level students because it is during this timeframe that a fascination and interest in science is developed (Klemmer, Waliczek, & Zajicek, 2005). Many students come into elementary schools with a curiosity for science and mathematics, yet they often end up developing a fear of mathematics and viewing science as a subject that is too hard or uninteresting to grasp (Klemmer, Waliczek, & Zajicek, 2005). But when horticulture is integrated into the curriculum to teach science concepts, researchers have discovered that it not only increases science process skills and cognitive science test scores but also that students emerge with a better understanding of science and show an overall increased excitement towards the topic (Klemmer, Waliczek, & Zajicek, 2005). In relation to academics and increasing science scores, school gardens seem to benefit older students such as fifth graders more so than children in the lower grades, because these students tend to be more developmentally advanced in cognitive science skills and therefore better able to apply the concepts learned in the classroom to their hands-on activities in the garden (Klemmer, Waliczek, & Zajicek, 2005).

The successful integration of school gardens into the curriculum is heavily dependent on the amount of involvement by teachers and administration of the participating school (O’Callaghan, 2005). Through their survey of 322 elementary schools across the nation who were issued a grant to establish a garden program, DeMarco, Relf, and McDaniel (1999), demonstrate that 91% of the schools had a dedicated teacher or a committee of teachers who took on the responsibility of
administering the garden activities. The remaining schools credit parental involvement (7%) and interested community volunteers (2%) for the success of their garden program (DeMarco, Relf, & McDaniels, 1999).

In order for a garden program to truly integrate itself into the academic curriculum, teachers must first recognize the garden as a valuable teaching resource that can help improve their students’ education (DeMarco, Relf, & McDaniel, 1999). Also, prior to having the teachers allocate precious time and money toward a novel program, sufficient research and evaluation of gardening activities must be conducted by researchers to produce effective lessons that have proven to be beneficial (Hilgers, Haynes, & Olson, 2008). And lastly, to fully justify the curriculum’s use, it must meet state-mandated standards of academics (DeMarco, Relf, & McDaniels, 1999).

Ultimately, teachers cannot carry the load of such a program on their own; principals also need to learn and understand the value of the gardening curriculum to fully support their teachers (DeMarco, Relf, & McDaniel, 1999).

**Obstacles and Solutions to Establishing and Sustaining School Garden Programs**

Elementary school gardens are infrequently used as instructional tools, with teachers using them no more than 10% of the time (Skelly & Bradley, 2000). Eighty-four percent of teachers surveyed by Skelly and Bradley (2000) attested to elementary school gardens as having enhanced their students’ learning. Yet gardens are often not established at all due to their perceived obstacles. One of the primary road blocks in establishing a school garden is concerns over cost and the apparent lack of funding available for such a program (O’Callaghan, 2005). Teachers who have established gardens in their schools report having received the majority of their funding through
donations made by parents and local garden centers; other teachers have paid for the
garden with their own money, and less than half report having received grants (Skelly &
Bradley, 2000). Most teachers are unaware of the availability of grants for such projects.
By bringing attention to these resources, more teachers can begin to effectively establish
elementary school gardens across the nation (Skelly & Bradley, 2000). To further
remove cost as a barrier, other means of support have been suggested, such as the
adoption of schools by local horticultural businesses (DeMarco, Relf, & McDaniel,
1999).

Several physical hindrances have prevented schools from establishing garden
education programs. Many campuses believe they have limited space when it comes to
dedicating school grounds for garden planting purposes and in conjunction with this
limitation, they claim to lack gardening equipment and necessary supplies to successfully
establish a hands-on gardening area (DeMarco, Relf, & McDaniel, 1999). One of the
essential limiting factors with respect to gardening materials is the absence of a water
source (DeMarco, Relf, & McDaniel, 1999). Furthermore, in desert cities like Las
Vegas, Nevada, the actual chemical makeup of the soil, tends to be low in organic matter,
alkaline, and high in salinity and boron (O’Callaghan, 2005). These conditions can
render the soil inadequate for planting certain fruits and vegetables (O’Callaghan, 2005).
Yet many schools within this area have successfully integrated a gardening curriculum
with lessons centered on, why and how their native vegetation differs from most of the
United States (O’Callaghan, 2005).

Issues of vandalism are another big concern among schools that desire a
gardening curriculum. Past incidences with vandalism have made many interested
faculty members reluctant to establish such a program (O’Callaghan, 2005). And lastly, teachers have expressed apprehension in using outdoor settings to enhance their students’ education due to logistical matters like lack of experienced volunteers, and not knowing how to efficiently integrate the garden into their existing curriculum (O’Callaghan, 2005; DeMarco, Relf, & McDaniel, 1999).

Despite these obstacles, teachers still show a high level of interest in establishing elementary school gardens, but feel as though additional training is needed to allow for its smooth transition into the curriculum (Klemmer, Waliczek, & Zajicek, 2005). Most teachers are unaware of the available resources to help with garden education and the ease with which they can incorporate an existing science lesson with a garden activity (Skelly & Bradley, 2000). This is evidenced through the national school gardening survey, which was administered to 322 elementary schools that had received a grant to incorporate gardens in their lessons; the surveyed teachers indicated more of a dependence on their gardening skills rather than their knowledge of science (DeMarco, Relf, & McDaniel, 1999). This suggests to researchers that teachers who do not have a background in gardening may simply not use the garden as a teaching tool; therefore more attention needs to be brought to these readily available educational resources (DeMarco, Relf, & McDaniel, 1999). In consideration of instructional time, teachers feel as though their schedules are already overloaded and there is no sufficient time during the school day to accommodate gardening activities (DeMarco, Relf, & McDaniel, 1999). Teachers need to realize that gardening is not meant to produce a heavier workload. Instead, it is designed to provide an alternative teaching method, i.e. a hands-on perspective to already existing curricular concepts.
A major factor that teachers attributed to the success of their existing garden programs was the ownership and commitment of both students and faculty members (DeMarco, Relf, & McDaniel, 1999). Principals play a critical role in the success of garden programs and more often than not they have been very cooperative, particularly by requesting supplemental training, to better aid the teachers (O’Callaghan, 2005). Yet in many instances, a thriving garden program would fail because a dedicated teacher or faculty member who was the main source of power behind the garden left the school (O’Callaghan, 2005). Thus, upon the establishment of a successful garden program, it should not be the responsibility of a single faculty member but rather the involvement of many members within the school community are needed (O’Callaghan, 2005). At times, the mentorship from a Master Gardener is welcomed in providing helpful tips to both teachers and students (O’Callaghan, 2005). The Master Gardener program is funded through grants, where volunteers are trained by state universities and horticulture experiment programs on all matters regarding agriculture; such as pest control, soil science, landscape construction, etc. In return for their acquired education Master Gardeners are required to provide a range of horticultural services on a volunteer basis (Flagler, 1992).

