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## **Educators' Perspectives Associated with School Garden Programs in Clark County, Nevada: Practices, Resources, Benefits and Barriers.**

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EDUCATORS' PERSPECTIVES ASSOCIATED WITH SCHOOL GARDEN PROGRAMS IN  
CLARK COUNTY, NEVADA: PRACTICES, RESOURCES, BENEFITS AND BARRIERS

by

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of the requirements for the

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## **ABSTRACT**

School garden programs have been utilized in the U.S. since their introduction at the end of the 19th century. The use of school gardens and the teaching style implemented in them are dependent on individual schools and teachers. Educators' attitudes, knowledge, and motivation for a school-based gardening program are crucial to implementing comprehensive school garden programs. To move toward an expansion of garden education, it is necessary to determine the concerns, resources, benefits or barriers that educators identify regarding the utilization of gardens to teach their students. The purpose of this pilot study was to determine principals' and teachers' perceived practices, resources, benefits, and barriers to the school garden programs in Clark County Nevada. The survey was sent to 250 teachers and administrators at schools in Clark County School District (CCSD) using an electronic web site link on an invitation to participated in the survey. One hundred and nineteen educators completed the survey and were used for the data analysis. Many educators with gardens perceive that students benefit from school garden programs; however, there are factors that can be improved for the implementation of school garden programs in CCSD to be a success. Current practices and important resources needed for school gardens as well as benefits of and barriers to the school garden programs will be presented. Recommendations will assist the suitability of school gardening in the future.

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## **Chapter 1 – Introduction**

School garden programs have been utilized in the United State for many years. School gardens were introduced in the U.S. at the end of 19<sup>th</sup> century. By 1918, every state in the U.S had at least one school garden to produce food to help the war effort (Subramaniam, 2002). Since First Lady Michelle Obama created vegetable gardens for children in 2009, there has been substantial growth in the number of school gardens in the U.S (University of Nevada Cooperative Extension, 2010). Departments of education and university extension programs in Texas and California have actively promoted school gardening programs through teacher training curricula and research (Blair, 2009). The California Department of Education launched “A Garden in Every School” initiative in 1995. State legislation was passed in 2006 and all California kindergarten and K-12 public schools were eligible for a grant to establish a garden (Hazzard, Moreno, Beall, & Zidenberg-Cherr, 2012). There are now an estimated 3,000 school gardens in the state of California being used as part of the academic curriculum (“Garden in Every School”, 2015). Two East coast states have also been actively involved in school garden programs. In New York, more than 200 schools including 100 teachers and 11,000 students utilize garden curriculums. Vermont has a school gardening program in partnership with the National Gardening Association which provides garden training, teacher education, and national garden newsletters (Blair, 2009).

In Nevada, University of Nevada Cooperative Extension (UNCE), in cooperation with school teachers, non-profit and private agencies, and community groups, had established a program to organize gardens for school children (O' Callaghan, 2005). This program offered hands-on learning opportunities in 50 schools and has provided information to approximately 11,000 students in Southern Nevada since 2002 (O' Callaghan, 2015). In Las Vegas, Nevada, a

non-profit organization named Green Our Planet launched in the spring of 2013, has raised more than \$400,000 for ecological projects, of which over \$360,000 has been used to build school gardens. In partnership with Garden Farms, Green Our Planet has helped build 60 school gardens and provides agricultural professional for educate more than 25,000 students in Las Vegas, Nevada (Green Our Planet, 2015).

School gardens with outdoor classroom programs provide an opportunity for students to be taught science, math, social studies, language and visual arts through hands-on learning. Moreover, they may be impactful in addressing the current obesity crisis in the U.S. since school garden programs have the potential for promoting healthier eating, which is a public health priority (Ozer, 2007). Vegetable gardens provide an opportunity for teachers to teach health and nutrition education such as the importance of vegetable and fruit consumption. Additionally, can students to learn about vitamins and minerals, change opinions about particular foods, improve food attitudes and eating habits, and be encouraged to make healthier food choices through education in the garden (Green Our Planet, 2015). Learning about agriculture in the academic curriculum provides an excellent opportunity for students to study food including where it comes from, health benefits, and the concepts of composting and recycling (Graham et al., 2004). Outdoor education is also associated with the physical benefits of weeding, watering and digging and other basic labor associated with garden maintenance, thus increasing physical activity of the students (Ozer, 2007).

The school garden program offers an excellent path through which to educate children and can cover many areas of academic programs with hands-on learning experience. However, the utilization of school gardens, the style of teaching in the gardens, and integration of an academic curriculum depend on the each school or individual teacher. For instance, in some

schools, during lunch, recess or after school, the school garden is open, and it is place where some students can spend their time. Other schools offer garden classes with the help of garden coordinator and students spend organized time in the garden (Ozer, 2007). Some school have better opportunities and students to get to see a farmer and visit the garden more than once a week, while in the other schools students may only be involved in the garden once per month or less. Depending on the educators teaching in the garden (i.e. teachers, gardeners or volunteers who teach garden education), students received different information and learning experiences. Because of the many benefits of school gardens, it is important to provide better opportunities to educate all students through the gardening experience. To move towards an expansion of garden education in schools, it is necessary to determine the resources, benefits or barriers that educators identify regarding the utilization of gardens to teach their students. The success of school garden programs depends on the efforts of educators (both teachers and administrators); therefor it is important to investigate their thoughts and perceptions about gardening programs. This research project determined administrators' and teachers' perceived practices, resources, benefits, and barriers to the school garden programs in Clark County Nevada.

### **Rational need for study**

Positive outcomes of school garden experiences for school children are found in previous research. Vegetable gardens contributed to the improvement of children's fruits and vegetable consumption through experiences of planting, weeding, harvesting, and food preparation, which help children connect with food (Heim, Stang, & Ireland, 2009). School-based gardening has been shown to be effective for increasing children's knowledge, preference and consumption of fruit and vegetables (Parmer et al., 2009). Moreover, Klemmer, Waliczek, and Zajicek (2005) surveyed 647 third, fourth and fifth grade students in an experimental study to see if students'

involvement in a school garden increases their science achievement. The results showed that students in the group that participated in school gardening scored significantly higher on the science achievement tests compared to the groups that did not participate in school gardening (Klemmer, Waliczek, & Zajicek, 2005).

Despite the benefits of school gardens, limited research has been conducted concerning barriers to implementation of school gardening programs. It is important to determine the resources needed and barriers to applying a garden-based curriculum for the future success and use of school gardening by principals and teachers. Even though a school has a garden, every teacher may not participate in school gardening program. Individual teachers within a school have in their own interest and motivation for the teaching approach they use. Since it is each teacher who controls the instruction methods in their classroom, the teacher is a crucial factor in the successful implementation of a school garden program. Skelly and Bradley (2000) stated that school garden programs are important hands-on experiences for student learning, however teachers also need to learn how to incorporate a curriculum of gardening into the classroom programs (Skelly & Bradley, 2000). Some school districts in the U.S. have created school garden programs and are empowering teachers on a wide scale; however, Clark County, Nevada has only few empowering programs for teachers (O' Callaghan, 2005). Additionally, it is important to consider principals' influence on the whole educational system within the school.

### **Purpose**

Administrators and teachers are a crucial component of an entire school garden program, because without their effort and support, programs could not be implemented or sustained. However, the research on principals' and teachers' perceived resources, benefits, barriers and practices is limited. The purpose of this study was to identify principals and teachers perceived

practices, resources, benefits, and barriers regarding the school garden programs in Clark County, Nevada. This project was collaboration between UNLV, CCSD and Green Our Planet. Green Our Planet has been instrumental in the CCSD garden program by building school gardens and creating a science and math curriculum for grades K-12 that meets the Nevada State education standards.

The study specifically focused on administrators and teachers from the Clark County School District (CCSD). Comparisons were made between educators who have school gardens programs and those who do not yet have a program. Comparison between administrators and teachers, and teachers who teach one hour or less in the garden per month and teachers who teach more than one hour in the garden per month. Determining educator's perceptions regarding school garden programs is crucial for the improvement of school garden programs. Teachers and administrators should be aware of each other's point of view, in order to reach the same goals for incorporating gardens into their academic curriculum. Identification of both administrators' and teachers' perception may help identify their needs or provide support for successful school garden programs within schools. Unfortunately, not all teachers are knowledgeable or have an interest in the garden. This may create a complication when teaching in the garden because it is difficult for students to feel enthusiastic in the garden if their teachers show no interest. Therefore, it is important to identify the perception of both teachers who spend a small amount of time in the garden compared to teachers who spend more time in the garden. This was accomplished by comparing teachers who teach one hour or less in the garden per month to teachers who teach more than one hour in the garden per month. The teachers who spend more time in the garden can teach the other teachers how to use the garden as a learning tool and how students can be more engaged with the topic taught. They may be able to help each other learn

what they are missing or what they need to help incorporate a school garden program into their academic curriculum.

CCSD's IRB approved this study. However, they would not allow the survey to go out district wide until later in the year because of their own survey. They did however allow it to be sent to a group of 250 of teachers and administrators. Because of this, my thesis was a pilot of the survey. Pilot studies can define the feasibility of a study and refer to small or trail forms for a major study. Pilot studies can define the feasibility of a study and refer to small or trail forms for a major study. It can be also the pre-testing or trying out of research tool (Teijlingen & Hundley, 2001). It was important to conduct a pilot study because it allowed us to evaluate whether some questions were inappropriate or too complicated, and if some questions were unclear or hard to understand. It also allowed us to assess whether the study was realistic and workable, and to define the resources (finance, staff) needed to conduct a planned study.

Finding solutions to identify educators' barriers and as well as knowledge of the resources needed will help to assist the suitability of using school gardening in the future. Moreover, the results of this study can help others increase the likelihood of successful implementation of a school gardening program for individual teachers and entire school systems.

### **Objectives**

This study assessed practices, resources, benefits, and barriers of administrators and teachers to the school garden programs in Clark County, Nevada and how these results apply to existing programs and future programs. The objectives for the study were:

1. To determine the current school garden practices within school garden programs.
2. To determine the resources associated with the use of garden programs in schools identified by administrators and teachers.

3. To determine the barriers to having and using school garden programs in schools identified by administrators and teachers.
4. To determine the perceived benefits students receive when school garden programs are incorporated into the school curriculum as reported by educators.

## **Chapter 2 - Literature Review**

The school gardening are unique learning methodology. Flexibility is a benefit of school gardens because they can be adjusted to meeting the educational needs of multicultural students, the teaching styles of individual teachers, and the curricula of different school. This section will review the available literature regarding school gardens in the U.S. First, the history of school gardens in the United States and Nevada will be explored. Then specific studies of school gardens will be described. This section reviews the existing research related to experiential learning, academic achievement, nutrition education, and teachers' perceptions. The final section covers a description of the non-profit organization Green Our Planet and their current activities related to the CCSD school garden program.

### **History of School Gardens**

Gardens have been utilized in school in the U.S. since the 1890s. The first school garden in this country was installed in 1891 at George Putnam School in Roxbury Massachusetts by Henry Lincoln Clapp, who was sent to study school gardens in Europe (Subramaniam, 2002). School gardens in this country were initially introduced for aesthetics in urban schools rather than educational purposes (Sealy, 2001). School gardening soon became a national movement and by 1918, every state in the U.S had at least one school garden to produce of food during the war effort (Subramaniam, 2002). After the World Wars, the educational value of school gardens diminished and schools utilized the grounds for playgrounds and athletic fields more than garden plots and technology became the most emphasized topic at school after 1944. The environmental concerns of the 1960's made people direct their attention to school gardens again so children could understand "life process" concept and have an environmental understanding (Subramaniam, 2002).



The American Horticultural Society held a symposium in 1993 which was the first school gardening symposium entitled “Children, Plants, and Gardens: Educational Opportunities” to spread the idea that school gardens could support educational curricula. This led to the development of numerous curricular materials using school gardens during the last decade (Subramaniam, 2002).

In Nevada, the UNCE has produced school garden programs to enhance the learning experience for school children in Clark County, Nevada. The UNCE established a training program for teachers and administrators to learn how to use gardens in 2002, and this had promoted a successful gardening program for students in Clark County (O' Callaghan, 2005). O' Callaghan stated that there were a variety of techniques used to provide training to school personnel during staff development days between 2002 and 2004. UNCE attended training sessions held by 15 individual schools from CCSD and they developed the professional development training materials, Food, Land, and People (FLP), Junior Master Gardener (JMG) curriculum, as well as other training materials (O' Callaghan, 2005).

### **Experiential Learning**

Subramaniam defined experiential learning as “a process through which a learner constructs knowledge, skill, and value from direct experiences (Subramaniam, 2002).” Schools have introduced gardening program into academic education as a way for students to learn hands-on. School gardens allows students to explore nature and build a garden, and gives a teacher an opportunity to demonstrate the practical application of classroom subjects in a real world scenario (Wiesen, 2011). Hands-on learning also provides students the chance to be part of the learning process as they become active participants instead of passive learners (Haury & Rillero, 1994). Skelly and Bradley stated, “The benefits of experiential learning allow for a better

understanding of concepts as the hands-on approach provides meaningful and tangible experiences” (Skelly & Bradley, 2000).

School gardens provide a hands-on learning environment that may help improve the understanding of subjects taught using traditional teaching methods. Skelly and Bradley conducted study in 1997, of 35 schools, including 71 teachers to address the perceptions teachers have of school gardens and the role these perceptions play in the use and success of school gardens. One of the questions they asked was “what is the garden was used for”? Seventy-three percent of teachers indicated that the garden was used for experiential learning. Eighty-four percent of the teachers also felt that the garden helped students learn better (Skelly & Bradley, 2000). Additionally, Waliczek et al. (2003) examined the impact of a 4 hour outdoor, hands-on learning experience which included subjects such as weather, insects, water, and soil on the critical thinking and cognition of 175 second to sixth grade students from five New Mexico schools. Results indicated that outdoor education produced positive attitudes towards the knowledge of science (Waliczek et al. 2003).

### **Academic Curriculum Achievement**

School gardens provide an outdoor opportunity for teaching and learning lesson covering many subjects such as science, math, social studies, language and visual arts (Haury & Rillero, 1994). Science is the most common subject taught in school garden programs and science achievement has also been linked to school gardens (Haury & Rillero, 1994). Two studies have shown that the outcomes of outdoor class learning were correlated with higher academic achievement. Smith and Motsenbocke (2005) studied the effects of a school garden and garden curriculum on the science achievement of fifth grade students in three Louisiana public elementary schools. The science achievement tests were given to both garden and non-garden

groups before and after the garden students participated in gardening activities to evaluate whether or not garden lessons helped increase test scores. Results showed science achievement post scores were significantly higher ( $P=0.017$ ) in the gardening group. The authors concluded that school garden based learning was associated with increased scores on science achievement tests (Smith & Motsenbocke, 2005).

Klemmer, Waliczak and Zajicek assessed the science achievement of 645 students from third to fifth grades in seven elementary schools in Temple, TX. Students in the experimental (garden) group joined a school gardening program in addition to being taught science through traditional in class lessons. Students in control (non-garden) group were only taught science through traditional in class lessons. The authors stated that science achievement of students who participated in a hands-on gardening program was higher ( $P=0.001$ ) than that of students who only engaged in classroom curriculum (Klemmer et al., 2005).

Utilizing school gardening program not only enhance science achievement, but also improve student academic and social success. Robinson and Zajicek assessed the change in 281 elementary school children's six constructs of life skills which included: teamwork, self-understanding, leadership skills, decision making, communication, and volunteerism. In this study, an experimental group participated in a one year school garden program while the control group did not participate in the garden program. The researchers found that on the pretest, students in the control group had higher overall life skills scores compared to the experimental group. However on the posttest, there were no significant differences between groups. Moreover, researchers emphasized that the garden program highly influenced two life skills, teamwork and self-understanding (Robinson & Zajicek, 2005).

## **Nutritional Education**

Child obesity is one of the most important public health issues in the United States. More than one third of children and adolescents are overweight or obese. This has a significant long-term impact on the cost of health care and population health (Oden et al., 2014). CDC states that obese youth are more likely to have risk factors for cardiovascular disease, high blood pressure, diabetes and bone and joint problems. Childhood weight gain and diet habits may contribute to their being overweight and obese as adults (CDC, 2014). The Nevada Division of Public and Behavioral Health has reported that 36.8% of the children in Nevada are considered overweight or obese (NDPBH, 2013). According to the data collection from 2007 to 2008, statewide, 18% of 4th, 7th, and 10th grade students are overweight and 20% are obese. Moreover, in Clark County nearly 18% of 4th, 7th and 10th grade students are overweight and a slightly higher percent are obese at 22% (Whitley & Green, 2010).

According to USDA and HHS, one key component to reducing the prevalence of childhood obesity is good nutrition. Proper nutrition also leads optimal growth and development and maintenance of healthy weight for children. Consumption of fruits and vegetables are especially important in a diet to provide the body with nutrients including vitamins, minerals, fiber and phytochemicals that enhance a healthy body in childhood (Morris et al., 2000). In a recent study of children's eating habits, Morris et al (2000) found that only 7% of children age 2 to 11 years consumed the recommended two servings of fruits and three servings of vegetables each day. Schools need innovative approach to motivate children to develop lifelong healthy eating habits (Morris et al., 2000).

The use of school gardens as a tool to promote nutrition awareness for school children is growing with the increasing problem of childhood obesity. School garden programs are designed to help teachers integrate nutrition education into their classroom using hands-on learning in the

garden. Many studies have focused on the effects of gardening on improved attitudes toward food consumptions, especially fruits and vegetables (Graham et al., 2004).

Studies have shown that school gardens contributed to the improvement of children's fruits and vegetable consumption through experiences of planting, weeding, harvesting, and food preparation, which help children connect with food (Heim, Stang, & Ireland, 2009). Researchers at Auburn University in Alabama studied 115 second grade students and examined the effects of a school garden on children's fruit and vegetable knowledge, preference, and consumption (Parmer et al., 2009). The authors stated that after the intervention, school-based gardening increased children's vegetable consumption, willingness to try new vegetables and improved their nutrition knowledge. The authors concluded that school-based gardening shows to be an effective program for increasing children's knowledge, preference and consumption of fruit and vegetables (Parmer et al., 2009). Another study conducted in Texas by Lineberger and Zajicek (2005) evaluated 111 third and fifth grade students to determine if students increased their positive attitudes and behaviors about eating more fruits and vegetables by using school garden programs. Results indicated that there were significant differences ( $P=0.030$ ) students' pretest and posttest scores in vegetable preference after students had participated in the garden program. There were significant differences ( $P=0.009$ ) in snack preference as well. However, fruit preference scores of students were not significant difference. The researchers stated that this result was due to students having a positive attitude towards fruit even before participating in the garden program (Lineberger & Zajicek, 2005).

### **Educators' Perspectives**

According to Blair, researchers who study educators' perceptions associated with school-based garden program should examine (1) principals' and teachers' enthusiasm for school

gardens as learning tools; (2) how teachers find gardens useful; and (3) what barriers they perceive in the integration of garden into the curriculum (Blair, 2009). Educators' attitudes, knowledge, and motivation for a school-based gardening program are vital factors to implement comprehensive school garden programs.

Two similar studies were performed by California researchers to evaluate attitudes and perception of principals and teachers about school gardening programs. Graham et al. (2005) used a questionnaire to survey California principals to determine the status of gardens in California schools (n=9805). The response rate was 43% (n=4194). The most often cited reason for having a garden was for the development of academic instruction (89%) and subject areas taught using the garden included science, environmental studies, and nutrition. Principals also indicated that gardens were moderately to very effective in enhancing science instruction. The factors that made it difficult to use the garden for academic curriculum were lack of time, lack of curricular materials linked to academic standard, and lack of teachers' interest, knowledge, experiences, and training in gardening (Graham et al., 2005).

Graham and Zidenberg-Cherr (2005) conducted a survey of fourth grade school teachers (n=592) in California to assess teachers' perceived attitudes of and barriers to school garden programs. In answering the question about the reason for having a garden, 68% of teachers said it was for enhancement of academic instruction. The subjects taught most often in school gardens were science (65%), nutrition (47%), environmental studies (43%), language arts (42%), math (40%), and agricultural studies (27%). In the article, a majority of teachers strongly agreed that resources needed for the school garden to be used for academic instruction included teacher training, materials for academic curriculum, and nutrition education. Finally, 67 % of teachers answered that the most common barriers for using the garden for academic instruction was time.

Other barriers that teachers identified included lack of teachers' interest in garden, lack of teachers experience with gardening, lack of curricular materials linked to the garden, and lack of teacher training in gardening (Graham and Zidenberg-Cherr, 2005). Both of the studies had similar results, that training was a crucial resource for teachers to teach students effectively in school gardens (Graham et al., 2005).

Another study conducted in Florida, evaluated the importance of school gardens as perceived by elementary school teachers. Researchers found the most frequent reason for using the school gardens were environmental education (97%), followed by helping students learn better (84%), experiential learning (73%), and personal love of gardening (67%). The majority of the teachers indicated that students spent between 1 hour (68%) and 2-3 hours (17%) per week in the garden. Moreover, more than 50% of teachers confirmed that the school garden was being used as an educational tool 10% or less of the class time (Skelly & Bradley, 2000). Results showed that while the participating schools may have gardens, large percentages of teachers were using them minimally as a teaching tool. Even though 84% of teachers considered that school garden programs helped students learn better and 67% of teachers answered that their reasons for using school gardens were because of personal love of garden; many teachers did not use school gardens because they did not know how to successfully incorporate the garden into an already existing curriculum. Researchers also pointed out reasons that the teachers surveyed were not using school garden very often were because of the length of time the garden had been established. The majority of the school gardens had been established less than one and a half years. Therefore, this number probably indicated that teachers may not have had the opportunity to incorporate the garden into their instruction, or teachers may not be comfortable using school gardens as educational tools. The most important finding from this study was teachers need to be

made aware of the resources available to support them in integrating the garden into classroom lessons (Skelly & Bradley, 2000).

UNCE has established school garden program in southern Nevada schools (O' Callaghan, 2005). In 2001, they mailed out an anonymous questionnaire to 169 elementary school principals in Clark County to evaluate concerns and usefulness of school gardens programs. The response rate was 38.5%. Most of the principles (either with or without garden in their school) reported a desire for gardens and for teacher training to use the garden. They also pointed out the greatest barriers to establishing gardens in their schools were concerns over cost and potential vandalism. Once gardens were established, it was difficult to maintain them with the limited number of people available (O' Callaghan, 2005). An author found the most successful school gardens and gardening programs were schools where teachers and administration became most involved (O' Callaghan, 2005). Further research is needed to evaluate how educators can best remove barriers to implementing garden programs for all school children (Blair, 2009).

### **Green Our Planet**

This project is in collaboration with the nonprofit organization, Green Our Planet, that has been instrumental in establishing many school gardens throughout CCSD. Green Our Planet's mission is to raise money for ecological projects and to educate the public about the most pressing environmental issues facing the planet today. Their goal is to help conserve, protect, and improve the environment through the funding of green projects and through education, which includes STEM (science, technology, engineering and math), nutrition and conservation education in K-12 schools (Green Our Planet, 2015).