**Conclusion**

Elementary school garden projects have provided students many benefits with regards to nutrition, academics, and psychological well being. Nutritionally, garden programs have aimed to increase fruit and vegetable consumption, where in most cases researchers have noted an increase in vegetable consumption more so than fruits. Additionally, nutrition education in the garden has seemed to have the biggest impact on
younger students, mainly because at a younger age children are more likely to be molded and persuaded. Thus to combat the obesity epidemic, nutrition education coupled with hands-on gardening activities must be implemented as early as the preschool grades.

With eating habits being embedded in our behavior, certain tactics such as peer influences must be used to accomplish a positive desired outcome. Garden education programs have been used to teach a multitude of topics such as science, mathematics, and the arts using the garden as a hands-on tool. This teaching method has been tested on elementary grade level students where the most success or increase in science achievement test scores was observed to be among the older students, particularly the fifth graders. This suggests that when using the garden as a hands-on laboratory to supplement concepts learned within the classroom, older students seem to benefit the most because their cognitive skills are further developed to allow them to make these connections. And lastly, on a psychological level, elementary school gardens have not only increased attributes like self esteem and cooperation among classmates, but these benefits have also been witnessed in juvenile offenders and special needs students.

After seeing the benefits that are offered through a school gardening program, researchers realize that gardening needs to be integrated into the curriculum. In order to do this seamlessly, the designed garden activities must meet state mandated standards in an effort to save teachers instructional time and energy. Teachers must also be made aware of these resources and the ease with which they can implement gardening into their courses. Teachers’ time and resources are valuable and limited, thus before implementing such a hands-on tool, sufficient research must be conducted to assure its validity with regards to all the noted benefits on academics, nutrition, and positive
psychological developments.

The initial planning stages are critical to the success of elementary school gardening research (Phibbs & Relf, 2005). Researchers must plan accordingly to first identify and focus on the issues that are of value to school boards and faculty members, such as the compliance of the developed lessons with state standards of learning, activities that are efficient with the allotted class time and cost friendly to effectively boost academic achievement scores and improve the health and nutrition of students (Phibbs & Relf, 2005).

Nonetheless, some studies are inconclusive about the benefits that a school gardening program can provide our youth. In order to obtain significant results that can be generalized to the public a larger sample size is needed. But several obstacles must be overcome in the process of conducting research on younger students (Phibbs & Relf, 2005). Children are considered a vulnerable population, therefore prior to initiating research a university Review Board approval is needed along with approval from the parents of the participating students and any other collaborating organizations (Phibbs & Relf, 2005). Researchers have also had issues with maintaining a sufficient number of participants, because when dealing with larger populations it is difficult to conduct a long-term study due to the high mobility of children who change schools and teachers on a frequent basis (Phibbs & Relf, 2005). To avoid such issues, researchers must plan ahead of time and recruit enough participants to compensate for inevitable losses, but this creates another common problem in research, that being the lack of funding (Phibbs & Relf, 2005). And lastly, communication is key when doing such research as many parties are involved in the planning and implementation of a garden project, thus the most
effective mode of communication, i.e. phone, email, etc. must be established in advance to meet the needs of all those who are involved (Phibbs & Relf, 2005).

In conclusion, it would seem that gardening, when integrated into a school’s curriculum, would benefit the participating students in many ways, including increased fruit and vegetable consumption, increased social and interpersonal skills, and a better understanding of subjects like mathematics, science, and the arts. While the initial establishment of a garden education program may pose a few obstacles such as lack of time, resources, and willingness, once established, the garden eventually becomes easier to maintain and the benefits begin to outweigh the proposed obstacles. It is important to continue to develop effective educational programs that can help to provide sound nutritional tools that are aimed at decreasing the incidence of childhood obesity.
CHAPTER III
METHODOLOGY

The purpose of this thesis was to assess the effectiveness of a previously created manual of in-class and hands-on garden education lesson plans developed for first and second grade students, using a pilot evaluation tool. The qualitative evaluation tool is intended to collect feedback from the teachers at Anatola Elementary in Van Nuys, California, whose students participate in the gardening sessions. In order to create an effective evaluation tool, a needs assessment was conducted. Upon determining the needs, two evaluation forms were created: The “Overall Project Questionnaire” intended to assess the program as a whole and the likelihood of its continuance by the involved teachers, and the “Lesson Plan Specific Questionnaire” was a short supplementary questionnaire, which asked the teachers to rate both the relevance of each particular lesson to their current curriculum, and their students’ level of engagement, ranked on a Likert-type scale.

Needs Assessment

The needs assessment for the development of the evaluation tools was mainly researched through Internet sources. Peer reviewed literature by DeMarco, Relf, and McDaniel (1999), in addition to research conducted by Skelly and Bradley (2000), which discussed teachers’ perspective of benefits and obstacles in establishing and maintaining an elementary school garden, were investigated. Overlapping issues and concerns between studies helped pinpoint areas of focus for the development of the evaluation tools. In addition, questions and responses to a previously administered qualitative evaluation were reviewed and used as a starting point to compose the current
questionnaires.