Green Our Planet started to provide public and private schools with the Outdoor Garden Classroom Program in Las Vegas, Nevada in January, 2013. The goal of this program is to help public and private schools raise funding to build outdoor gardens where students can be taught a variety of subjects, including STEM, health, and nutrition education (Green Our Planet, 2015). In spring of 2014, Green Our Planet was awarded a grant from Honda to develop a garden based science and math curriculum for grades K-5. Green Our Planet worked with science and math teachers from CCSD to develop the Outdoor Garden Classroom Curriculum for use in the garden that met the Nevada State education standards. In August 2014, Green Our Planet, Three Square, and LifeLab presented a two day workshop for twenty five CCSD elementary school teachers on how to teach classes in a garden using the new school gardens curriculum. CCSD elementary school teachers from eight elementary schools were also enrolled in a school garden Topic Study in fall 2014. During the study, teachers were shown the gardens curriculum in a garden with their students and then they discussed the effectiveness of the lessons with their Topic Groups at their schools. In October 2014, Green Our Planet in partnership with Three Square and CCSD launched the first school garden conference in Las Vegas, Nevada, to teach about the STEM garden curriculum. The event was held at John S Park Elementary School in Downtown Las Vegas and attended by more than eighty CCSD teachers, administrators, donors, and sponsors. During the conference, participants were able to learn about the new curriculum for STEM lessons associated with the school garden program. Green Our Planet hopes to provide the training to more than one hundred teachers from Clark County in 2015(Green Our Planet, 2015).

## **Chapter 3 -Methods**

This study was collaboration between UNLV, CCSD and Green Our Planet to determine principals' and teachers' practices, resources, benefits, and barriers to the school garden programs in Clark County Nevada. In this section, research questions, research design, subjects, content of survey, data collection, statistical analysis, and procedure limitations are defined. For the protection of "Human Subjects" involved in the research conducted, this research project was approved by UNLV's IRB and CCSD's IRB.

### **Research Questions**

The questions identified in this paper were based on the perceptions of researchers and garden educators are:

1. What current practices are being used at school gardens?
2. What are the resources associated with the use of school gardens?
3. What are the perceived barriers to having and using a school garden in academic instruction?
4. What are the perceived benefits students receive when school gardens are incorporated into their curriculum?

### **Research Design**

The research design that was cross-sectional which is primarily used to determine prevalence. This study compares different subjects at a single point in time. Due to no follow up, fewer resources are required to conduct the study. The most important advantages of cross-sectional studies are that they are quick and inexpensive. This study allowed researchers to compare many different variables at the same time (Mann, 2003).

### **Subjects**

A convenience sample of 250 administrators and teachers was used for this study. The survey was administered through Qualtrics, an electronic web site, with a link to the survey which was included in an email invitation to participate. The email invitation was sent to the educators by both Green Our Planet and CCSD.

### **Content of Survey**

The survey was developed by LifeLab in collaboration with the California School Garden Network. The LifeLab is a nationally recognized non-profit organization with over 35 years of experience in the field. They have received multiple awards over the years including National Academy of Sciences, National Science Foundation, National Parenting Publications Awards, and so on. LifeLab has been conducting educator surveys to evaluate school gardens in California since 2010 (LifeLab, 2013). This study utilizes their survey in addition to questions that were considered necessary to the answer research questions. The survey consisted of 30 questions and a majority of the answers were closed-ended; however, for each question participants had the option to write in additional comments. It also has a few open-ended questions for participants to contribute specific information. The survey is divided into four main categories including: (1) current school garden practices; (2) resources associated with the use of school gardens; (3) barriers to having and using school gardens; and (4) the benefits students receive when school gardens are incorporated into the school curriculum.

Current practices asked questions including: the main reason the school garden is used, when the school garden was installed for each school, the grade levels that participate in the school garden, time periods that the teacher uses the garden for class, the estimated amount of time that students visit the garden per week and month, subjects that are taught using the garden for academic instruction, and resources and materials that are used to teach core subjects

associated with gardens. Resources were evaluated using questions including: resources that support academic instruction in the garden, type of garden-based professional development lessons that educators have received, specific professional development topics that educators want to attend, and the most important elements that contribute to the success of the school garden program. Barriers were evaluated using the question, “what types of barriers are there to using the school gardens?” Benefits were evaluated using questions including: positive observations that have been made by educators in the school gardens and negative observations that have made by educators in the school gardens, and perceived effectiveness of the school garden programs. Educators without gardens were asked about barriers to implementing a school garden, perceived benefits of having a school garden and if their school plans to incorporate a school garden into the curriculum.

### **Data Collection**

The surveys were distributed to teachers and administrators at 250 educators from CCSD starting in May. Data were gathered using a self-administered online survey. The online survey system allowed for a faster response for survey implementation, quicker analysis of results, lower researchers’ cost, and convenience for participants to complete it in their free time (ITS Online Surveys, 2009). The surveys have 30 questions and take approximately 20 minutes to complete.

### **Statistical Analysis**

After the surveys were completed, data were analyzed using SPSS to generate frequency distributions for each question. Teachers’ and administrators’ answers to questions were analyzed using chi-squared and Fisher’s exact tests to identify statistical significance ( $P \leq 0.05$ ) for specific questions. Additionally, teachers who use the garden one hour or less per month and

teachers who use the garden more than one hour per month were compared using the same methods.

1. What current practices are being used at school gardens? Descriptive statistics were used to analyze the following responses. Chi square or Fisher's exact were used to determine if there were differences in responses of teachers and administrators, and teachers who use the garden one hour or less and teachers who use the garden more than one hour.

- Main reason the school gardens is used
- When (date) school garden was installed,
- What grades participate in the school garden
- How much time the teacher uses the garden for class per week or month
- The estimated amount of time that students visit the garden per week and month
- Academic subjects that are taught using the garden for academic instruction
- Resources and materials that are used to teach core subjects associated with gardens.

Null Hypothesis (Ho): There will be no significant difference between teachers and administrators, or between teachers

Alternate Hypothesis (Ha): There will be a significant difference between teachers and administrators, or between teachers.

2. What are the resources associated with the use of school gardens in schools? Descriptive statistics were used to analyze the following responses. Chi square or Fisher's exact were used to determine if there were differences in responses of teachers and administrators, and teachers who use the garden one hour or less and teachers who use the garden more than one hour.

- Resources that support academic instruction in the garden
- Type of garden-based professional development lessons have educators received
- Specific professional development topics that educators want to attend,
- The most important elements that contribute to the success of the school garden program

Null Hypothesis (Ho): There will be no significant difference between teachers and administrators, or between teachers.

Alternate Hypothesis (Ha): There will be a significant difference between teachers and administrators, or between teachers.

3. What are the barriers to having and using a school garden in academic instruction?

Descriptive statistics were used to analyze the following responses. Chi square or Fisher's exact were used to determine if there were differences in responses of teachers and administrators, and teachers who use the garden one hour or less and teachers who use the garden more than one hour. Additionally, chi square tests were used to determine if there is a difference in barriers to using the gardens between educators with and without gardens.

- Types of barriers are there to using the school gardens.

Null Hypothesis (Ho): There will be no significant difference between teachers and administrators with or without gardens

Alternate Hypothesis (Ha): There will be a significant difference between teachers and administrators with or without gardens.

4. What are the benefits students receive when school gardens are incorporated into their curriculum? Descriptive statistics were used to analyze the following responses. Chi square or Fisher's exact were used to determine if there were differences in responses of teachers and administrators, and teachers who use the garden one hour or less and teachers who use the garden more than one hour. Additionally, the perceived effectiveness of school gardens were compared between educators with and without gardens.

- Positive observations have been made by educators in the school gardens
- Negative observations have made by educators in the school gardens
- The perceived effectiveness of the school garden

Null Hypothesis (Ho): There will be no significant difference between teachers and administrators, or between teachers,

Alternate Hypothesis (Ha): There will be a significant difference between teachers and administrators, or between teachers.

## **Chapter 4 -Results**

This section describes the findings of the survey conducted with teachers and administrators from CCSD. The survey was divided into four main categories of questions addressing: current school garden practices; resources associated with the use of school gardens; barriers to having and using school gardens; and the perceived benefits students receive when school gardens are incorporated into the school curriculum.

The school garden surveys were sent to 250 teachers and principals from CCSD. One hundred and twenty-nine educators started the survey and 119 completed 90% of the survey (response rate 51.6%, completion rate 92.2%). Of the 119 respondents, ninety-one teachers (76%) and twenty-eight (24%) administrators completed the survey. From 119 respondents, 105 (88%) of the schools had a school garden or a garden program while 14 (12%) of the schools have not started a school garden yet.

### **Schools without gardens**

Fourteen educators from schools without gardens completed the survey, four administrators and ten teachers. The table 1 shows the reasons why schools do not have school garden program. The most frequent reasons for not having a school garden program was lack of funding (58%) followed by little to no knowledge about gardening (25%), and lack of garden supplies and time constraints (17%). However, many educators who do not have a school garden, answered that they are in the process of getting school garden.

Table 1. Reason school does not have school garden program.

<b>Answer</b>	<b>All Educators</b>
Lack of staffing	8.0%
Little to no knowledge about gardening	25.0%
Lack of garden supplies	17.0%
Lack of funding	58.0%
Difficulty linking to core academic standards	0.0%
Lack of volunteers	8.0%
No interest in having a garden	0.0%
Inadequate space	8.0%
The risk of vandalism	8.0%
Time constraints	17.0%
Few or no instructional materials	8.0%
Lack of technical assistance with gardening	8.0%
Time away from instruction	8.0%
Lack of teacher support	8.0%
Lack of administrator support	0.0%
Other	33.0%

Others: We will have one in the fall; we just received funding and are about to get a garden; in process; and I'm moving schools but hoping to start one.

Those who answered from schools without gardens identified the benefits of a school garden as: increase community engagement (64%); improves social skills (43%); improves academic achievement (36%); and garden are a powerful learning tool (36%). On the other hand, the educators at schools with gardens answered that the benefits of school garden programs were increased nutrition knowledge (76%) and teachers and students have fun in the garden (74%), followed by the gardens were a powerful learning tool (72%) and increase community engagement (64%) (Table 2). There were several significant differences between the groups regarding the benefits of having a school garden program, with the school garden group answering yes to the question significantly more often for: Increase nutrition knowledge, improve test scores, increase parent engagement, are a powerful learning tool, are fun for teachers and students, and are an important part of the curriculum (Table 2).



Table 2. Benefits of school garden

Answer	Educators With garden	Educators Without garden	Chi Square or Fisher's exact p value
Increase nutrition knowledge	<b>76.2%</b>	<b>28.6%</b>	<b>0.00</b>
Improve test scores	<b>39.0%</b>	<b>0.0%</b>	<b>0.00</b>
Improve academic achievement	56.2%	35.7%	0.17
Improve social skills	57.1%	42.9%	0.31
Increase community engagement	63.8%	64.3%	0.97
Increase time away from instruction	7.6%	0.0%	0.59
Lead to extra work	10.5%	14.3%	0.65
Increase parent engagement	<b>39.0%</b>	<b>7.1%</b>	<b>0.02</b>
Are a powerful learning tool	<b>72.4%</b>	<b>35.7%</b>	<b>0.01</b>
Are fun for teachers and students	<b>74.3%</b>	<b>28.6%</b>	<b>0.00</b>
Are an important part of the curriculum	<b>58.1%</b>	<b>7.1%</b>	<b>0.00</b>

### Schools with gardens

One hundred and five educators at schools with gardens answered the survey. Of those, 81 were teachers and 24 were administrators. Answers to the questions were evaluated for the entire group, for teachers who spend one hour or less in the garden per month, teachers who spend more than one hour per month in the garden, and for administrators. Seventy teachers provided information about the amount of time they spend in the garden, 29 teachers spent one hour or less in the garden and 41 teachers spent more than one hour per month in the garden. Chi Square and Fisher’s Exact tests were used to determine if there were significant differences between teachers based on time spent in the garden, and between teachers and administrators. Fisher’s Exact tests were used when a cell in the 2x2 table was less than five.

#### 1. Current school garden practices

Description of school gardens collected from the survey showed that ninety one percent of all educators answered the grades levels served by the gardens were pre-kindergarten through fifth grade. Middle and high schools were an extremely low percentage (Table 3).

Table 3. The grades that your school serves

<b>Answer</b>	<b>All Educators</b>
Pre-K/Kindergarten – 5th	91.0%
6th – 8th	2.0%
9th-12th	7.0%

Most of the gardens had been established at the school within the last year (Table 4).

There were no significant differences between teachers who spend one hour or less in the garden per month, teachers who spend more than one hour per month in the garden and administrators for this question.

Table 4. Date school garden was installed

<b>Answer</b>	<b>All Educators</b>	<b>Teacher &gt; 1 hour</b>	<b>Teachers ≤ 1 hour</b>	<b>Chi Square or Fisher's exact p value</b>	<b>Teachers</b>	<b>Administrators</b>	<b>Chi Square or Fisher's exact p value</b>
Within the last year	<b>58.0%</b>	51.2%	62.1%	0.37	56.8%	60.9%	0.73
2 years ago	19.0%	24.4%	13.8%	0.37	18.5%	25.0%	0.49
3 years ago	7.0%	7.3%	10.3%	0.69	7.4%	4.2%	1.00
4 years ago	4.0%	2.4%	6.9%	0.57	3.7%	4.2%	1.00
5-10 years ago	4.0%	4.9%	3.4%	1.00	4.9%	0.0%	0.57
More than 10 years ago	8.0%	9.8%	3.4%	0.39	8.6%	4.2%	0.68

The majority of the students that participated in the garden program at their schools were from pre-kindergarten through fifth grade. As table 5 indicates, the percentage of students from higher grades (from sixth to twelfth grade) was particularly low.

Table 5. Grade level(s) participate in garden programming at your school.

<b>Answer</b>	<b>All Educators</b>
Pre-K/Kindergarten	73.0%
First	81.0%
Second	81.0%
Third	82.0%
Fourth	82.0%
Fifth	82.0%
Sixth	4.0%
Seventh	3.0%
Eighth	3.0%
Ninth	8.0%
Tenth	8.0%
Eleventh	8.0%
Twelfth	7.0%

The most frequent time for using the garden program was during class instruction time (>90%). There was no significant difference between teachers that spend more than one hour and teachers that spend less than hour in the garden (Table 6). However, there were some significant differences between the answers of teachers and administrators in regards to when the gardens are used. Administrators answered that the gardens are used during recess, during lunchtime, and after school significantly more often than the teachers.

Table 6. Time that the garden used

Answer	All Educators	Teacher > 1 hour	Teachers ≤ 1 hour	Chi Square or Fisher's exact p value	Teachers	Administrators	Chi Square or Fisher's exact p value
During class instruction time	92.0%	95.1%	93.1%	1.00	91.4%	91.7%	1.00
During recess	<b>10.0%</b>	<b>9.8%</b>	<b>3.4%</b>	<b>0.39</b>	<b>6.2%</b>	<b>20.8%</b>	<b>0.05</b>
During lunchtime	<b>11.0%</b>	<b>9.8%</b>	<b>3.4%</b>	<b>0.39</b>	<b>7.4%</b>	<b>25.0%</b>	<b>0.03</b>
Before school	25.0%	24.4%	20.7%	0.72	23.5%	29.2%	0.57
After school	<b>24.0%</b>	<b>22.0%</b>	<b>20.7%</b>	<b>0.90</b>	<b>18.5%</b>	<b>41.7%</b>	<b>0.02</b>
Weekends	12.0%	19.5%	6.9%	0.18	12.3%	12.5%	1.00
Summer program/camp	18.0%	14.6%	20.7%	0.51	14.8%	29.2%	0.11
Non-school community uses	7.0%	14.6%	3.4%	0.23	8.6%	0.0%	0.35
Other, please specify	5.0%	4.9%	6.9%	1.00	6.2%	0.0%	0.59

Others: Garden club on Saturdays; explorations classes; boy scouts; trainings; professional development; Junior Master Gardening Training

Table 7 showed that total percentage of students at school visit the garden (at least once) per month by administrators. Administrators who answered the most said 20% of the students in their school visit the garden (at least once) per month and followed by 100% and 30%.

Table 7. The estimated amount of time that students visit the garden per month (Administrators)

<b>Answer</b>	<b>Administrators</b>
10%	11%
20%	23%
30%	15%
40%	5%
50%	6%
60%	6%
70%	5%
80%	3%
90%	10%
100%	16%

Teachers were asked how many hours per month their class spends in the garden. The most common answer was 2 to 3 hours, followed by 1 hour (Table 8).

Table 8. The estimated amount of time that students visit the garden per month. (Teachers)

<b>Answer</b>	<b>All teachers</b>
1 hour	31.0%
2 to 3 hours	36.0%
4 to 5 hours	13.0%
6 to 7 hours	2.0%
7 to 8 hours	7.0%
Other Amount	10.0%
0 hours	1.0%

With the exception of teachers who use the garden less than one hour, the most frequent reason for having a garden program was academic instruction (Table 9). Teachers who use the garden one hour or less indicated the garden was used for subject matter reinforcement most often (28%). Moreover, administrators indicated that experiential learning was also an important reason for having a garden program. As seen in table 9, a couple of responses were significantly different. While none of the teachers that spend more than one hour using the

garden selected “other” as a reason to use the garden, nearly 14% of the teachers that spend less than one hour in the garden did select “other”. Other reasons include; vocational training; environmental management; and so students connect to the natural world. In addition, there is a significant difference between the percentage of administrators and teachers that selected “experiential learning” as a response.

Table 9. The main reason for use your school garden.

<b>Answer</b>	<b>All Educators</b>	<b>Teacher &gt; 1 hour</b>	<b>Teachers &lt; 1 hour</b>	<b>Chi Square or Fisher's exact p value</b>	<b>Teachers</b>	<b>Administrators</b>	<b>Chi Square or Fisher's exact p value</b>
Academic instruction	38.0%	<b>46.3%</b>	<b>24.1%</b>	<b>0.06</b>	39.5%	33.3%	0.58
Subject matter reinforcement	16.0%	<b>12.2%</b>	<b>27.6%</b>	<b>0.10</b>	16.0%	16.7%	1.00
Extracurricular activity	5.0%	7.3%	0.0%	0.26	4.9%	4.2%	1.00
Nutrition education	5.0%	2.4%	10.3%	0.30	6.2%	0.0%	0.59
Personal love of gardening	1.0%	0.0%	0.0%	NA	1.2%	0.0%	1.00
Encouragement from administration	1.0%	0.0%	0.0%	NA	0.0%	4.2%	0.23
Experiential learning	19.0%	17.1%	10.3%	0.51	<b>13.6%</b>	<b>33.3%</b>	<b>0.03</b>
Other	4.0%	<b>0.0%</b>	<b>13.8%</b>	<b>0.03</b>	4.9%	0.0%	0.57

Others: vocational training; environmental management; students connect to the natural world

All educators indicated that they used the gardens for multiple teaching purposes including mathematics, English language arts, sciences, and health & nutrition education, and these are the most commonly taught subjects in the garden (more than 77%), followed by history/social science (58%) and environmental studies (53%). There was no significant difference between teachers that spend more than one hour and teachers that spend less than hour in the garden, or between teachers and administrators (Table 10).

Table 10. Academic subjects that are taught using the garden for academic instruction

Answer	All Educators	Teacher > 1 hour	Teacher $\leq$ 1 hour	Chi Square or Fisher's exact p value	Teaches	Administrators	Chi Square or Fisher's exact p value
Is the school garden used for core academic content instruction? (Math, English-Language Arts, Science, Social Studies)	91.0%	91.7%	92.0%	1.00	91.7%	92.0%	0.96
Is the garden used to teach mathematics?	80.0%	72.7%	91.3%	0.10	72.7%	91.3%	0.10
Is the garden used to teach English-Language Arts?	80.0%	72.7%	90.5%	0.17	72.7%	90.5%	0.17
Is the garden used to teach History/ Social Sciences?	58.0%	53.1%	65.0%	0.40	53.1%	65.0%	0.40
Is the garden used to teach Science?	77.0%	80.5%	72.4%	0.43	80.5%	72.4%	0.43
Agricultural Studies	21.0%	22.0%	20.7%	0.90	22.0%	20.7%	0.90
Art	39.0%	31.7%	48.3%	0.16	31.7%	48.3%	0.16
Computer Technology	4.0%	4.9%	3.4%	1.00	4.9%	3.4%	1.00
Environmental Studies	53.0%	61.0%	41.4%	0.11	61.0%	41.4%	0.11
Foreign Language	0.0%	0.00%	0.00%	NA	0.00%	0.00%	NA
Health & Nutrition	77.0%	80.5%	72.4%	0.43	80.5%	72.4%	0.43
Home Economics / Culinary	29.0%	29.3%	27.6%	0.88	29.3%	27.6%	0.88
Physical Education	7.0%	7.3%	6.9%	1.00	7.3%	6.9%	1.00
Special Education	21.0%	19.5%	24.1%	0.64	19.5%	24.1%	0.64
Business/Micro Economics	13.0%	7.3%	20.7%	0.15	7.3%	20.7%	0.15
Service Learning/Community Service	40.0%	48.8%	27.6%	0.07	48.8%	27.6%	0.07

## 2. Resources associated with the use of school gardens

The majority of educators indicated a resource which supports academic instruction in the garden was teacher training in garden based learning instruction (61%). Funding was the most frequent answer among the administrators (71%). Funding and access to garden based

curriculum/education materials were also reported as common resources of support among teachers. There was no significant difference between teachers or between teachers and administrators (Table 11).

Table 11. Resources that support academic instruction in the garden.

<b>Answer</b>	<b>All Educators</b>	<b>Teacher &gt; 1 hour</b>	<b>Teachers ≤ 1 hour</b>	<b>Chi Square or Fisher's exact p value</b>	<b>Teachers</b>	<b>Administrators</b>	<b>Chi Square or Fisher's exact p value</b>
Access to garden-based curriculum/education materials	49.0%	51.2%	44.8%	0.60	51.9%	37.5%	0.22
Teacher training in gardening skills	45.0%	51.2%	44.8%	0.60	48.1%	33.3%	0.20
Teacher training in garden-based learning instruction	61.0%	61.0%	55.2%	0.63	59.3%	66.7%	0.51
Teacher training in outdoor classroom management	30.0%	31.7%	31.0%	0.95	32.1%	20.8%	0.29
Lesson planning time	30.0%	29.3%	31.0%	0.87	32.1%	25.0%	0.51
Funding	56.0%	58.5%	48.3%	0.40	51.9%	70.8%	0.10
Staff support	28.0%	29.3%	27.6%	0.88	28.4%	25.0%	0.74
Parent/volunteer support	31.0%	26.8%	37.9%	0.32	29.6%	33.3%	0.73
A garden coordinator	36.0%	41.5%	27.6%	0.23	34.6%	37.5%	0.79
Encouragement from administrators to use the garden as an instructional tool	25.0%	29.3%	17.2%	0.25	25.9%	20.8%	0.61
Other, please specify	4.0%	2.4%	6.9%	0.56	4.9%	0.0%	0.57

Others: we could use more money to do cool things with our gardens; we have all of the other things listed above to some or full degree; watering cans, rakes, shovels, a place for storage; materials to do hands on lessons in the classroom; and more time. Too many demands on teacher's time

When asked what kind of garden-based professional development educators had received during the past three years, the top answer among all educators was that they had received no professional development (33%). There was a significant difference between teachers and



administrators in regard to what types of garden-based professional development they had received. The answer “other” was selected significantly more by administrators than by teachers and this option includes; community providers workshop; the science teachers attend off-site workshops and seminars; and cooperative extension service teaching of planting techniques (Table 12).