**Development of the Evaluation Tools**

Analysis of both the scholarly literature and the previously administered evaluation were conducted to help develop a draft of the evaluation tools. It was reasoned that a more extensive questionnaire would be necessary to assess the garden project in its entirety, and a smaller supplementary questionnaire would be used to rate each developed lesson plan on an individual basis. Once a draft of the evaluation tools was created, they were submitted for revision to the garden project’s thesis committee chair and project leader, Claudia Fajardo-Lira and Ritamarie Little, respectively. Minor corrections were made to the drafts and they were resubmitted for final approval. The “Overall Project Questionnaire” consisted of a combination of 12 multiple choice and open ended questions; the classroom teachers were asked about issues such as logistics, benefits, and limitations of the project, the likelihood of its sustainability, and if the lessons helped supplement their existing curriculum. It was then printed on official California State University, Northridge (CSUN) letterhead and attached to a postage paid return envelope that was addressed to the Marilyn Magaram Center at CSUN. The “Lesson Plan Specific Questionnaire” asked respondents to rate each specific lesson on a Likert-type scale ranging from one-to-five; a score of one corresponded to a low value and a score of five corresponded to the highest possible value. This evaluation was printed prior to each individual lesson. The questions on the form remained the same but the heading was changed to reflect the title of the particular lesson being taught. Refer to Appendix A and Appendix B for a copy of each questionnaire.
Administration and Collection

For the 2012-2013 academic year, the garden project targeted the first and second grade classrooms at Anatola Elementary in Van Nuys, CA. During the Fall 2012 semester, a combination of eight in-class and hands-on gardening lessons were taught to the first grade students, where the sample pool consisted of three first grade classrooms with an average of 20 students per class. Upon the completion of each individual lesson, the teachers were provided with the “Lesson Plan Specific questionnaire”, which asked them to rank both the relevance of that particular lesson to their current curriculum, and their students’ level of engagement on a Likert-type scale. They were given the option to either complete the evaluation on the spot or return it completed during the following lesson. Due to logistical problems, a few of the initial lessons were not individually assessed by the teachers. The “Overall Project Questionnaire” was later administered via the teachers’ mailboxes, and for anonymity purposes, it was asked that the results be mailed back in the provided return envelope.

During the Spring 2013 semester, four lessons were taught to the second grade students at Anatola Elementary, while holding the two-fold evaluative process constant. The sample pool for the second grade consisted of four classrooms, three of which had an average of 20 students and the fourth consisted of 12 special needs students. Overall, throughout the Fall 2012 and Spring 2013 semesters a total of seven classrooms participated in the garden education program and all seven teachers provided feedback through both questionnaires.
The purpose of this thesis was to pilot an evaluation tool that could be used to assess in-class and hands-on garden education lesson plans from a previously created manual as part of the gardening component of the HUD grant. These developed lesson plans were used to teach first and second grade students at Anatola Elementary School in Van Nuys, CA. During the Fall 2012 semester, a total of eight lessons adapted from the manual were taught to the first graders, and in the Spring 2013 semester, four lessons were taught to the second grade classes. The “Lesson Plan Specific Questionnaires” were distributed to each teacher prior to conducting the lessons, and they were used to assess lesson content on level of effectiveness, degree of relevance to current curriculum, and likelihood of implementation of that particular lesson to future classes. The “Overall Project Questionnaire” was used to ascertain a more in-depth assessment of the garden project as a whole.

A total of three first grade classrooms were taught individually in the Fall of 2012. Each lesson was taught within a 20-minute time span, either in the classroom or in the garden area, depending on the content of the lesson. The eight lessons taught to the first graders during the Fall 2012 semester were as follows: A) “Amending the Soil with Compost Tea”; this lesson was taught in the garden area. It demonstrated to the students the importance of amending the soil and replenishing its nutrients for optimal plant growth, after which each student was able to water the soil in the Woolly pockets (breathable and flexible garden containers that are designed to be placed on horizontal surfaces) with prepared compost tea. B)“Planting Day and What Do Plants Need”, was
also taught in the garden area. This lesson focused on plant survival needs like water, food, and sunlight. Along with this, the students were taught how to plant a seed, and each student got a turn planting a variety of seeds in the Woolly pocket designated for their particular classroom. C) The “Germs and Hand Washing” lesson was taught in the classroom, and defined the concept of germs to the students. Students were instructed in proper hand washing techniques, followed by a hands-on activity where each student had a cinnamon and water solution applied to their hands, which represented “germs”. Students were then instructed to thoroughly wash their hands until the “germs” had disappeared.

D) “Good Bugs and Bad Bugs” was taught in the garden area, and explored the value of certain bugs (e.g. ladybugs, praying mantises, bees, and butterflies) to our garden, as well as the disadvantage of bugs like caterpillars. Students also learned how to apply vocabulary terms like predators, pollinators, and pests. At the conclusion of the lesson, each student was able to release a lady bug into the Woolly pockets.

E) “Counting Seeds” was a mathematics lesson that was taught in the classroom. The lesson was taught during Halloween season, which appropriately allowed for the utilization of a pumpkin, and description of its fruit properties along with the use of its seeds for counting purposes. To practice their addition and subtraction capabilities, each student was given a handful of pumpkin seeds and asked to follow along the poem of “Farmer Frankenstein”, who needed help in counting his pumpkin seeds for planting.

F) “Parts of the Plant” was another lesson that was taught in the classroom, and explored the function of the roots, stem, leaves, and flower of the plant, along with how all parts of the plant can potentially be edible. The students were then handed lyrics to “The Plant Parts Song” which followed the melody of “Farmer and the Dell”, and were asked to sing along, in an
The “MyPlate” lesson was taught in the classroom and exposed the students to the different food groups, i.e. fruits, vegetables, grains, protein, and dairy, through USDA’s MyPlate model. The students’ comprehension was assessed through an activity where the content of three different grocery shopping bags were analyzed to see which food group was missing in each bag. “Harvesting and Herbs” was the final lesson of the semester. The lesson was initiated in the classroom and later the students were taken to the garden area for a final overview of the project. During this lesson, the students learned the definition of herbs, and their different uses throughout history (e.g. their use in trade, medicine, and culinary use. Students then participated in an activity that allowed them to explore their five senses: touch, vision, scent, sound, and taste, through the different plants they had planted in their garden. Students used their sense of touch to feel the different leaf patterns of herbs like basil, cilantro, and mint; then they used their sense of vision to examine the different sizes, shapes, and colors of these herbs; and their olfactory senses to smell the different scent of the herbs. With the use of other vegetables like carrots, they explored their sense of hearing as they bit down on the vegetable to hear the “crunch”, while at the same time, using their sense of taste to explore the flavor of the vegetable. And lastly, the students got to taste other vegetables that they had planted, like tomatoes, radishes, and peas. Due to logistical issues, certain lessons like “Amending the Soil with Compost Tea” and “Planting Day and What Do Plants Need”, were not evaluated by the first grade teachers.

The lessons taught to the four classrooms of second graders during the Spring 2013 semester were: “Planting Day and What Do Plants Need”, “Good Bugs and Bad
“Bugs”, “Parts of the Plant”, and lastly, “Harvesting and Herbs”. The content of these lessons was the same as when these lessons were presented to the first grade classrooms.

As these four lessons were repeated for the second graders, the total evaluations distributed for them yielded seven evaluations, whereas the number of evaluations given out for the remaining lessons totaled three. These particular lessons were selected to help address certain topics within the curriculum, like science, math, history, and nutrition, while ultimately trying to increase fruit and vegetable consumption among the students.

The feedback obtained through the evaluations for each individual lesson is summarized below in a tabular format, followed by comments made by the instructors.

Table 1: Average Evaluation Scores for Lesson Plans

<table>
<thead>
<tr>
<th>Lesson Plan</th>
<th>N</th>
<th>Completed Evaluations</th>
<th>Effectiveness</th>
<th>Relevance</th>
<th>Sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planting Day and What Do Plants Need</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Germs and Hand Washing</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>4.33</td>
<td>5</td>
</tr>
<tr>
<td>Good Bugs and Bad Bugs</td>
<td>7</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Counting Seeds</td>
<td>3</td>
<td>3</td>
<td>4.67</td>
<td>4.33</td>
<td>4</td>
</tr>
<tr>
<td>Parts of the Plant</td>
<td>7</td>
<td>6</td>
<td>4.83</td>
<td>4.67</td>
<td>4.5</td>
</tr>
<tr>
<td>MyPlate</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Harvesting and Herbs</td>
<td>7</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

*a On a scale of 1-5, (1 being the least and 5 the most), rate the effectiveness of this lesson, i.e. were the students engaged?*

*b On a scale of 1-5, (1 being the least and 5 the most), rate the relevance of this lesson to your current curriculum.*

*c On a scale of 1-5, (1 being the least and 5 the most), how likely are you to implement this particular lesson to future classes?*
<table>
<thead>
<tr>
<th>Table 2: Qualitative Evaluations of Lessons Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Planting Day and What Do Plants Need:</strong></td>
</tr>
<tr>
<td>- Students were very engaged.</td>
</tr>
<tr>
<td>- Our current unit is “Better Together”, it is about working together to get things done.</td>
</tr>
<tr>
<td>- I will do a “plant” unit in the spring, they will apply these skills to that unit.</td>
</tr>
<tr>
<td><strong>Germs and Hand Washing:</strong></td>
</tr>
<tr>
<td>- The students were engaged and interested in the lesson. The student teachers were warm and friendly. I enjoyed watching the kids get germs and then practice washing them away.</td>
</tr>
<tr>
<td>- The lesson gave my students a better understanding of why it is important to wash their hands and for how long. It is a lesson I will do with my students, thank you.</td>
</tr>
<tr>
<td><strong>Good Bugs and Bad Bugs:</strong></td>
</tr>
<tr>
<td>- Great lesson on pollination. Good information shared with the students, it was very informative. Will implement today with a depth and complexity flip book.</td>
</tr>
<tr>
<td>- We are about to begin a spring unit on plants and bugs.</td>
</tr>
<tr>
<td>- Very informative and children were engaged in the bug discussion. They loved it!</td>
</tr>
<tr>
<td>- Great lesson students were engaged in the lesson.</td>
</tr>
<tr>
<td><strong>Counting Seeds:</strong></td>
</tr>
<tr>
<td>- Tell the students what subject they are learning. For example, today we will use pumpkins to learn math.</td>
</tr>
<tr>
<td>- For this grade (1st), slow down, and explain thoroughly, and redundantly before starting.</td>
</tr>
<tr>
<td>- This lesson fits in perfectly with our “Pumpkin Day Celebration.”</td>
</tr>
<tr>
<td><strong>Parts of the Plant:</strong></td>
</tr>
<tr>
<td>- Great job, good visuals and use of songs.</td>
</tr>
<tr>
<td>- Love the song. Good question and answer session. Good visuals</td>
</tr>
<tr>
<td>- Dr. Jean has a cute song about flower parts, it’s on youtube. Great job. Your song was cute too.</td>
</tr>
<tr>
<td>- Students were very engaged and interested in the lesson. Nice closing activity to check for comprehension. Students also loved coloring it.</td>
</tr>
<tr>
<td>- Break the lesson so children are not sitting on their desk. Bring them to the carpet. You need to have the words to show how their paper will look like.</td>
</tr>
<tr>
<td><strong>MyPlate:</strong></td>
</tr>
<tr>
<td>- Great job!</td>
</tr>
<tr>
<td><strong>Harvesting and Herbs:</strong></td>
</tr>
<tr>
<td>- Students were very excited about touching, smelling, and eating carrots and herbs.</td>
</tr>
<tr>
<td>- We are currently working on the changing world around us and this fits in perfectly.</td>
</tr>
<tr>
<td>- It’s a good way for students to see how plants change daily.</td>
</tr>
<tr>
<td>- Maybe give each group of students a small batch of herbs and spices. Nice tying on herbs and spices and carrots to the garden and having them walk out to look at them.</td>
</tr>
<tr>
<td>- Great combining in classroom and outdoor gardening today.</td>
</tr>
</tbody>
</table>
The individual lesson plan evaluations were pertinent in understanding whether a particular lesson meets the teaching expectations of the participating instructors. The “Overall Project Questionnaire” was used to assess the garden project on a wider scope to help capture the teachers’ attitude toward the project itself and ultimately the likelihood of its sustainability. This assessment was administered to all the first and second grade teachers throughout the Fall 2012 and Spring 2013 academic semesters, making the sampling pool a total of seven instructors. After multiple submissions, a total of three completed evaluations were retrieved. Detailed below in Table 3, are the specific questions and their respective responses:

Table 3: “Overall Project Questionnaire” Questions and Responses

<table>
<thead>
<tr>
<th>1. What limitations do you see in the gardening project?</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Time constraints</td>
</tr>
<tr>
<td>b. Shortage of volunteers</td>
</tr>
<tr>
<td>c. Logistics (ex. children getting dirty/wet)</td>
</tr>
<tr>
<td>d. Does not tie into curriculum</td>
</tr>
<tr>
<td>e. Topic comprehension</td>
</tr>
<tr>
<td>f. Resources</td>
</tr>
<tr>
<td>g. Children adhering to a consistent maintenance schedule</td>
</tr>
<tr>
<td>h. Other</td>
</tr>
<tr>
<td>- Response #1: h. Other – None</td>
</tr>
<tr>
<td>- Response #2: f. Resources</td>
</tr>
<tr>
<td>- Response #3: h. Other – I think it’s great</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Do you feel as though students are engaged during the lessons? If not, what techniques do you suggest to help engage them?</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Response #1: Yes! They are engaged. The presentations are wonderful.</td>
</tr>
<tr>
<td>- Response #2: Absolutely they are! Wish we could teach this way all the time!</td>
</tr>
<tr>
<td>- Response #3: Yes, but being outside for group discussions is a little distracting for some of them.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. Does the school have a system in place for maintaining the garden during the summer and holidays? If not what troubleshooting suggestions do you have?</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Response #1: Yes. Jose our maintenance man takes care of them.</td>
</tr>
<tr>
<td>- Response #2: No.</td>
</tr>
<tr>
<td>- Response #3: No. In the past teachers have volunteered to come and water.</td>
</tr>
</tbody>
</table>
Table 3: “Overall Project Questionnaire” Questions and Responses (cont.)

<table>
<thead>
<tr>
<th>4. Were the students engaged in active discovery, problem solving, and questioning? Give examples of how students were engaged in discover, problem solving, and questioning. If not what do you think could help engage them more efficiently.</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Response #1: Yes they were engaged. Students were actively answering and asking questions. Volunteers were good at keeping them on topic and expanding learning.</td>
</tr>
<tr>
<td>- Response #2: Yes they were engaged. Students were actively answering and asking questions. Volunteers were good at keeping them on topic and expanding learning.</td>
</tr>
<tr>
<td>- Response #3: The students were able to touch the seeds, seed packets, soil, watering can, and other materials</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5. Are there specific topics that you would like us to incorporate into our lesson?</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Response #1: Pollination and its effect on plants.</td>
</tr>
<tr>
<td>- Response #2: N/A</td>
</tr>
<tr>
<td>- Response #3: The life cycle of a plant.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6. Is the garden project helping to facilitate what is being taught in the classroom? If not, please give suggestions.</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Response #1: Yes.</td>
</tr>
<tr>
<td>- Response #2: Yes. We have a song we sing called “Dirt Made My Lunch”, they can see first-hand what that means.</td>
</tr>
<tr>
<td>- Response #3: Yes.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7. Since there are multiple aspects to the gardening project – in class vs. hands on. Which do you feel has the most impact on the students or gets them the most excited to ultimately reach our goal of building a healthier population? Examples?</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Response #1: Taking care of plants and being responsible.</td>
</tr>
<tr>
<td>- Response #2: Probably hands-on because a lot of them don’t get to see seeds/plants close up.</td>
</tr>
<tr>
<td>- Response #3: The kids are most excited when they are engaged in hands-on activities. Planting and eating their way through the food groups was a fun way to teach them.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>8. Based on the current lessons, do you feel as though this is something you can do without us in the future?</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Response #1: Yes.</td>
</tr>
<tr>
<td>- Response #2: Yes, but don’t have the time.</td>
</tr>
<tr>
<td>- Response #3: Yes. The one main issue is having the resources for the activities. There is a lack of school funds and teachers already spend a lot of their own money on various activities.</td>
</tr>
</tbody>
</table>
Table 3: “Overall Project Questionnaire” Questions and Responses (cont.)

<table>
<thead>
<tr>
<th>9. How do we make this project better?</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Response #1: N/A</td>
</tr>
<tr>
<td>- Response #2: I don’t know.</td>
</tr>
<tr>
<td>- Response #3: It would be best to do all discussions in the classroom and then go outside for the projects.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>10. In the future, do you see yourself implementing these garden lesson plans yourself, or would you prefer them to be taught by another individual, i.e. a part-time faculty member, PTA member, outside party, etc.?</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Response #1: I would try but it would be nice to have someone else implement it.</td>
</tr>
<tr>
<td>- Response #2: I think it’s best by someone else because then the time is made for it.</td>
</tr>
<tr>
<td>- Response #3: Yes, we could teach these lessons but it’s always nice to have an expert visit.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>11. Academically, what potential benefits do you see for students who participate in gardening programs?</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Response #1: Waiting for a garden to grow takes patience. They have to continue to take care of the plant which takes perseverance both skills needed in everyday life. Plus it’s fun!</td>
</tr>
<tr>
<td>- Response #2: N/A</td>
</tr>
<tr>
<td>- Response #3: They learn firsthand where food comes from. They are exposed to healthy foods and the beauty in nature. It also teaches them how they can be self sustaining.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>12. Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Response #1: N/A</td>
</tr>
<tr>
<td>- Response #2: N/A</td>
</tr>
<tr>
<td>- Response #3: All of the CSUN students are warm and motivating. They are enthusiastic about the subject matter and knowledgeable. The students ask each week when is gardening! Thank you for coming to Anatola, we really appreciate your help and knowledge!</td>
</tr>
</tbody>
</table>
CHAPTER V

SUMMARY, DISCUSSION, AND CONCLUSIONS

The purpose of this thesis was to evaluate lesson plans created for a garden education program at Anatola Elementary School in Van Nuys, California, using a pilot assessment tool. Feedback collected from the evaluation was then be used to ascertain the garden project’s likelihood of sustainability. The evaluated lesson plans were adapted from a previously created in-class and hands-on garden education manual, tailored specifically for first and second grade students. Throughout the Fall 2012 and Spring 2013 semesters a total of seven instructors participated in the two-fold evaluative process.