Table 12. Types of garden-based professional development have educators received.

Answer	All Educators	Teacher > 1 hour	Teachers ≤ 1 hour	Chi Square or Fisher's exact p value	Teachers	Administrators	Chi Square or Fisher's exact p value
None	33.0%	39.0%	31.0%	0.49	35.8%	25.0%	0.32
On-site school sponsored	30.0%	29.3%	34.5%	0.64	30.9%	25.0%	0.58
Off-site workshop	11.0%	7.3%	10.3%	0.69	9.9%	12.5%	0.71
Conferences or seminars	14.0%	14.6%	6.9%	0.46	11.1%	20.8%	0.22
Webinars	0.0%	0.00%	0.00%	NA	0.00%	0.00%	NA
Online courses	1.0%	0.0%	3.4%	0.41	1.2%	0.0%	1.00
Topic study	8.0%	9.8%	3.4%	0.39	8.6%	4.2%	0.68
Other, please specify	15.0%	7.3%	13.8%	0.44	<b>9.9%</b>	<b>29.2%</b>	<b>0.02</b>

Others: Community Providers Workshop; our science teachers attends off-site workshops and seminars, but few others do; and Cooperative Extension Service Teaching of Planting Techniques.

To improve and increase their knowledge to use school garden programs, educators would like to see certain professional development topics offered. The two answers selected most often by all educators were connecting the garden to common core English/Language Arts and Math (69%), and connecting the garden to Next Generation Science Standards (67%). When looking at the percentages of “connecting the garden to the next generation Science standards”, a significant difference was seen between teachers that spend more than one hour (78%) and teachers that spend less than hour in the garden (45%). There was also a significant difference

between teachers and administrators, with administrators reported higher percentage of garden-based learning in early childhood education (Table 13).

Table 13. Specific professional development topics that educators wants to attend.

Answer	All Educators	Teacher > 1 hour	Teacher $\leq$ 1 hour	Chi Square or Fisher's exact p value	Teachers	Administrators	Chi Square or Fisher's exact p value
Garden enhanced nutrition education	40.0%	43.9%	41.4%	0.83	42.0%	29.2%	0.26
Connecting the garden to Common Core English/Language Arts and Math	69.0%	75.6%	58.6%	0.13	70.4%	62.5%	0.47
Connecting the garden to Next Generation Science Standards	67.0%	<b>78.0%</b>	<b>44.8%</b>	<b>0.00</b>	66.7%	66.7%	1.00
English language learning in the garden	33.0%	36.6%	24.1%	0.27	32.1%	33.3%	0.91
Building a school garden program: Fundraising, community building, budgeting, etc.	32.0%	39.0%	24.1%	0.19	32.1%	33.3%	0.91
Outdoor classroom management	24.0%	31.7%	20.7%	0.31	27.2%	12.5%	0.14
Garden-based learning in early childhood education	21.0%	9.8%	20.7%	0.30	<b>16.0%</b>	<b>37.5%</b>	<b>0.02</b>
Youth empowerment and food justice for teens	11.0%	14.6%	6.9%	0.46	11.1%	8.3%	1.00
Gardening how-to's: Composting, irrigation, etc.	54.0%	58.5%	48.3%	0.40	56.8%	45.8%	0.34
Networking events	35.0%	26.8%	20.7%	0.56	23.5%	33.3%	0.33

The most common elements that educators strongly agreed would lead to the success of the school garden program included motivated teachers (57%), funding (57%), administration support (56%), garden coordinator staff position (54%), and time scheduled within the school

day for garden instruction (54%) (Table 14). There was a significant difference between teachers that spend more than one hour and teachers that spend less than hour in the garden with teachers that spend less than one hour in the garden pointed out that “professional development for school educators” was an important element influencing the success of your school garden program (Table 14).

Table 14. The most important elements that the success of your school garden program.

Answer	All Educators	Teacher > 1 hour	Teachers ≤ 1 hour	Chi Square or Fisher's exact p value	Teachers	Administrators	Chi Square or Fisher's exact p value
Administration support	56.0%	58.5%	44.8%	0.26	55.6%	58.3%	0.81
Parent volunteers	26.0%	22.0%	24.1%	0.83	23.5%	33.3%	0.33
Garden coordinator staff position	54.0%	53.7%	51.7%	0.87	54.3%	54.2%	0.99
Time scheduled within the school day for garden instruction	54.0%	58.5%	48.3%	0.40	58.0%	41.7%	0.16
Community volunteers	27.0%	19.5%	27.6%	0.43	23.5%	37.5%	0.17
Funding	57.0%	56.1%	51.7%	0.72	54.3%	62.5%	0.48
Technical assistance for gardening	32.0%	36.6%	34.5%	0.86	34.6%	25.0%	0.38
Professional development for school educators	32.0%	<b>24.4%</b>	<b>48.3%</b>	<b>0.04</b>	34.6%	25.0%	0.38
Support from non-profit organization	42.0%	43.9%	41.4%	0.83	43.2%	37.5%	0.62
Motivated teachers	57.0%	58.5%	51.7%	0.57	56.8%	58.3%	0.89
Comprehensive curriculum for teaching in the garden	33.0%	31.7%	34.5%	0.81	34.6%	29.2%	0.62
Other, please specify	4.0%	4.9%	6.9%	1.00	4.9%	0.0%	0.57

Others: Knowledge about gardening; what to plant when and where, amount of sun, water, how and when to harvest; Before school option: Garden club; and Grant to assist in replanting.

### 3. Barriers to having and using school gardens

Educators were asked what barriers or obstacles presented themselves when working in the garden. More than 50% of the educators answered that the most common barriers were lack of time, followed by lack of experience with the garden (45%), and lack of training in the garden (34%). As indicated in table 15, there is a significant difference between teachers that spend more than one hour and teachers that spend less than hour in the garden with “Lack of interest in using the garden by teachers” selected by teachers that use the garden more than one hour significantly more than teachers that use the garden less than one hour.

Table 15. Types of barriers are there to using the school gardens.

<b>Answer</b>	<b>All Educators</b>	<b>Teacher &gt; 1 hour</b>	<b>Teacher ≤ 1 hour</b>	<b>Chi Square or Fisher's exact p value</b>	<b>Teachers</b>	<b>Administrators</b>	<b>Chi Square or Fisher's exact p value</b>
Lack of interest in using the garden by teachers	27.0%	<b>41.5%</b>	<b>10.3%</b>	<b>0.00</b>	27.2%	25.0%	0.83
Lack of curricular materials linked to academic standards	18.0%	22.0%	20.7%	0.90	21.0%	8.3%	0.23
Lack of training in the garden	34.0%	39.0%	34.5%	0.70	35.8%	29.2%	0.55
Lack of experience with gardening	45.0%	53.7%	41.4%	0.31	46.9%	37.5%	0.42
Lack of administrator support	4.0%	4.9%	3.4%	1.00	3.7%	4.2%	1.00
Lack of time	55.0%	58.5%	44.8%	0.26	55.6%	54.2%	0.90
Lack of interest in using the garden by students	4.0%	7.3%	0.0%	0.26	3.7%	4.2%	1.00
Lack of interest in using the garden by administrators	6.0%	4.9%	3.4%	1.00	3.7%	4.2%	1.00
Other, please specify	6.0%	2.4%	3.4%	0.83	4.9%	8.3%	0.62

Others: We have had a lot of trouble with our watering system and our garden keeps dying; Although the curriculum is provided many teachers are not aware of the curriculum due to lack of time to share this information with the staff; Too expensive to add beds; and Lack of money to make improvements.

#### **4. The perceived benefits students receive when school gardens are incorporated into the school curriculum.**

Perceived benefits were identified by asking educators to identify benefits of having a school garden program. The answers with the highest percentages among teachers were increase nutrition knowledge (76%), provide a powerful learning tool (72%), and it is fun for teachers and students (74%). Administrators, on the other hand answered quite differently and considered improve social skills (43%) and increase community engagement (64%) the benefits of school garden for students. There were a number of significant differences between teachers and administrators, with the teachers perceiving the following benefits of a school garden more often: increase nutrition knowledge, improve test scores, increase parent engagement, a powerful learning tools, gardens are fun for teachers and students and garden are an important part of the curriculum (Table 16).

Table 16. Benefits of school garden

Answer	All Educators	Teachers > 1 hour	Teachers ≤ 1 hour	Chi Square or Fisher's exact p value	Teachers	Administrators	Chi Square or Fisher's exact p value
Increase nutrition knowledge	76.0%	78.0%	65.5%	0.25	<b>76.2%</b>	<b>28.6%</b>	<b>0.00</b>
Improve test scores	40.0%	48.8%	34.5%	0.23	<b>39.0%</b>	<b>0.0%</b>	<b>0.00</b>
Improve academic achievement	56.0%	63.4%	44.8%	0.12	56.2%	35.7%	0.15
Improve social skills	57.0%	63.4%	55.2%	0.49	57.1%	42.9%	0.31
Increase community engagement	64.0%	63.4%	51.7%	0.33	63.8%	64.3%	0.97
Increase time away from instruction	8.0%	9.8%	3.4%	0.39	7.6%	0.0%	0.59
Lead to extra work	11.0%	14.6%	10.3%	0.73	10.5%	14.3%	0.65
Increase parent engagement	40.0%	31.7%	41.4%	0.41	<b>39.0%</b>	<b>7.1%</b>	<b>0.02</b>
Are a powerful learning tool	72.0%	70.7%	65.5%	0.64	<b>72.4%</b>	<b>35.7%</b>	<b>0.01</b>
Are fun for teachers and students	74.0%	78.0%	65.5%	0.25	<b>74.3%</b>	<b>28.6%</b>	<b>0.00</b>
Are an important part of the curriculum	58.0%	56.1%	51.7%	0.72	<b>58.1%</b>	<b>7.1%</b>	<b>0.00</b>
Other, please specify	4.0%	0.0%	10.3%	0.57	0.0%	10.3%	0.57

Others: Great for vocational/horticultural education; Gives students a connection to the natural world, which will affect stewardship of the land; and Teach and reinforce life skills.

Among the possible answers for what educators thought were the positive aspects of having a school garden, more than 50% of educators selected: improved environmental awareness (71%), improved attitude towards school (60%) and improvements in health and nutrition (60%) (Table 17). There were significant differences between teachers and administrator regarding improvements in health and nutrition as a result of the garden.

Table 17. Positive observations have been made by educators in the school gardens

Answer	All Educators	Teacher > 1 hour	Teacher $\leq$ 1 hour	Chi Square or Fisher's exact p value	Teachers	Administrators	Chi Square or Fisher's exact p value
Improved environmental awareness	71.0%	75.6%	65.5%	0.36	75.6%	65.5%	0.36
Better community engagement	51.0%	46.3%	51.7%	0.66	53.7%	48.3%	0.66
Increased social skills/behaviors	56.0%	61.0%	48.3%	0.29	61.0%	48.3%	0.29
Increased leadership skills	43.0%	43.9%	41.4%	0.83	43.9%	41.4%	0.83
Improved attitude towards school	60.0%	65.9%	51.7%	0.23	65.9%	51.7%	0.23
Sense of volunteerism	49.0%	56.1%	37.9%	0.13	56.1%	37.9%	0.13
Improvements in health and nutrition	60.0%	<b>68.3%</b>	<b>48.3%</b>	<b>0.09</b>	<b>68.3%</b>	<b>48.3%</b>	<b>0.09</b>
Improved motor skills	21.0%	22.0%	20.7%	0.90	22.0%	20.7%	0.90
Academic gains	33.0%	31.7%	34.5%	0.81	31.7%	34.5%	0.81
Other, please specify	4.0%	4.9%	3.4%	1.00	4.9%	3.4%	1.00

Others: awareness of food justice issues; and introduces students to an experience they would probably not receive otherwise.