The “Lesson Plan Specific Questionnaire” which accompanied each lesson, asked the teachers to rate that particular lesson on a Likert-type scale with regards to the lesson plans’ effectiveness, relevance to the curriculum, and likelihood of future implementation. The “Overall Project Questionnaire” which was intended to be completed once by each participating instructor, was designed to collect a wider scope of feedback on the in-class and hands-on garden education portion of the garden project and ultimately be used to assess the sustainability of the program. The ultimate goal was to develop strategies that help to increase fruit and vegetable consumption among the youth. Projects such as the garden education would be one of the strategies. In order to assess the value of the gardening education component used in this project, it was necessary to conduct an evaluation that would be used to forecast the project’s chances of survival.

Analysis of the teachers’ rating and responses of the lesson plans showed that certain lessons needed to be revised to better suit the needs of the teachers, while other lessons met all their desired criteria. Furthermore, the obtained results supported the
existing literature and provided insight for future research.

The “Planting Day and What Do Plants Need” lesson plan was taught to both the first and second graders, but only the second grade teachers were administered the evaluation form. A total of four teachers participated, yet only three evaluations were received back. The overall average score for effectiveness, relevance to curriculum, and future implementation of the lesson was of the highest possible rating. Thus, rendering this lesson highly effective, very relevant to the curriculum, and very likely for it to be implemented in future lessons. Specific written comments made by the instructors mention that the students were engaged in the lesson, the particular lesson tied into the curriculum especially with their current unit of “Better Together”, which is about working together to get things done. Similarly, through their research Robinson and Zajicek (2005) also showed that elementary school gardens positively influence students’ group work capabilities and self understanding. This lesson was also mentioned to be helpful on the aspect of future implementation in that the current curriculum is set up for a “plant” unit in the spring, and the teachers expected to use their newly learned skills of planting seeds to supplement that unit.

The “Germs and Hand Washing” lesson plan was only taught to the first grade class, therefore three evaluation forms were administered to the three participating classroom teachers, and all forms were received back completed. With scores of five, this lesson was rated as highly effective, and the teachers expressed interest in implementing a similar lesson to future classes. But with an average score of 4.3, this lesson was somewhat lacking in relevance to the current curriculum. This lesson may not be so relevant because the topic of germs which is often covered under the science
curriculum may be too advanced for this group level, thus further research is needed to appropriately gear this lesson to the correct audience. With regards to certain lessons, Klemmer, Waliczek, and Zajicek (2005) discovered that school gardens seem to benefit older students such as fifth graders more so than children in the lower grades, because these students tend to be more developmentally advanced in cognitive science skills and therefore better able to apply the concepts learned in the classroom to their hands-on activities in the garden. On the other hand, specific written comments by the teachers showed validation of the lesson. One teacher mentioned how the lesson was important in giving her students a better understanding of why it is important to wash their hands, and the duration of time needed to spend washing their hands. Another teacher commented, “the students were engaged and interested in the lesson, the student teachers were warm and friendly, I enjoyed watching the kids get germs and then practice washing them away.”

The “Good Bugs and Bad Bugs” lesson was taught to both the first and second grade students, a total of seven evaluations were administered yet only four were received back completed. The rating for all three attributes of effectiveness, relevance to the curriculum, and likelihood of future implementation received the highest possible ranking, making this lesson highly retainable within the garden project manual. In addition, the positive written comments received from the teachers show that this lesson was designed and executed successfully. Certain comments like, “we are about to begin a spring unit on plants and bugs,” and “will implement this lesson today with a depth and complexity flipbook…great lesson on pollination, good information shared with the students, it was very informative” show that the lesson has significance within the
existing curriculum. The teacher’s use of a complexity flipbook to further engage the students demonstrates that the instructors at Anatola Elementary School are incorporating the constructivist theory within their curriculum and utilizing a creative, hands-on approach with their students (DeMarco, Relf, & McDaniel, 1999). It can further be inferred that because the teachers are willing to use alternative and creative methods of instruction, the use of the garden to educate their students in the future is highly probable. Despite the lesson’s great connection to the curriculum, it is also important to gauge the level of engagement of the students. If for instance, the students were not interested in the topic, and seemed to be disgusted by the bugs the lesson would then need to be revised before being included in the manual. For this reason, comments such as, “great lesson, students were engaged in the lesson,” and “very informative and children were engaged in the bug discussion, they loved it” made by the teachers who know their students capabilities and reactions best, are very important; it can help the researcher confidently reach a conclusion.

The lesson of “Counting Seeds”, which utilized pumpkins and pumpkin seeds to incorporate a Halloween theme, was taught only to the first grade classes. A total of three evaluations were administered and collected back. The lesson received 4.67, 4.33, and 4 for the lesson’s effectiveness, relevance to the curriculum, and likelihood of future implementation. These lower scores indicate a need for improvement with this lesson plan, prior to its final inclusion in the manual. The evaluators’ comments are mainly critical of the execution of the lesson, they advise the student teachers to “slow down, and explain thoroughly and redundantly before starting,” and to “tell the student(s) what subject they are learning, for example, today we will use pumpkins to learn math.”
Comments were more directed at the persons implementing the lesson that the lesson itself. As noted in previous literature one of the obstacles in garden education programs is the lack of experience of volunteers, who are unquestionably good-intentioned but they need specific training (Phibbs & Relf, 2005). Instances such as these further provide more reason as to why it is best for the teachers to take over these lessons and implement them at the appropriate pace that is suitable for their students. The positive aspect of this lesson seemed to be the theme, where it was commented that “this lesson fits in perfectly with our pumpkin day celebration.”