Educators were asked to list any negative behaviors observed in the school gardens.

Below lists some of the negative comments by all educators:

- Although the curriculum is designed to fit in with the NVACS, it isn't rigorous enough. I have to find other ways to incorporate the NVACS into my garden lessons, which takes a lot of time. Some lessons don't even seem related to the NVACS.
- Not enough garden beds for the students to plan and explore.
- Sometimes students begin to think or feel that everything in our outdoor learning area is part of our curriculum. When we don't go out to our outdoor learning area, they have a tendency to be cranky.

- We have had watering issues where the valves for the irrigation are not working properly. We have also had problems with vandalism. We have pictures of children from the neighborhood, which do not go to this school, pulling up plants and then throwing them down to die.
- The only feedback that I have heard was that they wish there are more benches to sit on.

Since schools have established a garden program, educators have noticed a change in some student's behavior (Table 18). The greatest change that educators selected was that students began to show a greater interest in eating healthier foods (60%). There were significant differences in the answers between teachers that spend more than one hour and teachers that spend less than hour in the garden. A higher percentage of teachers that spend more than hour in the garden indicated that students are more engaged in school, and teachers in general selected this answer more than administrators (Table 18).



Table 18. Student’s behavior has changed in the school garden program.

<b>Answer</b>	<b>All Educators</b>	<b>Teacher &gt; 1 hour</b>	<b>Teachers ≤ 1 hour</b>	<b>Chi Square or Fisher's exact p value</b>	<b>Teachers</b>	<b>Administrators</b>	<b>Chi Square or Fisher's exact p value</b>
No change in student behavior	10.0%	12.2%	10.3%	1.00	9.9%	4.2%	0.38
Students are more engaged in school	39.0%	<b>51.2%</b>	<b>27.6%</b>	<b>0.05</b>	<b>43.2%</b>	<b>20.8%</b>	<b>0.05</b>
Students are suggesting to parents healthier food choices at home	38.0%	43.9%	34.5%	0.43	39.5%	37.5%	0.86
Students are suggesting to school staff healthier food choices at school	17.0%	14.6%	20.7%	0.51	17.3%	12.5%	0.58
Students show a greater interest in eating healthier foods	60.0%	61.0%	44.8%	0.18	58.0%	62.5%	0.70
Students are making healthier food choices	47.0%	41.5%	34.5%	0.55	43.2%	58.3%	0.19
Other, please specify	2.0%	2.4%	3.4%	0.80	2.5%	0.0%	1.00

Others: Students are willing to try foods that they have never had before.

When educators were asked “what skills have you seen students acquire through the use of your school garden”, the answer with the highest percentage was the ability to recognize different vegetables (71%). Followed by ability to understand and carry out gardening (63%), concern for the environment (63%), and knowledge of gardening activities such as soil/composting/insects/irrigation systems (64%) (Table 19).

Table 19. Skills you seen students acquire through the use of your school garden

<b>Answer</b>	<b>All Educators</b>	<b>Teacher &gt; 1 hour</b>	<b>Teachers ≤ 1 hour</b>	<b>Chi Square or Fisher's exact p value</b>	<b>Teachers</b>	<b>Administrators</b>	<b>Chi Square or Fisher's exact p value</b>
Ability to understand and carry out gardening	63.0%	73.2%	58.6%	0.20	65.4%	54.2%	0.32
The ability to recognize different vegetables	71.0%	78.0%	62.1%	0.14	70.4%	75.0%	0.66
Knowledge of gardening activities such as soil/composting/insects/irrigation systems	64.0%	73.2%	51.7%	0.07	64.2%	62.5%	0.88
Increased physical activity	26.0%	31.7%	24.1%	0.49	28.4%	25.0%	0.74
Inclination to eat a healthier diet	54.0%	53.7%	48.3%	0.66	53.1%	58.3%	0.65
Concern for the environment	63.0%	61.0%	62.1%	0.93	63.0%	62.5%	0.97
Other, please specify	0.0%	0.00%	0.00%	NA	0.00%	0.00%	NA

## **Chapter 5 -Discussion**

The first part of this discussion describes the overall findings of significant differences between schools with and without gardens programs and discusses interesting findings. The second part of the discussion describes the significant differences between teachers who spend one hour or less in the garden per month, teachers who spend more than one hour per month in the garden and administrators, and discusses interesting findings. The discussion was divided into four main categories of questions including: current school garden practices; resources associated with the use of school gardens; barriers to having and using school gardens; and the perceived benefits students receive when school gardens are incorporated into the school curriculum.

### **School without garden**

There were several significant differences between schools with and schools without a garden program in regards the perceived benefits of having a school garden program. The school garden group was significantly more likely to select following perceived benefits: Increase nutrition knowledge, improve test scores, increase parent engagement, a powerful learning tool, fun for teachers and students, and an important part of the curriculum. This may be because the group without gardens has not been able to witness benefits of having one. On the other hand, garden group was significantly more likely to identify the benefits of having a garden because they currently use a school garden and have experience with its positive outcomes.

Lack of funding was selected as the main reason for not having a garden program among schools without gardens. A study conducted in Clark County in 2001 found cost and potential vandalism as barriers to school garden programs (O' Callaghan, 2005) This is probably because without a budget and the funds, schools are not able to build and maintain a school garden program and this continues to be a concern of educators in Clark County.

## **Schools with gardens**

### **1. Current school garden practices**

More than 70% of the students that participate in gardens were pre-kindergarten through fifth grade. This is probably due to the fact that at in elementary school, classes consist of the same students throughout the day. This consistency is hardly found in higher levels of education (junior high and high school), which makes it hard to coordinate when the garden can be used. The early study in 2005 in California stated the core curriculum from kindergarten to fifth grade is also easier to incorporate into the school garden program than it is at higher levels. Therefore, it is favorable that students are exposed to the garden and its benefits at these school levels (Graham et al., 2005). This allows for them to gain a better understanding of what they are eating, gain healthy eating habits, learning basic academic curriculum with experiential learning, and expose them to new experiences since they are of young age (Lineberger & Zajicek, 2000). Moreover, a K-5 curriculum is available for science and math and that this finding is not surprising as many of the partners such as Green Our Planet, Create a Change Now, and American Heart have focused their school garden programs on elementary schools. Green Our Planet has been instrumental in building school gardens and creating a science and math curriculum for grades K-5 that meets the Nevada State education standards (Green Our Planet, 2015).

Ninety percent of educators indicated that the school garden is used during class instruction time. However, there were some significant differences between the answers of teachers and administrators in regards to other times the gardens are used. Administrators were significantly more likely to indicate that the gardens are used during recess, during lunchtime, and after school compared to teachers. This may indicate that administrators have assumptions

about when the garden is used compared to teachers who are actually using the garden or the administrators might have more knowledge about activities at the school beyond that of the teachers.

The most frequently stated reason for using the garden was academic instruction (38% all educators). There was a significant difference between the percentage of administrators and teachers that selected “experiential learning” as a response. The percentage of administrators is more than double (33%) that of the teachers (14%). Skelly and Bradley conducted a study in 1997 to address the perceptions teachers have of school gardens and the role these perceptions play in the use and success of school gardens. One of the questions they asked was “what is the garden used for”? Seventy-three percent of the teachers indicated that the garden was used for experiential learning (Skelly & Bradley, 2000). Compared to this result, this study shows a much lower percentage of teachers selecting “experiential learning” as a reason to use the garden program. This could be because the teachers that participated in my study were not aware of the benefits of experiential learning or have not reached the point of using the garden for experiential learning. Because it allows for a better understanding of concepts as the hands-on approach provides meaningful and tangible experiences, it would be good for teachers to incorporate experiential learning into their school garden program (Skelly & Bradley, 2000). Another significant difference was, while none of the teachers that spend more than one hour using the garden selected “other” as a reason to use the garden, nearly 14% of the teachers that spend less than one hour in the garden did select “other”. This might be because, aside from the fact that different teachers might have different uses for the garden, due to simple preferences for using the garden.

Although both administrators and teachers recognized that school garden programs can be beneficial for their students, the majority of the teachers (67%) indicated that their students visit the garden less than three hours per month, and administrators answered that 20% of the students in their school visit the garden (at least once) per month. These results coincide with the amount of time that teachers reported spending in the garden (68% spend 1 hour per week) in Skelly and Bradley's study (2000). This result might be related to the fact that more than half of the school gardens had been established within the last year (58%). Because of this, schools may have not had the time or experience to incorporate core classes into the garden or to learn how to schedule classes to utilize the garden. The K-5 science and math curriculum developed by teachers at CCSD and Green Our Planet that meets the Nevada State Standards was just released at the beginning of the 2014 academic year (August 2014) and teachers may not have had the opportunity to move their instruction out into the garden yet.

All educators indicated that the most frequent reason for having a garden program was academic instruction and they used the garden for multiple teaching purposes including mathematics, English language arts, sciences, and health & nutrition education which are consistent with findings from other studies (Graham & Zidenberg-Cherry, 2005; Haury & Rillero, 1994). However, I found that school gardens in CCSD were more often used to teach language arts, nutrition and math than findings from Graham and Zidenberg-Cherry's (2005) study of teachers. These subjects were the most selected probably because the curriculum is fairly easy to adapt to use the garden.

## **2. Resources associated with the use of school gardens**

When asked what kind of garden-based professional development educators had received during the past three years, the most frequent answer from teachers was they had received no

professional development within three years. Again, this outcome may also be associated with the fact that more than half of the school gardens had been established within the last year (58%). If the garden program has only been established for short period of time, educators may not have had the chance to attend any garden-based professional development. There was a significant difference between teachers and administrators in regards to what type of garden-based professional development they had received. The fact that teachers and administrators selected different answers is not surprising considering that they both might need different kinds of training or development. For example, while teachers need to learn how to interact with students, administrators might need to learn the administrative and financial side of having a garden.

According to the CCSD survey, educators would like to see certain professional development topics offered that connect the garden to common core English/Language Arts and Math (69%), and that connect the garden to Next Generation Science Standards (67%). This makes sense; since the most frequently taught subjects using the school garden were English language arts, math and sciences, and educators indicated that they want to learn how to connect these subjects to the school garden programs. Additionally, a study conducted in Florida reported that neutral or negative attitudes towards science itself might be the reason why educators need extra material to help them to teach science connected to garden experiences (Skelly & Bradley, 2000). There was a significant difference between teachers that spend more than one hour (78%) and teachers that spend less than one hour in the garden (45%) with wanting professional development for connect the garden to Next Generation Science Standards. As mentioned earlier, this might be because teachers that spend more than one hour in the garden are more likely to teach a variety of subject to their students in the garden and they would like to improve

their knowledge about science related subjects. There was also a significant difference between teachers and administrators, with administrators being interested in professional development related to early childhood education as a topic. This is might be because; administrators have to consider the whole school system of education, and teachers only focus on their class level of education. An important take away from this is that administrators and teachers might have different ideas about what professional development is important related to school gardens and it is important for administrators to ensure that teachers are receiving the professional development that is most important for them to utilize the school garden effectively.

The most important elements for a successful garden identified by the educators were: motivated teachers, administrative support, funding, time and a garden coordinator. This is similar to the most prominent resources that principals reported in California in 2005 in sustaining the garden program included funding (74%), staff support (67%), administrative support (63%), time (58%), and a garden coordinator (Graham et al., 2005). There was a significant difference between teachers that spend more than one hour and teachers that spend less than hour in the garden in regard to the most important elements that contribute to the success of school garden program. Teachers that spend less than one hour in the garden indicated that professional development for school educators was the most important element influencing the success of the school garden program. This might be because, teachers that spend less than one hour in the garden are not experienced and need more resources such as professional development linked to garden-based education to be able to teach students in the garden.

When the educators were asked to identify what resources support academic instruction in the garden, teacher training in garden based learning instruction (61%) was the most selected



answer by all teachers. In contrast, administrators indicated that funding (71%) was the important resource to having a school garden program. California researchers performed studies to evaluate attitudes and perceptions of principals and teachers about school gardening programs (Graham et al., 2005). The researchers asked educators what resources assisted in sustaining a garden. Principals stated that the most important resource for sustaining the garden was funding (74%), and teachers indicated teacher training (51%) (Graham et al., 2005). Findings from this study support these findings.

### **3. Barriers to having and using school gardens**

The most often identified barriers to using school gardens were: lack of time, lack of experience with gardening and lack of training. These findings are consistent with other studies (Graham et al., 2005; Graham & Zidenberg-Cherr, 2005) A significant difference was found between teachers that spend more than one hour and teachers that spend less than hour in the garden. “Lack of interest in using the garden by teachers” was selected significantly more often by teachers that use the garden more than one hour compared those who use the garden less than one hour. Teachers who spend more than an hour in the garden per month may perceive that teachers who do not use the garden as much as they do are not as interested as they are in the garden. An interesting finding from this question was the small percent of teachers who indicated a lack of administrative support (4-5%) was a barrier to using the school garden, although a high percent of teacher indicated that administrative support is an important element of a successful garden. These answers indicate that a high percent of teachers are receiving the administrative support needed for a successful garden.

### **4. The perceived benefits students receive when school gardens are incorporated into the school curriculum.**

Perceived benefits were identified by asking educators what they thought the benefits of having a school garden program were. Most of the previous research regarding educators' perspectives on school gardening programs appear to have been more concerned about the barriers and negative aspects of the garden program instead of its benefits. For example, some of the questions were "what are the greatest barriers for using the garden programs?" and "what are the major reasons your school does not have a garden?" None of the previous studies asked about the benefits students received from using the garden program. This particular question had a number of significant differences between teachers and administrators, with the teachers selecting the following benefits more often: increase nutrition knowledge, improve test scores, increase parent engagement, provide a powerful learning tools, gardens are fun for teachers and students and gardens are an important part of the curriculum. Teachers may have clearer and stronger answers to this question because they experience the benefits first hand. They are with the students when they learn and experience the garden so they can directly perceive the positive outcomes. On the other hand, administrators may be more removed from how the garden is affecting the students.

The biggest change that educators indicated that they have seen in the student's behavior was that they began to show a greater interest in eating healthier foods. Moreover, when educators were asked what skills have they seen students acquire through the use of the school garden, the answer with the highest percentage was the ability to recognize different vegetables. This is probably because most of the schools that participated in this survey are from a low social economic area and many students have never had the opportunity to taste most of vegetables that grow in their gardens. Students are excited to explore new vegetables that they have not seen before. There were significant differences in the answers between teachers that spend more than

one hour and teachers that spend less than one hour in the garden in regard to what changes they had seen in the student's behavior. A higher percentage of teachers that spend more than one hour in the garden indicated that students are more engaged in school, and teachers in general selected this answer more than administrators. Teachers commented that "The students love going out to the garden and the excitement of learning outside continues throughout the day.", "The garden is a great teaching tool", and "The garden has opened the students up to the idea of gardening and has introduced them to different types of produce." This is because schools have introduced the gardening program into academic education as a way for students to experience hands-on learning and allow students to explore and build a garden. This also gives teachers the opportunity to demonstrate the practical application of classroom subjects in outside learning experiences (Wiesen, 2011).

Finally, a few negative observations were made by educators in the school garden programs. One teacher stated, "Sometimes students begin to think or feel that everything in our outdoor learning area is part of our curriculum. When we don't go out to our outdoor learning area, they have a tendency to be cranky. Another teacher noted, "Not enough garden beds for the students to plan and explore." The great majority of the comments do not really express any negativity towards the garden itself. Instead, they show that students and teachers see the benefits of the garden and want it to be able to use it more, but that there might not be enough resources. The rest of the comments indicate that some academic classes might not be incorporated into the garden appropriately, which is probably due to the lack of experience most schools have with the garden program.

Even though this was a pilot study, it provided valuable information that can be given to schools that are interested in establishing a school garden program and even schools that

currently have one. Through this pilot study, we learned how the questionnaire should be revised. Some questions needed to be expressed differently so there were easier to understand, and some questions were too ambiguous and need to be more specific. Based on the answers from this study we were also able to gain an idea of what answers to expect, which made us think of other questions we could ask based. For example, a lot of teachers answered that they did not have enough time to work on the garden, but the study did not have a follow-up question that asked why they lacked the time. For future questionnaires, that question and others can be added or modified to better serve the purpose of the study.

## **Chapter 6 -Limitations**

The primary limitation of this study was that only schools from the Clark County School District participated in this study. Thus, the results may not be generalizable to school garden programs in other states. The study was also limited because it was only a pilot study and the survey was only sent to 250 teachers and administrators. Another limitation is the time difference schools have had the school garden. While some schools implemented the garden less than a year ago, other have had it for more than that. This causes some schools to have more experience than others and since not all schools are in the same stage in the process of implementing and using the garden, answers for the same questions varied across schools. This study may have also had selection bias due to preference and interest in school gardens of some educators. Teachers interested in school gardens may have been more likely to participate in the survey than teachers with no interest in school gardens. Lastly, the different answers between teachers and administrators may be because they are from different schools and not all schools have the same practices.

## **Chapter 7 -Recommendations**

In this section, recommendations for Clark County School District to better develop and successfully implement school garden programs are presented. Recommendations for modification of this survey for future research on the topic are also presented. The recommendations are based on the findings of this study as well as previous research.

### **The Clark County School District**

First of all, it is important to remember that communication among educators of the school is key for a garden program to be successful. A study conducted in southern Nevada by O'Callaghan (2005), indicated that the most successful school garden programs are those in which the school teachers and administrators are the most involved. The results of this study showed that the answers to some of the questions were significantly different between teachers and administrators in regards to when the garden is used and what its benefits are. This may indicate a lack of communication between them. Because both teachers and administrators are important components of school garden programs, communication between them must be achieved. This will allow for the school as whole to have a clear goal and understand how a successful school garden program can be achieved.

Second, cooperation and support between teachers improves the overall success of the garden and the experiences that students have from using it. Blair stated that teachers with adequate gardening support were enthusiastic about the potential of school gardens (Blair, 2009). This study showed that not all teachers are knowledgeable about gardening or have an interest in the garden. This may create an obstacle because it is harder for students to feel enthusiastic about something that their teachers show no interest in. It is possible that teachers who are not interested in using the garden have not seen its benefits, and there is opportunity for educators to

support and help each other. The teachers who spend more time in the garden can teach the other teachers how to use the garden as a learning tool and how students can be more engaged with the topic taught.

Third, the garden can be used after regular school hours, during recess, and can even become part of a summer camp. According to the results showed that about 40% educators think students are more engaged in school since school garden program have been established their school. This will increase the student's engagement because it will help them see the garden as more than a school responsibility, but also as a fun activity that they can learn from. Use these times outside of the classroom can also save class time for core instruction.

Fourth, allowing volunteers and community members to be a part of the garden program may help with maintenance of the garden. The results of this study indicate that one of the main barriers of having a garden program is the lack of time to teach and maintain the garden itself. Volunteers and community members can help with the task of maintaining the garden, and this will also give teachers more time to focus on how to use the garden as a tool for their specific classes, instead of just focusing on maintaining the garden. Moreover, allowing parents to join the garden program not only will allow them to know what their children are learning, but the parents might find themselves learning about healthy eating habits and foods. This is a great opportunity to extend the influence of the garden, help the community as a whole and increase parent and community engagement. The fact that students will be able to share this activity with their families can also motivate them to use the garden more.

Based on the results of this study, teachers have not been trained to use the garden or incorporate it into class curriculum; however, results also showed that teachers want to learn. It is possible that administrators do not know where their teachers can get professional

development, academic instruction, or training, but here are a lot of available resources such as non-profit organization, communities, and local chefs. The non-profit organization Green Our Planet provides school teachers with development workshops including Topic study, Webinars, an annual school garden conference, coordinator meeting and a chef program.

### **Modifications to the Survey**

This was a pilot study. Based on my findings, I would suggest that the following modifications be made to the survey:

- Address not only teachers that use garden programs, but also teachers who teach in school with gardens but do not use garden to identify barriers to using the garden. (All teachers from CCSD)
- Ask teachers more specific questions regarding administrators and administrators more specific questions about teachers. This will give a better idea of why their answers are so different.
- Include more YES or NO questions. For example: “Do you like to use school garden for your class?”
- Include more open -ended questions regarding what educators think and need.
- Include more detailed questions. For example, educators were asked what barriers or obstacles presented themselves when working in the garden. More than 50% of the educators answered that the most common barriers were lack of time. For future studies, I would like to ask them why they do not have time to teach in the school garden.
- Consider interviewing some teachers and administrators.



## **Chapter 8 -Conclusions**

The number of school garden programs has increased in the United States for educators to provide outdoor, hands-on lessons for their students. School garden programs have proven to provide many benefits to their students. This pilot research project determined administrators' and teachers' perceived practices, resources, benefits, and barriers to the school garden programs in Clark County Nevada. Although it was a pilot study, it provided important information that can be given to school educators who are interested in incorporating school garden program into their academic curriculum.

Based on differences in perceived benefits of school gardens between educators at schools with and without gardens, it would be important to increase awareness of the benefits of gardens at schools without gardens to expand the school garden program in CCSD. Teachers seem to be aware of the fact that the garden is a very powerful learning tool; however data shows that it is not being used to its fullest potential through experiential learning. Moreover, data indicated that the gardens are mostly used for particular topics such as English language art, sciences, mathematics, and nutrition educations. The garden can be a tool for many other topics such as foreign language, social study, and physical education. It can also be a space for students to engage in group activities while learning. In addition, the results of this study indicate that educators need additional professional development to improve their knowledge of using the garden program. Teacher interest and administrator support are important components of a successful school garden. In order for children to learn and fully experiences the garden, their teachers must be interested in it and administrator supportive of it, first.

## Appendix

### SURVEY INSTRUMENT

#### School Garden Survey

#### YOUR ROLE IN SUPPORTING THE SCHOOL GARDEN:

- Teacher
- School Administrator

#### DOES YOUR SCHOOL HAVE A GARDEN OR GARDEN PROGRAM?

- Yes
- No

**THIS PAGE IS ONLY DISPLAYED FOR THOSE THAT STATE THE DON'T HAVE A GARDEN.**

#### PLEASE CHOOSE ALL APPLICABLE REASONS THAT BEST DESCRIBE WHY YOUR SCHOOL DOES NOT HAVE A SCHOOL GARDEN.

- Time away from instruction
- Lack of teacher support (administrator's survey)
- Lack of administrator support (teacher's survey)
- Lack of staffing
- Little to no knowledge about gardening
- Lack of garden supplies
- Lack of funding
- Difficulty linking to core academic standards
- Lack of volunteers

- No interest in having a garden
- Inadequate space
- The risk of vandalism
- Time constraints
- Few or no instructional materials
- Lack of technical assistance with gardening
- Other, please specify... \_\_\_\_\_

**DO YOU THINK SCHOOL GARDEN: (SELECT ALL THAT APPLY)**

- Increase nutrition knowledge
- improve test scores
- Improves academic achievement
- Improves social skills
- Increase community engagement
- Increase time away from instruction
- Lead to extra work
- Increase parent engagement
- Are a powerful learning tool
- Are fun for teachers and students
- Are an important part of the curriculum
- Other, please specify... \_\_\_\_\_

**DOES YOUR SCHOOL HAVE ANY AMBITIONS OR PLANS FOR BUILDING A GARDEN IN THE FUTURE?**

- Yes
- No

**THANKS FOR TAKING THE SURVEY! CLICK "NEXT" TO SUBMIT YOUR ANSWERS**

**CHECK THE GRADES THAT YOUR SCHOOL SERVES:**

- K/Kindergarten – 5th
- 6<sup>th</sup> – 8th
- 9<sup>th</sup>-12th

**WHEN WAS YOUR GARDEN STARTED?**

- Within the last year
- 2 years ago
- 3 years ago
- 4 years ago
- 5-10 years ago
- More than 10 years ago

**WHAT GRADE LEVEL(S) PARTICIPATE IN GARDEN PROGRAMMING AT YOUR SCHOOL? (SELECT ALL THAT APPLY)**

- Pre-K
- T-K/Kindergarten
- First
- Second
- Third
- Fourth
- Fifth
- Sixth
- Seventh
- Eighth
- Ninth
- Tenth
- Eleventh
- Twelfth

**WHEN IS THE GARDEN USED? (SELECT ALL THAT APPLY)**

- During class instruction time
- During recess
- During lunchtime
- Before school
- After school
- Weekends
- Summer program/camp
- Non-school community uses
- Other, please specify... \_\_\_\_\_

**WHAT PERCENTAGE OF YOUR SCHOOL'S STUDENTS DO YOU ESTIMATE VISIT THE GARDEN (AT LEAST ONCE) FOR FORMAL INSTRUCTION PER MONTH? (ADMINISTRATOR ONLY)**

- 10%
- 20%
- 30%
- 40%
- 50%
- 60%
- 70%
- 80%
- 90%
- 100%

**WHAT PERCENTAGE OF YOUR CLASS TIME DO YOU ESTIMATE VISIT THE GARDEN (AT LEAST ONCE) FOR FORMAL INSTRUCTION PER MONTH?**

- 10%
- 20%
- 30%
- 40%

- 50%
- 60%
- 70%
- 80%
- 90%
- 100%

**HOW MANY HOURS PER WEEK DOES YOUR CLASS SPEND IN THE GARDEN?  
(TEACHER ONLY)**

- 1
- 2-3
- 4-5
- 6-7
- 7-8
- Other

**ON AVERAGE, HOW MANY HOURS PER WEEK IN TOTAL DO ALL CLASSROOM  
TEACHERS WORK/TEACH IN THE GARDEN? (ADMINISTRATORS ONLY)**

- 0-1 hour
- 1-2 hours
- 2-4 hours
- 4-6 hours
- 6-8 hours
- 8-10 hours
- 10-15 hours
- 15-20 hours
- 20-30 hours
- 30-40 hours
- 40-50 hours

- 50-60 hours
- 60-70 hours
- 70-80 hours
- 80-90 hours
- 90-100 hours
- 100+ hours

**WHAT IS THE MAIN REASON YOU USE YOUR SCHOOL GARDEN?**

- Academic instruction
- Subject matter reinforcement
- Extracurricular activity
- Experiential learning
- Nutrition education
- Personal love of gardening
- Encouragement from administration
- Other, please specify... \_\_\_\_\_

**DO YOU THINK SCHOOL GARDEN: (SELECT ALL THAT APPLY)**

- Increase nutrition knowledge
- Improve test scores
- Improves academic achievement
- Improves social skills
- Increase community engagement
- Increase time away from instruction
- Lead to extra work
- Increase parent engagement
- Are a powerful learning tool
- Are fun for teachers and students
- Are an important part of the curriculum
- Other, please specify... \_\_\_\_\_

**IS THE SCHOOL GARDEN USED FOR CORE ACADEMIC CONTENT INSTRUCTION? (MATH, ENGLISH-LANGUAGE ARTS, SCIENCE, SOCIAL STUDIES)**

- Yes
- No

**IS THE GARDEN USED TO TEACH MATHEMATICS?**

- Yes
- No

**IF YOU ANSWERED "NO" TO THE QUESTION ABOVE SKIP TO THE NEXT QUESTION. HOW WOULD YOU CHARACTERIZE GARDEN-BASED MATHEMATICS INSTRUCTION AT YOUR SCHOOL? (SELECT ALL THAT APPLY)**

- Garden related mathematics concepts are taught in a lesson prior to or after garden class time.
- Math skills are reinforced through garden instruction.
- Explicit math lessons are taught in the garden.

**IS THE GARDEN USED TO TEACH ENGLISH-LANGUAGE ARTS?**

- Yes
- No

**IF YOU ANSWERED "NO" TO THE QUESTION ABOVE SKIP TO THE NEXT QUESTION. HOW WOULD YOU CHARACTERIZE GARDEN-BASED ENGLISH-LANGUAGE ARTS INSTRUCTION AT YOUR SCHOOL? (SELECT ALL THAT APPLY)**

- Garden-related English/Language Arts concepts are specifically taught in a lesson prior to or after garden class time.
- English/Language Arts skills are reinforced during garden instruction time.
- English/Language Arts lessons are taught during garden class time (ie. journaling, composition, reading, etc.).



**IS THE GARDEN USED TO TEACH HISTORY/ SOCIAL SCIENCES?**

- Yes
- No

**IF YOU ANSWERED "NO" TO THE QUESTION ABOVE SKIP TO THE NEXT QUESTION. HOW WOULD YOU CHARACTERIZE GARDEN-BASED HISTORY/ SOCIAL STUDIES INSTRUCTION AT YOUR SCHOOL? (SELECT ALL THAT APPLY)**

- Garden-related History/ Social Studies concepts are specifically taught in a lesson prior to or after gardening garden class time.
- History/ Social Studies concepts are reinforced through garden instruction.
- History/ Social Studies lessons are taught during garden class time.

**IS THE GARDEN USED TO TEACH SCIENCE?**

- Yes
- No

**IF YOU ANSWERED "NO" TO THE QUESTION ABOVE SKIP TO THE NEXT QUESTION. HOW WOULD YOU CHARACTERIZE GARDEN-BASED SCIENCE INSTRUCTION AT YOUR SCHOOL? (SELECT ALL THAT APPLY)**

- Garden-related science concepts are taught in a lesson prior to or after garden class time.
- Science concepts are reinforced through garden instruction.
- Explicit science lessons are taught in the garden.
- Students create and conduct their own science projects in the garden.

**WHICH OF THE FOLLOWING NON-CORE SUBJECTS ARE TAUGHT USING THE GARDEN? (SELECT ALL THAT APPLY)**

- Agricultural Studies
- Art
- Computer Technology

- Environmental Studies
- Foreign Language
- Health & Nutrition
- Home Economics / Culinary
- Physical Education
- Special Education
- Business/Micro Economics
- Service Learning/Community Service
- None of the above
- Other, please specify... \_\_\_\_\_

**WHICH OF THE FOLLOWING POSITIVE OBSERVATIONS HAVE YOU MADE IN YOUR SCHOOL GARDEN PARTICIPANTS? (CHECK ALL THAT APPLY)**

- Improved environmental awareness
- Better community engagement
- Increased social skills/behaviors
- Increased leadership skills
- Improved attitude towards school
- Sense of volunteerism
- Improvements in health and nutrition
- Improved motor skills
- Academic gains
- Other, please specify... \_\_\_\_\_

**DESCRIBE ANY NEGATIVE OBSERVATIONS THAT YOU HAVE SEEN IN YOUR SCHOOL GARDEN PARTICIPANTS.**

**WHAT ARE BARRIERS TO USING YOUR SCHOOL GARDEN? (SELECT ALL THAT APPLY)**

- Lack of interest in the garden

- Lack of experience with gardening
- Lack of curricular materials linked to academic standards
- Lack of training in the garden
- Lack administrator support
- Lack of time
- Other, please specify... \_\_\_\_\_

**WHAT EDUCATIONAL RESOURCES AND MATERIALS ARE USED TO TEACH CORE ACADEMIC SUBJECTS WHEN THE GARDEN IS A LEARNING LABORATORY? (SELECT ALL THAT APPLY)**

- Outdoor garden classroom STEM curriculum
- Textbooks (specify title): \_\_\_\_\_
- Garden-based learning publications (specify title) \_\_\_\_\_
- Lesson plans created by you or other educators
- Websites (specify organizations and addresses) \_\_\_\_\_
- Materials received at workshops or seminars (specify seminars and materials)  
\_\_\_\_\_
- Other, please specify... \_\_\_\_\_

**WHICH RESOURCES WOULD BEST SUPPORT ACADEMIC INSTRUCTION IN YOUR GARDEN? (CHECK ALL THAT APPLY)**

- Funding
- Staff support
- Parent/volunteer support
- A garden coordinator support
- Access to garden-based curriculum/education materials
- Teacher training in gardening skills
- Teacher training in garden-based learning instruction
- Teacher training in outdoor classroom management

- Lesson planning time
- Encouragement from administrators to use the garden as an instructional tool
- Other, please specify... \_\_\_\_\_

**IN THE PAST THREE YEARS WHAT TYPES OF GARDEN-BASED PROFESSIONAL DEVELOPMENT HAS YOUR STAFF RECEIVED? (SELECT ALL THAT APPLY)**

- None
- Topic study
- On-site school sponsored
- Off-site workshop
- Conferences or seminars
- Webinars
- Online courses
- Other, please specify... \_\_\_\_\_

**WHAT SPECIFIC PROFESSIONAL DEVELOPMENT TOPICS WOULD YOU ATTEND OR LIKE TO SEE OFFERED IN YOUR AREA?**

- Garden enhanced nutrition education
- Connecting the garden to Common Core English/Language Arts and Math
- Connecting the garden to Next Generation Science Standards
- English language learning in the garden
- Building a school garden program: Fundraising, community building, budgeting, etc.
- Outdoor classroom management
- Garden-based learning in early childhood education
- Youth empowerment and food justice for teens
- Gardening how-to's: Composting, irrigation, etc.
- Networking events
- Other, please specify... \_\_\_\_\_

**SELECT THE MOST IMPORTANT ELEMENTS THAT CONTRIBUTE TO THE SUCCESS OF YOUR SCHOOL GARDEN PROGRAM. (CHECK ALL THAT APPLY)**

- Support from non-profit organization
- Motivated teachers
- Administration support
- Comprehensive curriculum for teaching in the garden
- Parent volunteers
- Garden coordinator staff position
- Time scheduled within the school day for garden instruction
- Community volunteers
- Funding
- Technical assistance for gardening
- Professional development for school educators
- Other, please specify... \_\_\_\_\_

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# **CURRICULUM VITAE**

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Master of Public Health, 2015  
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**Graduate Assistant (May 2012 – Aug 2015)**  
UNLV Office of International Students & Scholars (OISS)

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Green Our Planet  
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### **PRESENTATIONS**

Murakami, T. A Garden Pre Project: Measurement of Children's Nutrition Knowledge, and Fruit and Vegetable Consumption. Annual MPH Internship Poster Day, Division of Health Sciences. May 8, 2015. Las Vegas, NV.

Murakami, T. Cystic Fibrosis. Senior Students Poster Session, Department of Kinesiology and Nutrition Sciences. March 11, 2011. Sunrise Hospital Las Vegas, NV.

### **THESIS**

**EDUCATORS' PERSPECTIVES ASSOCIATED WITH SCHOOL GARDEN PROGRAMS IN CLARK COUNTY, NEVADA: PRACTICES, RESOURCES, BENEFITS AND BARRIERS**