The “Parts of the Plant” lesson was taught to both the first and second grade classrooms. A total of seven evaluations were administered for this lesson; six were completed and returned. The scores in all three fields show that there is room for improvement, particularly on the aspect of future implementation. Being that the lesson was taught entirely in the classroom, one of the teachers felt that it could be better executed if we were to “break the lesson so children are not sitting on their desk, bring them to the carpet,” because children of that age group need constant stimulation to maintain their interest. With most of these underperforming lessons, it is not the content of the lesson that is not liked but rather the teaching style, because the other comments by the teachers show that they “love the song, good question and answer session, good visuals” or “students were very engaged and interested in the lesson, nice closing activity to check for comprehension, students also loved coloring it (final worksheet).” A comment made by one teacher indicates that previous research of a similar lesson has been attempted, in that she mentions “Dr. Jean has a cute song about flower parts, it’s on YouTube; your song was so cute too.” The fact that the teacher knew of this song can
allow us to infer that this topic is being covered as part of the current curriculum. The goal of this project is not to have the teachers follow our developed manual precisely but rather adapt it to their own teaching style wherein if they feel, another song or teaching tactic is more suitable it should be used, to ultimately achieve the main purpose of the garden project.

The “MyPlate” lesson plan which discusses the different food groups was taught to the first graders, where three evaluations were administered of which two were received back completed. This lesson is purely supplementary to the in-depth nutrition lessons taught through the nutrition education component of the project. McPherson, Montgomery, and Nichaman (1995) point out that 95% of children learn about nutrition through their school, and being that this lesson was ranked favorably among the instructors, it is imperative to retain this lesson within the manual.

The concluding lesson of “Harvesting and Herbs” was taught to both first and second grade classrooms; five out of the seven administered assessments were received back completed. On all three attributes, the lesson received the highest possible scores, suggesting that it was very effective, relevant to the curriculum, and it was highly likely that the teachers will implement a similar lesson in the future. The students’ level of engagement was noted by one of the teachers, where she mentioned that the “students were very excited about touching, smelling, and eating carrots and herbs.” For future recommendations on the lesson, it was advised to break up the students into groups of two rather than having five-to-six students per group, to allow the students a closer look at the herbs and spices. This lesson was found to be very relatable to the curriculum: “We are currently working on the changing world around us and this fits in perfectly…it
is a good way for the students to see how plants change daily.” Smith and Motsenbocker (2005) also credit school gardens for providing a hands-on laboratory where students can experiment and learn science concepts in an unpredictable, natural setting. And lastly, the teachers appreciated that the lesson was divided between the classroom and the garden area, as the following was mentioned: “great combining in-classroom and outdoor gardening today” or “nice tying on herbs, spices, and carrots to the garden and having them walk out to look at them.” This may have been a good tactic to break up the monotony of the lesson and maintain the interest of the students.

Overall, the feedback received through the “Lesson Plan Specific Questionnaires” are clearly positive toward the students’ level of engagement, the lesson plans’ compatibility with the current curriculum, and the likelihood of future implementation of most of the lessons. The teachers are enthusiastic and appreciative of the program but express a lack of time and resources necessary to implement the lessons themselves. Teacher feedback included designating a specific amount of time toward the project if the lessons are taught by an outside party. Although the polled teachers expressed concerns over their limited resources for such projects, they need to realize that the majority of the supplies such as the Woolly pockets, watering cans, hose, water key, etc. have already been provided for them, in addition there must be an awareness of the different grants that are available to fund such projects.

The “Overall Project Questionnaires” were distributed several times to the seven participating teachers with a sufficient timeframe for completion only three questionnaires were completed and returned. The reasons for non-submission by the remaining instructors are purely speculative, but may be due to lack of time, desire, or
heavy workload. Nonetheless, the responses obtained from the three completed forms are helpful to gather some insight about the project.

The teachers’ enthusiastic responses demonstrate their appreciation for the garden project but it also shows that there may be some misconceptions about certain logistics of the project. The instructors noted that there are no major limitations to the garden project, with the exception of limited resources; within the realm of this questionnaire, resources refers to physical items such as soil, water supply (watering cans, hose, spigot, water key, etc.), plants and seeds and an actual space for planting. Comments found in the responses are similar to what O’Callaghan (2005) found: the initial starting process of an elementary school garden project may incur some costs but once the main items are established, the garden is self sustaining and not such a monetary burden. As such, all supplies used to teach at Anatola Elementary that were provided through the HUD grant will remain at the school for future use by the teachers, thus the majority of the costly purchases such as the Woolly pockets to house the plants, watering cans, hose, and water key already belong to the school. With regards to future purchases of soil, plants or seeds, teachers need to be made aware that they may apply for monetary funds through grants that are available to assist such projects. Despite being knowledgeable about these grants some instructors could foresee the process to be time consuming and be reluctant to apply. If that is the case the application process may opt to be handled by the school administration, because according to O’Callaghan (2005), the successful integration of a garden project is heavily dependent on the amount of involvement by teachers and administration of the participating school. DeMarco, Relf, and McDaniel (1999) also point that the key driving force behind a successful garden project is the positive
reinforcement of the school principal. Resources may also be obtained through many neighboring schools that have their own thriving garden projects. These schools are often willing and able to donate several plants to other participating schools; as was the case during the Fall 2012 and Spring 2013 semesters, where several plant donations were made by Sylmar High School.

Another resource of concern is the manpower available for maintenance of the garden during school holidays and summer vacations. According to the evaluation, the teachers expressed concern over who bears the responsibility to care for the garden during these times: One teacher was under the impression that it is to be taken care of by the maintenance crew, where as another teacher mentioned that “in the past teachers have volunteered to come and water.” Yet during spring break, it was quickly made evident that there is no designated individual assigned to care for and water the plants. An important aspect in the survival of an elementary school garden project is the preservation and upkeep of the garden area. Therefore, a garden maintenance or continuity plan needs to be established for off-school days to help sustain the plants.

Overall, with regards to the content of the lesson plans the teachers reported them as being helpful in facilitating the topics that are taught in the classroom, and the students seem to be very engaged as they get excited about touching and experimenting with the seeds, plants, soil, etc. When asked about their preference of in-class versus hands-on garden education, most of the teachers agreed that the garden area is most suited for teaching these lessons, despite it being disruptive at times. One respondent recommended holding all discussions in the classroom setting, followed by a brief outdoor garden activity.
From the inception of this program at Anatola Elementary School, the teachers of each class have shadowed or actively participated in all the lessons taught to their students, therefore when posed with the question of if this is something they can do on their own most responded by saying yes; an answer which is invaluable for the sustainability of this project. Following their positive response, many of them also expressed that they simply do not have the time but implied that the time is allotted for the lessons if it is taught by an outside party. They also reasserted their lack of resources and how teachers currently spend out of their own pockets to fund for certain activities, similar to the teachers surveyed by Skelly and Bradley (2000) who have paid for the garden with their own money. Therefore, the addition of a garden project may be viewed by the teachers as another stretch of their budget. But as previously discussed, in order to accommodate for any monetary insufficiencies there needs to be an awareness made of available funds through grants. And lastly, one teacher mentioned that she is willing to teach these lessons but prefers an “expert” to do it. O’Callaghan (2005) has pointed out that at times, the mentorship from a Master Gardener is welcomed in providing helpful tips to both teachers and students. But ultimately, the instructors need to realize that they are the “experts” who can teach these lessons; there may be a false perception among the teachers, who think that in order for them to teach the garden education lessons they need to have a solid understanding of horticulture (DeMarco, Relf, & McDaniel, 1999). On the contrary these lessons focus more on teaching science and mathematics concepts through an outdoor laboratory setting, they merely facilitate what is already being taught in the classroom.

The success of any garden project and ultimately achieving its primary goal to
increase fruit and vegetable consumption among the youth are highly dependent on gaining the involved teachers’ cooperation and acceptability of the project. Therefore it becomes highly critical to gear the lessons toward their liking, thus allowing for easier adaptation of the lessons into their current curriculum. As it stands, the individual lesson plans covered and rated thus far meet the teachers’ criteria, but to further accommodate them their lesson suggestions must also be considered. Within this evaluation, the polled teachers recommend the development of two specific lessons: one lesson focused on the life cycle of a plant and the other centered around pollination and its effects on plants. Conclusively, the teachers genuinely showed an appreciation toward the garden project not only from an academic standpoint but they also perceived its social and nutritional benefits. For instance, they noted that it taught their students responsibility, patience, and perseverance, similar to the psychological benefits proposed by Robinson and Zajicek (2005), the garden program also taught the students how to eat their way through the food groups.

Future research which is already underway, should focus on making the program more teacher-centered and train the participating instructors to implement the lessons themselves. Despite the teachers’ hesitations due to their already impacted schedules, having them teach the lessons can provide firsthand experience and allow them to understand the ease with which these lessons may be implemented. By doing so, the teachers may quickly realize that the lesson plans are purely supplementary to topics and concepts already taught within their existing curriculum; subjects like science, mathematics, and nutrition. The garden project merely provides an outdoor laboratory for further enhancement of the learning process. In addition, it would be highly
beneficial to have the active involvement and endorsement of the participating schools’ principals because they are the honorary leaders for the success of such a program (DeMarco, Relf, & McDaniel, 1999). The principals may participate by providing support for grant writing to monetarily fund the project, and help or be accessible during the actual teaching of the lessons.

Ultimately, to assure implementation success of garden projects in elementary schools throughout the nation, it is recommended that future studies focus on collecting quantitative data that can show statistical significance of the program on aspects of increased fruit and vegetable consumption, increased test scores, and its social and psychological benefits. Doing so may also lead to more solid legislative support and further curricular changes that reflect a garden based education which can provide our children an understanding and appreciation of a healthier lifestyle.
REFERENCES


Greetings, Anatola Elementary 2nd grade teachers! It has been a pleasure working with you and your students this semester developing the gardens at Anatola Elementary. In order to optimize our time here and provide you with appropriate lesson plans we would appreciate your constructive feedback and input, on our project and activities. Your responses to this survey will help us improve the current program toward long-term sustainability and allow for its manageability in the classroom. We will be completing our program shortly and will provide you with current, updated, easy to implement lesson plans.

Please answer the following questions as openly and honestly as possible. Your results will remain anonymous and confidential. Feel free to use the back of the page and/or attach additional sheets as necessary. If possible, complete and return this survey in the attached postage paid envelope as soon as possible. Thank you.

1. What limitations do you see in the gardening project?
   a. Time constraints
   b. Shortage of volunteers
   c. Logistics (ex. Children getting dirty/wet)
   d. Does not tie into curriculum
   e. Topic comprehension
   f. Resources
   g. Children adhering to a consistent maintenance schedule
   h. OTHER –
2. Do you feel as though students are engaged during the lessons? If not, what techniques do you suggest to help engage them?

3. Does the school have a system in place for maintaining the garden during the summer and holidays?  
   If not what troubleshooting suggestions do you have?

4. Were the students engaged in active discovery, problem solving, and questioning?  
   Give examples of how students were engaged in discovery, problem solving and questioning.  
   If not what do you think could help engage them more efficiently.

5. Are there specific topics that you would like us to incorporate into our lessons?

6. Is the garden project helping to facilitate what is being taught in the classroom?  
   If not, please give suggestions.

7. Since there are multiple aspects to the gardening project - in class vs hands on.  
   Which do you feel has the most impact on the students or gets them the most excited to ultimately reach our goal of building a healthier population?  
   Examples?
8. Based on the current lessons, do you feel as though this is something you can do without us in the future?

9. How do we make this project better?

10. In the future, do you see yourself implementing these garden lesson plans yourself, or would you prefer them to be taught by another individual, i.e. a part-time faculty member, PTA member, outside party, etc.?

11. Academically, what potential benefits do you see for students who participate in a gardening program?

12. Comments:
APPENDIX B

Lesson Plan Specific Questionnaire

Individual Lesson Plan Evaluation

Name of Lesson:

1. On a scale of 1-5 (1=Least effective, 5=Very effective) rate the effectiveness of this lesson, i.e. were the students engaged?
   1--------2--------3--------4--------5

2. On a scale of 1-5 (1=Least relevant, 5=Very relevant) rate the relevance of this lesson to your current curriculum.
   1--------2--------3--------4--------5

3. On a scale of 1-5 (1=Least likely, 5=Very likely) how likely are you to implement this particular lesson to future classes.
   1--------2--------3--------4--------5

4. Comments/Suggestions: