

**SCHOOL GARDEN SUSTAINABILITY:
MAJOR CHALLENGES TO THE LONG-TERM MAINTENANCE
AND SUCCESS OF SCHOOL GARDEN PROGRAMS**

by

Felicia Yu

A thesis submitted to the Faculty of the University of Delaware in partial fulfillment of the requirements for the degree of Master of Science in Public Horticulture

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ABSTRACT

School gardens in the U.S. have experienced several periods of popularity over the past century. Each period has emphasized different ways in which such gardens could help address some of the social and public health issues of the day, in addition to meeting educational goals. Today, school gardens are receiving renewed attention and enthusiasm as a potential solution for childhood obesity and the growing disconnect between children and nature. They are also still considered a viable method to increase academic achievement through experiential learning.

The increasing popularity of school gardens has corresponded with a growing number of school gardens that have been unable to take root, despite enthusiastic beginnings. This research examined common challenges to the long-term maintenance of these programs, including funding, personnel stability, community buy-in, planning and teacher preparation, and garden maintenance issues. In addition, this research sought feedback from former school gardens in order to investigate the most common reasons for their discontinuation.

Qualitative and quantitative data were collected using an online survey distributed through the National Gardening Association youth educators' listserv. A total of 1,301 responses were analyzed, including 1,166 from participants involved in current school garden programs, and 135 from participants responding on behalf of discontinued school garden programs. Both groups highlighted a similar range of challenges, including funding, maintenance difficulties, and dependence on untrained teachers who are frequently subject to changing employment conditions. In order for

school gardens to become a permanent component of their schools, those who are currently involved in school gardening and those who wish to start (or restart) a school garden need to consider the common pitfalls and be prepared to address them through careful planning and by securing broad-based support.

Chapter 1

INTRODUCTION

School gardens have experienced several periods of widespread popularity in the U.S. during the last century, with a wide range of educational objectives associated with them, depending on the social, political, and economic issues of the day (Lawson, 2005). Many school gardens have been established in the latest wave of public interest, which began in the 1990's. Today, thousands of these gardens are used for instruction across the nation, with over 2,000 in California alone (Ozer, 2007). There is currently no definitive estimate of the total number of school gardens in the U.S., but from 2010-2011, the National Gardening Association (NGA) received 10,298 school garden grant applications (NGA, 2011). Using this figure as a rough estimate of the number of school gardens nationally, since there are certainly more school gardens that did not apply for NGA grants, there could easily be over 10,000 school gardens in the U.S. today.

The philosophy of gardening in basic education dates to at least the 19th century, with thinkers such as Jean-Jacques Rousseau and Friedrich Froebel promoting direct observation and experience of nature as the foundation of learning (Bucklin-Sporer and Pringle, 2010). By the 1880's, a garden in every rural school had been mandated by law in Austria, agricultural instruction was obligatory at French schools, and the kindergarten (literally "children's garden") concept of early education developed by Froebel had become widely accepted in Europe and the U.S. (Desmond, Grieshop and Subramaniam, 2004; Lawson, 2005; Bucklin-Sporer and Pringle, 2010).

The earliest school gardens in the U.S. were promoted by educational reformers looking to imitate Europe's successful use of school gardens in agricultural education (Lawson, 2005). School gardens began to gain momentum as a national movement around 1890, when there was widespread concern over urban congestion and public health hazards in cities, the emptying of the countryside as Americans gravitated toward industrial jobs, and the need for public education reform (Lawson, 2005). For the next few decades, school gardens were promoted on a national level as a method of instruction not just in agriculture, but in personal and civic attributes such as hard work, thrift, responsibility, self-respect, good citizenship, and appreciation of nature (Carter, 2010).

After the First World War, the movement to make school gardens an integral part of basic education withered (Lawson, 2005). Nationwide enthusiasm for school gardening (except when connected with victory garden food production efforts during the first and second World Wars) did not return until the 1960's and 70's. At this time, the burgeoning environmental and countercultural movements brought a renewed focus on both school and community gardens (Desmond, Grieshop and Subramaniam, 2004). When those movements waned, so too did the prevalence of school gardens, until the present period of school garden enthusiasm began in the 1990's.

The school garden movement today is focused largely on improving students' eating habits, academic achievement, self-esteem, social skills, and gaining an understanding of food systems and ecology. Richard Louv's best-selling book, *The Last Child in the Woods*, brought the term "nature-deficit disorder" to a wide audience, describing the decrease in children's experience of nature and its associated effects (2005). These growing concerns over the disconnect between children and the

natural world and food sources, along with a desire to engage children in experiential learning with limited school resources, are giving new relevancy to school gardens as a possible solution for a number of these problems at once (Bucklin-Sporer and Pringle, 2010). The rise of childhood obesity has also renewed interest in the use of gardening to instill better nutrition awareness and eating habits in children (Lawson, 2005; Ozer, 2007). High-profile projects such as First Lady Michelle Obama's vegetable garden at the White House and chef Alice Waters' The Edible Schoolyard in Berkeley, CA, have drawn national attention to the role of gardening in improving children's nutrition. At the legislative level, the Healthy Hunger-Free Kids Act of 2010, also championed by Michelle Obama, even included funding for grants to help schools establish gardens and farm-to-school programs (USDA, 2012).

The growing popularity of school gardens called for a closer look at not only what it takes to establish a school garden, but also for identifying features that enhance its sustainability beyond the first growing season. Past experiences with school gardening in the U.S. have demonstrated that there is an abiding appreciation for its benefits but not enough sustainability in the practice to make school gardens a permanent feature of basic education on a national level. This research addressed the issue of sustainability by elucidating the most common reasons for school garden discontinuation, and the most common challenges for currently active school gardens. The results of this research were used to formulate recommendations for school garden practitioners hoping to achieve long-term sustainability for their programs.

Chapter 2

LITERATURE REVIEW

Children and Nature

A growing body of research in environmental psychology and related fields has indicated that nature exposure plays a crucial role in human health and well-being. In fact, the connection between health and landscapes has been acknowledged throughout recorded history (Ward Thompson, 2011). Despite the lack of attention paid to environmental health benefits in modern medicine, sufficient research has emerged recently to affirm what was once merely acknowledged as common sense – that contact with the natural world can promote human health (Frumkin, 2001). The stakes are even higher for children since the amount of interaction they have with nature and outdoor environments early in life can affect not only their health but also their attitudes toward the environment and natural resources in adulthood. Most environmentalists today credit childhood experiences in nature as the catalyst for their desire to protect the environment (Louv, 2005).

Louv's *Last Child in the Woods* (2005) catalogued the many lines of evidence that support the need for children, as well as adults, to interact with nature and to connect with their outdoor environment. The benefits of time spent in green outdoor spaces include the alleviation of attention-deficit disorder symptoms and behavioral problems, and the increasing of focus and mental concentration (Taylor, Kuo and Sullivan, 2001; 2002). These benefits were observed even in indoor spaces with a view of greenery outside. The past few decades have also seen more research on the

positive impact of one's exposure to nature, including a reduction of stress and improved concentration, building on the attention-restoration theory of Kaplan and Kaplan (1989). Natural environments are also particularly effective at relieving the fatigue caused by long periods of directed attention (Kaplan, 1995).

In an age where the use of antidepressant medications for children has been increasing rapidly (Delate, Gelenberg, Simmons and Motheral, 2004), nature exposure could offer a non-pharmaceutical treatment for children's mental health issues. Wells and Evans (2003) found that children in rural areas who are exposed frequently to high levels of nature near their homes rated lower on measures of behavioral disorders, anxiety, and depression than their peers living with lower levels of nearby nature. Children living in high-nature conditions also scored themselves higher than did their peers on a measure of global self-worth, suggesting that nature has the ability to protect children psychologically from life stresses (Wells and Evans, 2003).

Benefits of School Gardens

School gardens, or green schoolyards more generally, are a subset of the many ways children might receive more exposure to nature. Schools have an opportunity to offer their students both structured and unstructured interaction with nature on a frequent basis. Most school gardening literature pertains to evaluating the benefits of school gardens in different areas of students' lives, including nutrition knowledge and behavior, and academic achievement. The majority of these studies have focused on the gardens' impact on children's diets, attitudes toward eating fresh fruits and vegetables, and nutrition knowledge (Blair, 2009), finding in fact that students are more inclined to eat fresh produce after growing vegetables themselves (Heim, Stang and Ireland, 2009; Robinson-O'Brien, Story and Heim, 2009). Furthermore, reports

from elementary school garden projects indicate that vegetable gardens improved students' nutritional awareness and knowledge of food systems (Canaris, 1995; Thorp and Townsend, 2001; Faddegon, 2005), and garden-based nutrition education actually increased students' consumption of fruits and vegetables (McAleese and Rankin, 2007).

Academic outcomes, especially science achievement, have also been linked to school gardens. In Texas, 5th graders who participated in a garden-based science curriculum had significantly higher science test scores than a non-gardening control group (Klemmer, Waliczek and Zajicek, 2005). The implementation of a Junior Master Gardener curriculum at a Louisiana elementary school likewise resulted in significantly higher science achievement scores (Smith and Motsenbocker, 2005). In Blair's (2009) literature review, nine of the twelve quantitative studies evaluated showed that school gardening had positive effects on science achievement and student behavior. An additional nine qualitative studies evaluated in the review also indicated positive learning outcomes and behavioral improvements (Blair, 2009).

The impact of school gardens on student achievement in other academic subjects has not yet been examined, although environmental education research indicates that experiential, place-based learning leads to higher test scores across subjects (State Education and Environment Roundtable, 2000; Bartosh, 2003). Environment-based education is also credited with increasing math achievement, improving standardized test scores, and increasing school attendance while decreasing the number of student suspensions, referrals, and expulsions (Louv, 2005).

School garden research has also addressed the changes in environmental attitudes, social skill development, and self-esteem among students who participate in

gardening, as evidenced by increased environmental attitude scores (Skelly and Zajicek, 1998; Waliczek and Zajicek, 1999). However, this is not a consistent conclusion, as quantitative studies on school gardening's effect on social skills and self-esteem have shown no or small significant differences between experimental gardening and non-gardening control groups of students (Waliczek, Bradley and Zajicek, 2001; Robinson and Zajicek, 2005). Aside from environmental attitudes, Blair (2009) also reports that in reviewing seven studies of individual school gardens, all reported that students who gardened improved their attitudes toward school and took more pride in their work.

Teacher and Principal Perceptions

School garden researchers have also examined the perceptions of principals and teachers regarding the usefulness of school gardens. In most cases, a majority of both viewed gardens as somewhat to very effective at enhancing student learning (Blair, 2009). Teacher and principal surveys also revealed the most commonly perceived barriers to incorporating school gardens into their curriculum. These barriers included lack of time, funding, staff support, teacher interest, and horticultural knowledge (Graham, et al., 2005; Graham and Zidenberg-Cherr, 2005). Another survey of teachers participating in a farm-to-school program also found that lack of time and lack of curriculum tied to standards were perceived barriers (Graham, Feenstra, Evans and Zidenberg-Cherr, 2004).

A study by Demarco, Relf and McDaniel (1999) examined the factors essential for school garden success as perceived by teachers, and found that student ownership and integration with other subjects were most often chosen by the survey participants. Other essential factors included having a person to organize school garden activities;

adequate funding, space and materials; and administrative support from the school principal.

Program Sustainability

Established school garden programs and organizations commonly publish recommendations for the successful start-up and maintenance of school gardens based on their experiences, but scholarly research on school garden sustainability is scarce. Two areas in need of further research are “qualitative studies of smoothly functioning school gardens that examine how success is managed and maintained” and “studies of reasons for garden failure” (Blair, 2009). Ozer (2007) also recommended that future research examine “the implementation factors that contribute to the sustainability of effective school garden programs.” Currently, the largest organizations that support school gardening such as the California School Garden Network and the National Gardening Association, do not track or publish the rate of school garden start-up or discontinuation. However, one Los Angeles school garden report found that of 84 schools surveyed, 52% currently had a garden, 33% had never had one, and 15% once had a garden that was subsequently abandoned. The most commonly cited reasons for ending the garden programs were teacher overload, lack of funding, and the loss of available space (Azuma, Horan and Gottlieb, 2001).

Chapter 3

METHODOLOGY

This mixed methods research used a survey instrument, which had both quantitative and qualitative components. The survey was developed using Qualtrics, a web-based survey tool licensed by the University of Delaware (Qualtrics Labs, 2011). The self-administered questionnaire was accessed by a link that could be distributed via email or posted online.

Institutional Review Board

This researcher completed Human Subjects Training on August 30, 2010 and all research protocol complied with all regulations of the University of Delaware's Office of the Vice Provost for Research (Appendices A and B). This study was approved by the Vice Provost for Research for exemption from review by the Human Subjects Review Board (Appendix C). Survey participants were granted optional anonymity and those who supplied personal information remained confidential. All data will be destroyed within two years of the completion of this research.

Survey Instrument Development

For the purposes of this study, "school garden" was defined as a planted area used by students and teachers for instruction. Some survey questions were adapted from the Azuma, Horan, and Gottlieb report (2001) of school gardens in the Los Angeles Unified School District and the LifeLab California School Gardens Survey (2011). The questionnaire was refined by the thesis committee, one public garden

youth education coordinator, and the education program coordinator of the National Gardening Association. Volunteers were solicited from the School Gardening e-list of the Los Angeles County Master Gardeners, with the permission of the list administrator, to take a pilot version of the survey; nine people responded and eight volunteered to take the pilot survey. Their feedback was incorporated and a final version of the survey was activated online.

Survey Structure

Following an initial set of questions about respondent background information, the questionnaire used skip-logic to direct respondents to one of two sets of questions (Appendix D). Respondents were thus divided into two groups—those working with extant school garden programs, and those responding on behalf of discontinued school garden programs. At the end of the survey, all respondents were directed to the same question block where they could volunteer personal contact information for possible follow up investigation, and optional free-response comments. Individuals working with current school garden programs were asked a total of seventeen questions while those identifying with discontinued school garden programs were asked a total of nineteen questions.

Sample and Recipients

The target sample was school garden organizers nationwide. The introductory text to the questionnaire requested that it be filled out by the person in charge of or most knowledgeable about their garden program, whether extant or discontinued. The survey link was distributed by the National Gardening Association (NGA) in one email blast to their Youth Educators e-list on June 18, 2011 (Appendix E). This e-list

consisted of approximately 196,580 subscribers, including educators, parents, and specialists who work with children and gardening. These recipients posted or forwarded the survey link to other email lists or online networks, including:

- Environmental Education Alliance of Georgia (5000 subscribers)
 - Web posting of survey link and invitation to other sites of the Southeast Environmental Education Alliance (Alabama, Florida, Mississippi, North Carolina, South Carolina, Kentucky, Tennessee) and also affiliated sites in Wisconsin and Hawaii
- New York City School Gardens Google Group
- Michigan State University Youth & Community Food listserv
- Los Angeles County Master Gardeners School Gardening listserv

Other networks, listservs, or individuals may have received the survey link as well, since the link could be freely forwarded and shared if the recipient so chose.

The survey was closed to further submissions on July 26, 2011.

Data Analysis

Distribution frequencies and chi-square cross-tabulations were calculated with Qualtrics tools. Free-written survey responses were coded and organized by themes using NVivo 9 software, a research tool used to structure and analyze qualitative data (QSR International, 2010).

Chapter 4

RESULTS

The survey collected a total of 1,301 completed responses, including 1,166 responses from participants involved with current school garden programs and 135 from participants responding on behalf of discontinued garden programs. A small number of responses (0.02%) were from international locations, including eight from Canada, three from Australia, and one each from Austria, India, Belize, Morocco, New Zealand, Spain, and Thailand.

Roles of Survey Respondents at Their Schools

The majority of respondents, 54.1%, identified as teachers, while 30.1% identified as school garden coordinators or similar, such as outdoor education coordinator (Figure 1). Among the other types of respondents, maintenance staff (0.3%), principals (4.2%), and administrators (8.8%) were the least represented. Those who identified themselves as “volunteer” (18.3%) included parents, master gardeners, retired teachers, school board members, 4-H leaders, and AmeriCorps volunteers. “Other” write-ins (a total of 14.8%) included auxiliary school staff such as librarians, nurses, teacher aides, counselors, after school program coordinators, substitute teachers, education specialists, and food services staff; non-profit organization staff members or directors; and other local community members and business owners. Percentages total more than 100% because respondents were allowed to identify with more than one role at their schools or facilities.

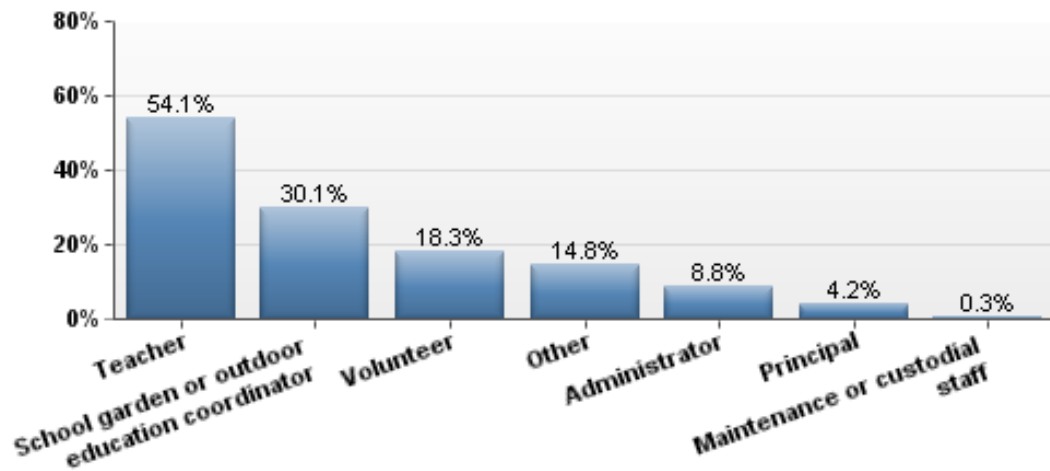


Figure 1 Self-identified roles of survey respondents at their respective schools, by percentage of all respondents (n=1301).

Drilling down by the role of respondents showed that for each role, some respondents identified with other roles as well (Figures 2-8). The role of garden coordinator seemed to be most often doubled with other roles, especially with teachers (Figure 5). However, a majority of the respondents chose only one role.

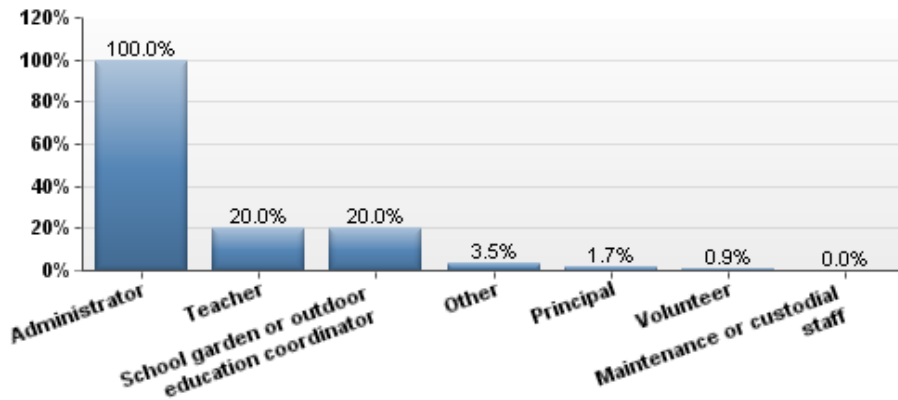


Figure 2 Drill-down of all other roles with which Administrators identified, by percentage of Administrator respondents (n=115).

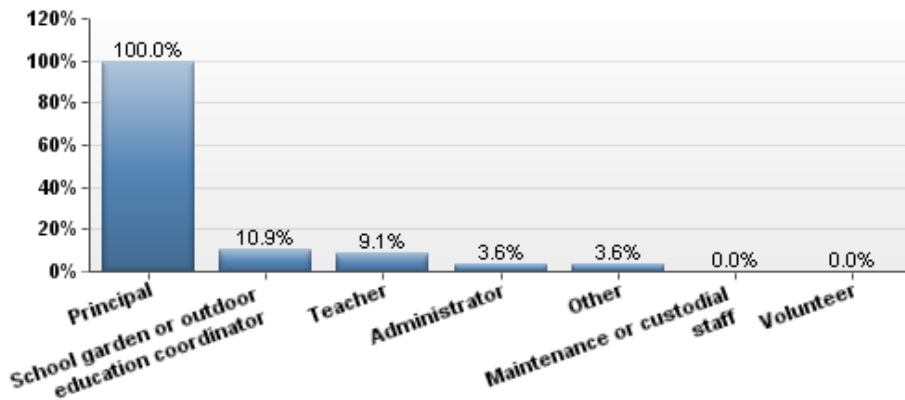


Figure 3 Drill-down of all other roles with which Principals identified, by percentage of Principal respondents (n=55).

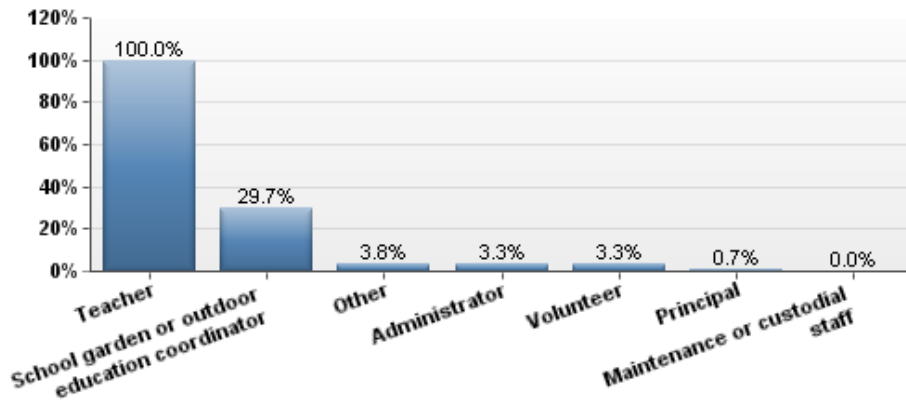


Figure 4 Drill-down of all other roles with which Teachers identified, by percentage of Teacher respondents (n=704).

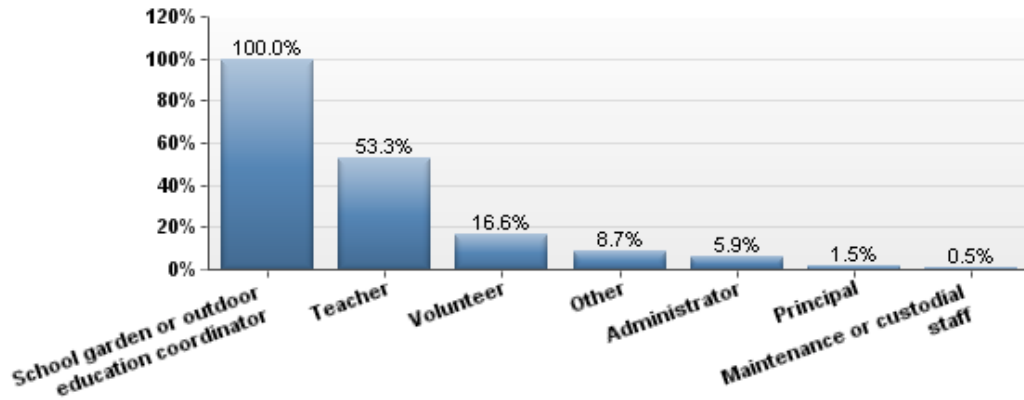


Figure 5 Drill-down of all other roles with which School Garden Coordinators identified, by percentage of School Garden Coordinator respondents (n=392).

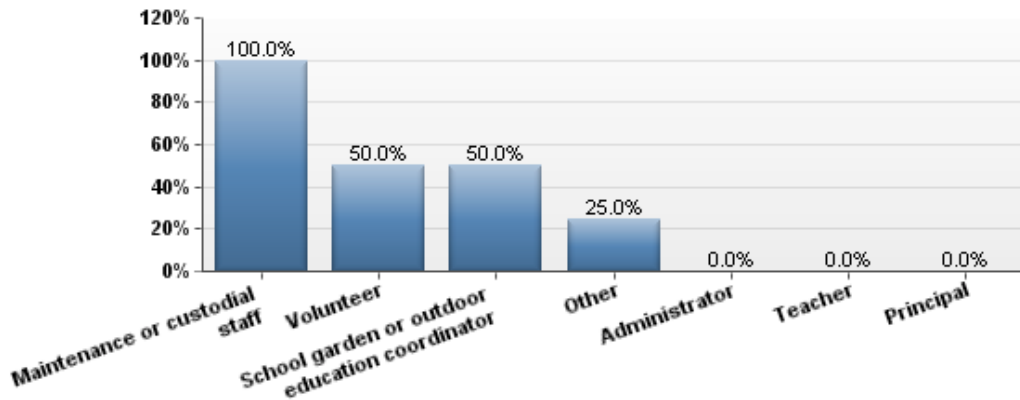


Figure 6 Drill-down of all other roles with which Maintenance Staff identified, by percentage of Maintenance Staff respondents (n=4).

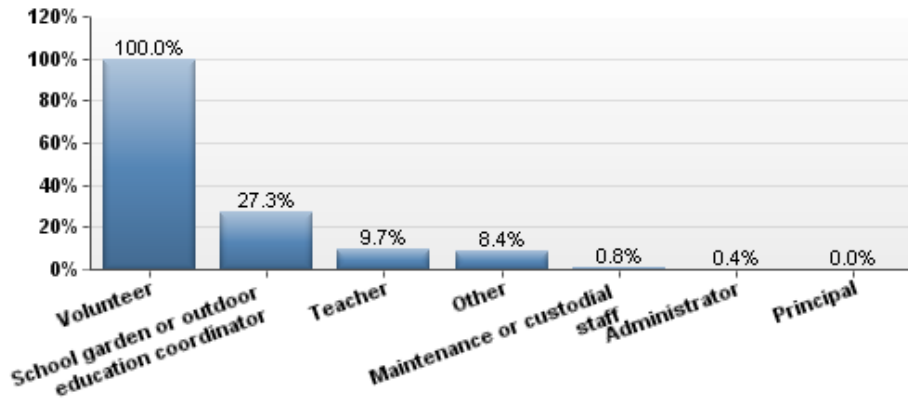


Figure 7 Drill-down of all other roles with which Volunteers identified, by percentage of Volunteer respondents (n=238).

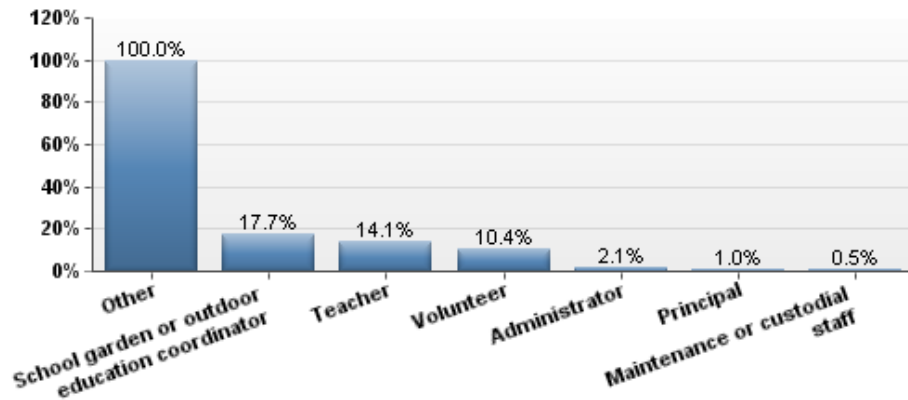


Figure 8 Drill-down of all other roles with which “Other” respondents identified, by percentage of “Other” respondents (n=192).

Among school types (Figure 9), public schools were the most common by far (73.1%), followed by private schools at 22.4% and charter schools at 4.5%. Most of the schools (85.5%) were on a traditional nine-month academic schedule, versus a year-round schedule (Figure 10). Nearly half (46.7%) were elementary schools, followed by K-8 schools, pre-kindergartens, middle and high schools, K-12 schools, and others (Figure 11). A total of 44.9% of the schools were located in suburban areas, followed by 33.4% in urban locations and 21.7% in rural locations (Figure 12).

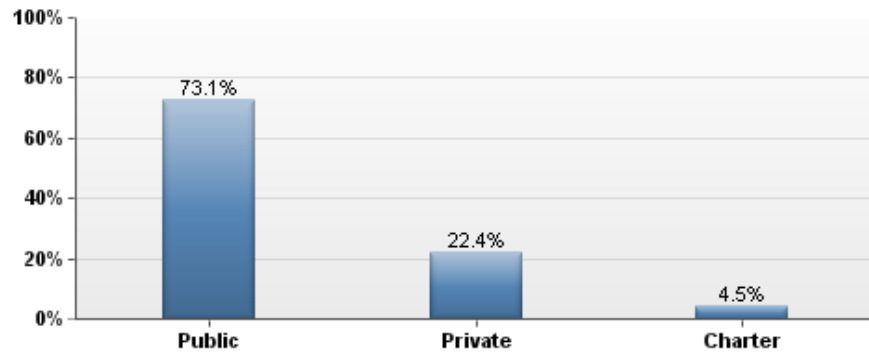


Figure 9 School types (n=1288).

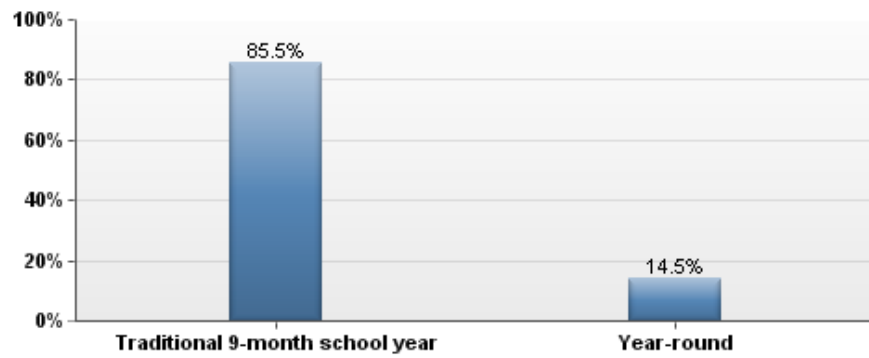


Figure 10 Academic year types (n=1291).

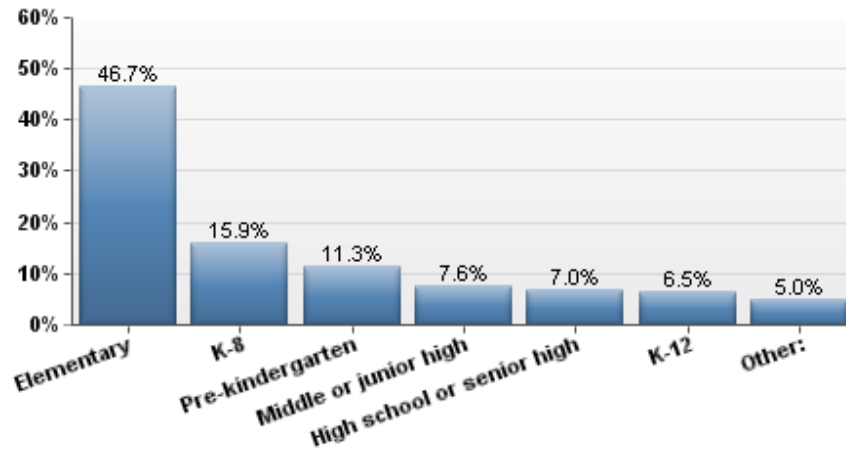


Figure 11 School level classifications (n=1296).

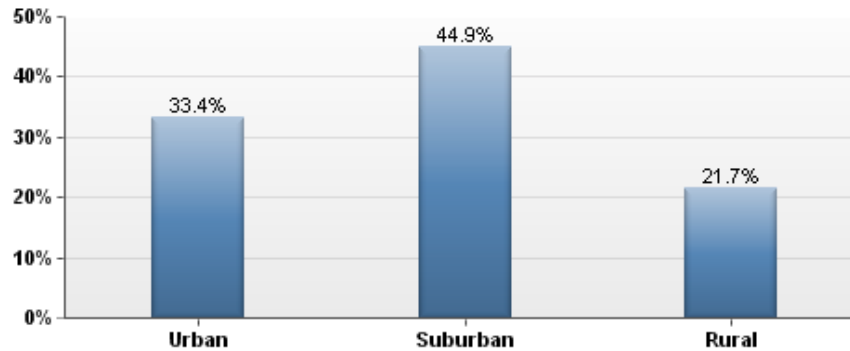


Figure 12 School neighborhood classifications (n=1297).

After respondents provided basic information about themselves and their school's characteristics, the survey partitioned participants into those with extant

school gardens and those with discontinued school gardens. A total of 89.6% of the survey participants chose the former category, with 10.4% in the latter (Figure 13).

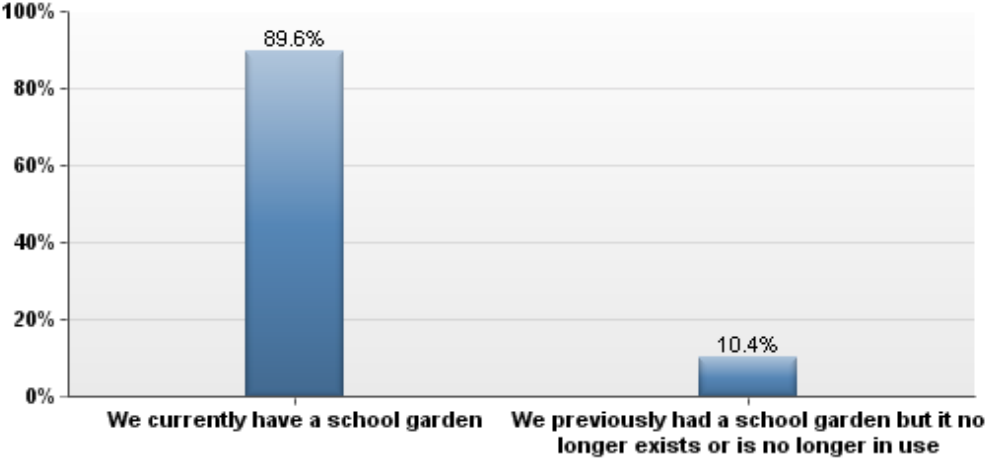


Figure 13 Percentages of respondents with extant or discontinued school garden programs (n=1301).

General Profile of Extant School Gardens

A total of 78% of the respondents in this group indicated that their gardens were relatively new – five years old or less. A total of 97% of all the garden programs in this group were ten years old or less (Figure 14).

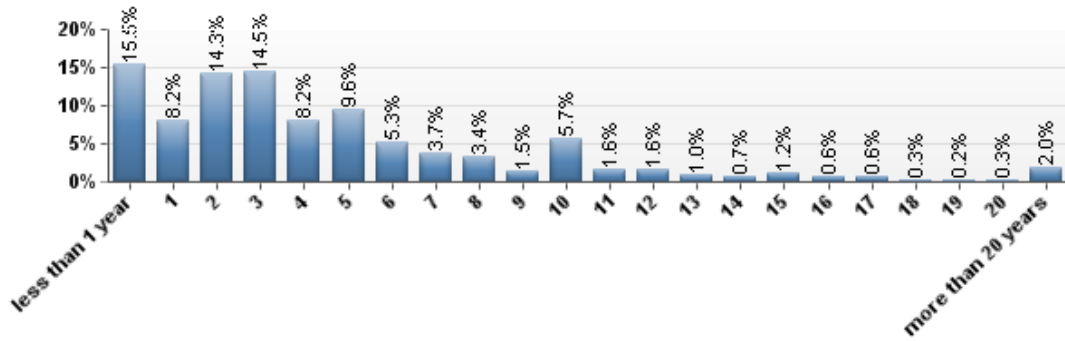


Figure 14 Length of time the current school garden programs have been in existence (n=1152).

Teachers and students carried the greatest maintenance burden (76.9% and 82.1%, respectively), followed by parents and volunteers from outside the school (42.9% and 36.6%, respectively) (Figure 15). Only 16.3% of the respondents said that school maintenance staff maintained their gardens. Others who helped with garden maintenance included garden coordinators (2.7%) and “other,” including principals and administrators, other school staff, and members of non-profit organizations.

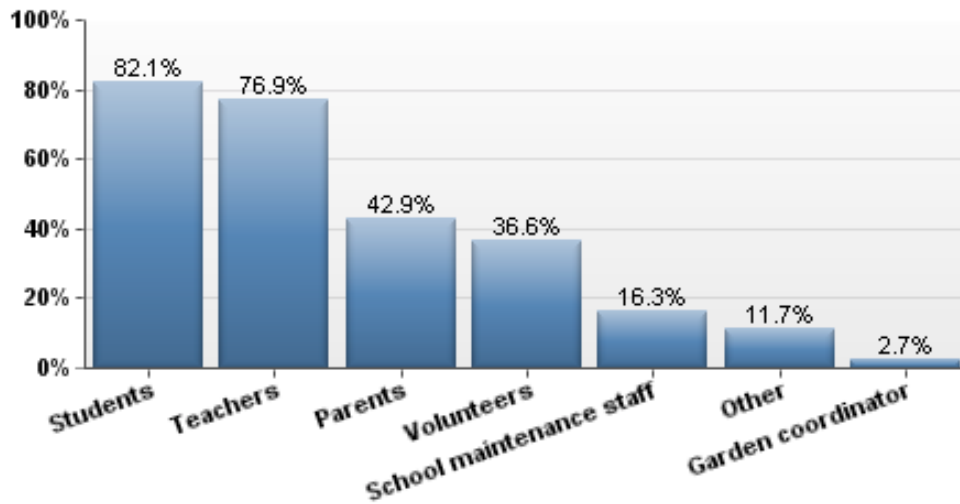


Figure 15 The school garden participants primarily responsible for garden maintenance (n=1165).

The school gardens comprised a wide variety of elements and plant types, the most popular being vegetables, flowers, and herbs (Figure 16). They were also used for a multiple teaching purposes, with science, health and nutrition, math, language arts, and art among the most commonly taught subjects in the gardens (Figure 17). The most common non-academic curricular uses of the gardens were cooking classes, produce grown to be donated, and produce grown for the cafeteria (Figure 18).

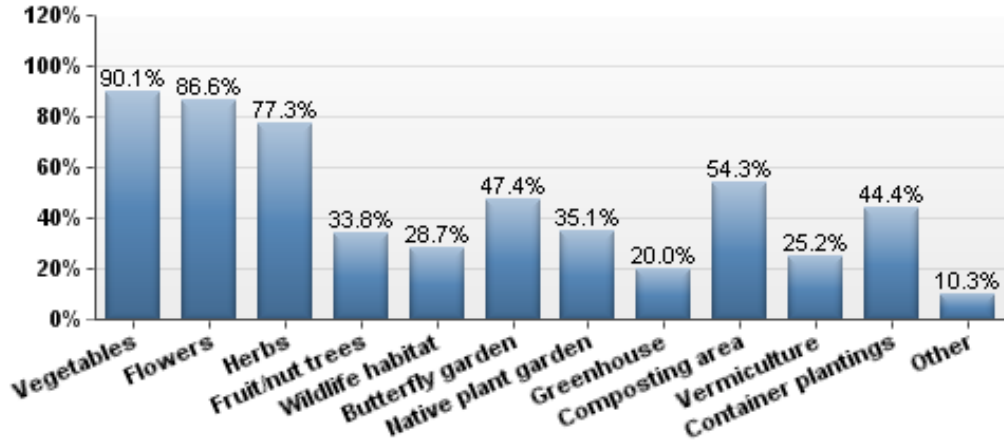


Figure 16 Common features included in extant school gardens (n=1165).

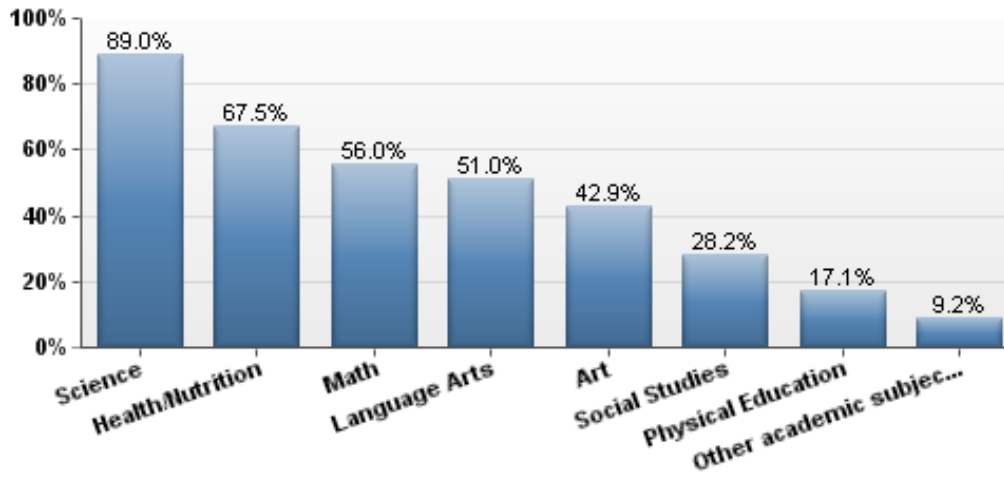


Figure 17 Academic subjects taught using the garden in extant school gardens (n=1162).



Figure 18 Non-academic subject uses of extant school gardens (n=1162).

General Profile of Discontinued Garden Programs

A total of 82% of the respondents in this group indicated that their garden programs lasted five years or fewer (Figure 19). Over half (55%) of the programs ended recently, since 2009, and 81% ended since 2005 (Figure 20).

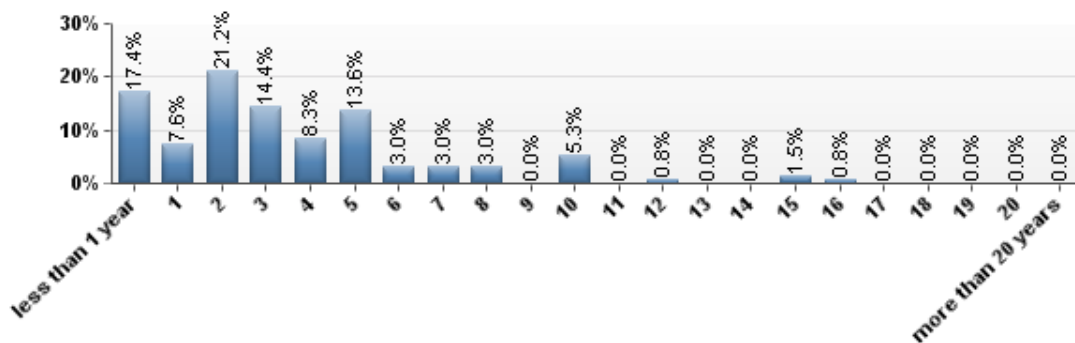


Figure 19 Length of time discontinued school garden programs lasted (n=132).

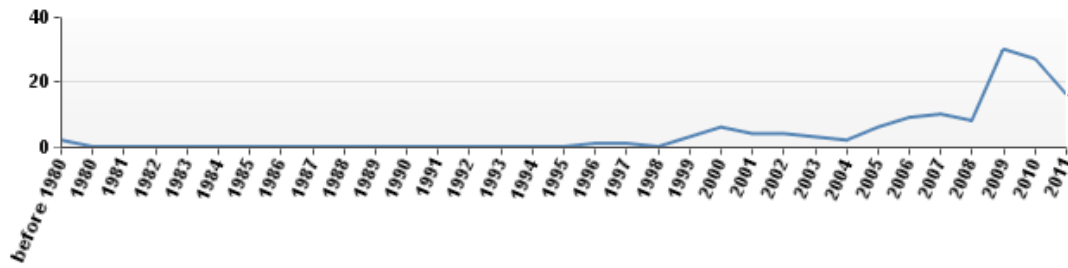


Figure 20 Year when the discontinued garden programs ended (n=132).

The general profile of the garden programs in this group was similar to that of the existing garden programs. Teachers and students bore the greatest share of responsibility for garden maintenance (Figure 21). Flowers, vegetables, and herbs were the most common garden elements (Figure 22). Science, math, health and nutrition, and language arts were the most common subjects used in garden instruction (Figure 23). The most common non-academic curriculum uses included “other uses” (such as special education, afterschool clubs, and school beautification), job training in horticulture or agriculture, and cooking classes (Figure 24).

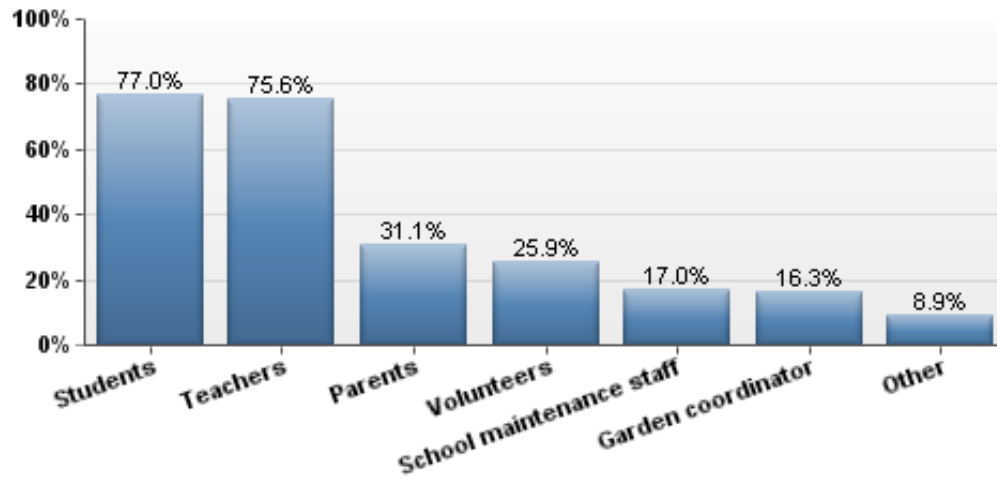


Figure 21 The school garden participants who were primarily responsible for garden maintenance (n=135).

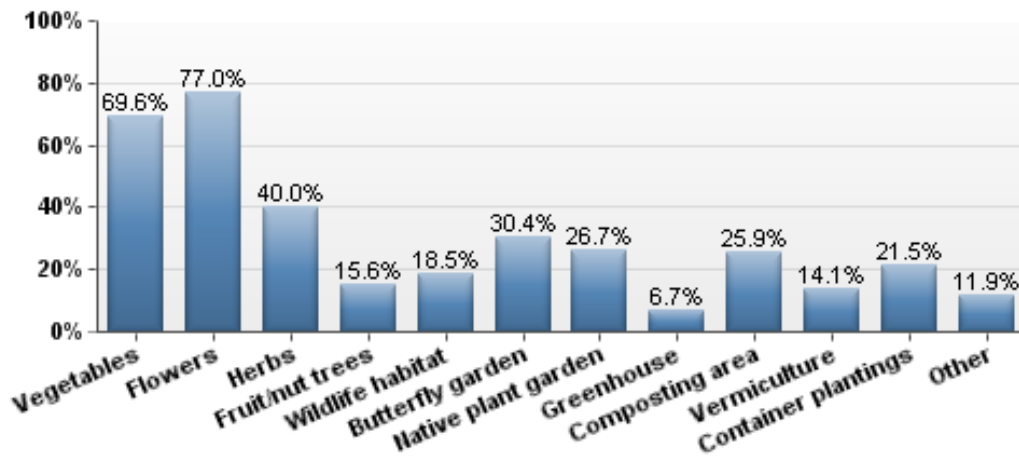


Figure 22 Common features included in discontinued school gardens (n=135).

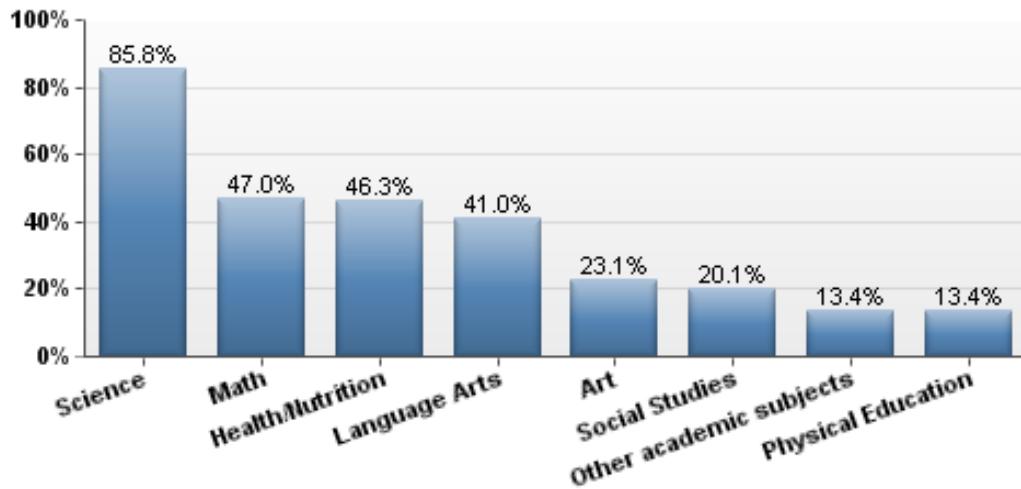


Figure 23 Academic subjects taught using the garden in discontinued school gardens (n=134).

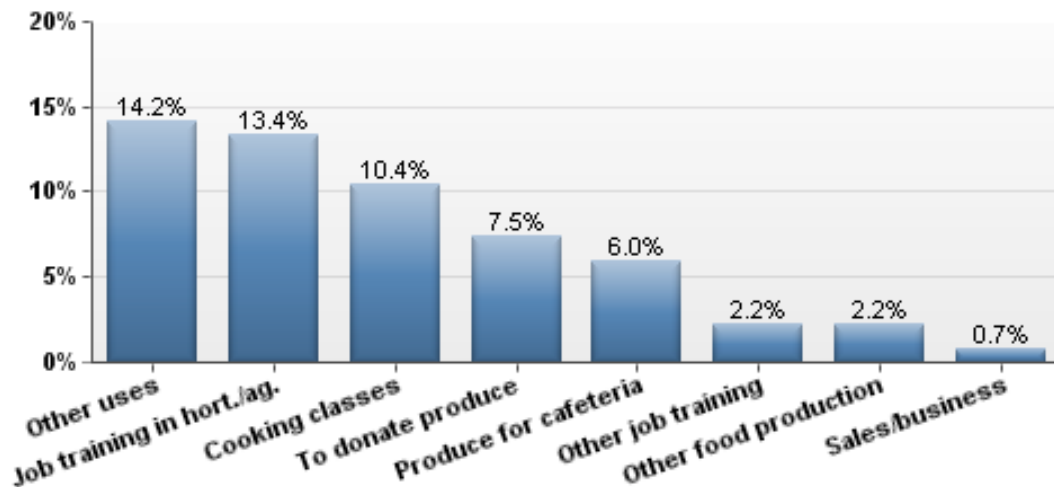


Figure 24 Non-academic subject uses of the discontinued school gardens (n=134).

Challenges to Sustainability and Reasons for Program Discontinuation

Among the respondents for extant school gardens, the most common responses to the question, “What are the biggest challenges to your garden’s continuance and success?”, indicated that their greatest challenges were funding, lack of teacher training in garden-based instruction, garden maintenance creating untenable burdens on teachers, staffing turnover, and maintenance over vacations (Figure 25).

Among the respondents for discontinued school gardens, the most common responses to the question, “What led to the garden’s discontinuation?”, pertained to funding, staffing turnover, garden maintenance overburdening teachers, and maintenance over vacations (Figure 26). Lack of a dedicated school garden coordinator, lack of a strategic plan, and lack of principal and administration support were also commonly cited reasons for garden program discontinuation. A commonly cited “other” reason was school closure or building projects taking over the garden site.

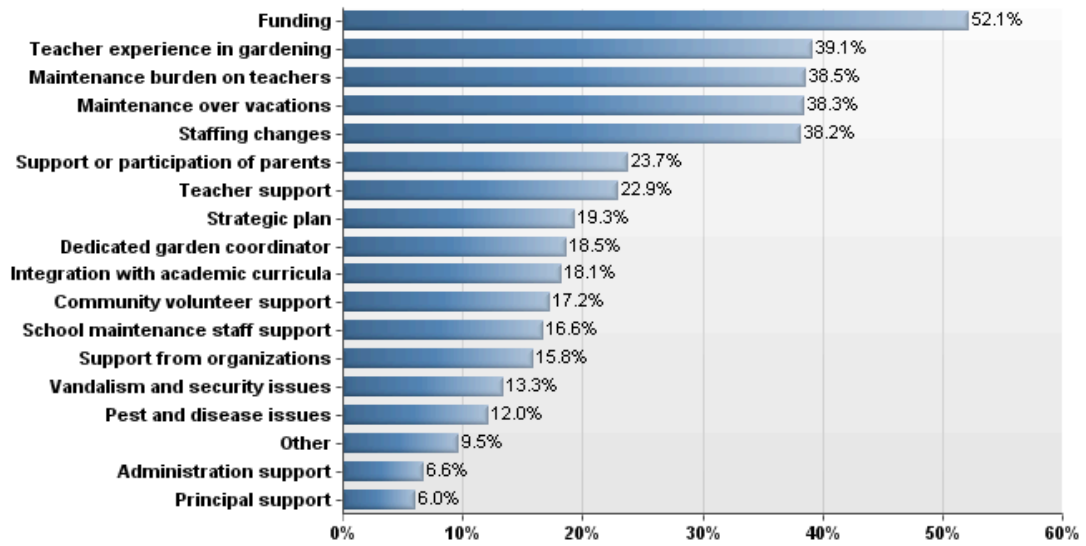


Figure 25 Challenges to program sustainability among extant school gardens (n=1166).

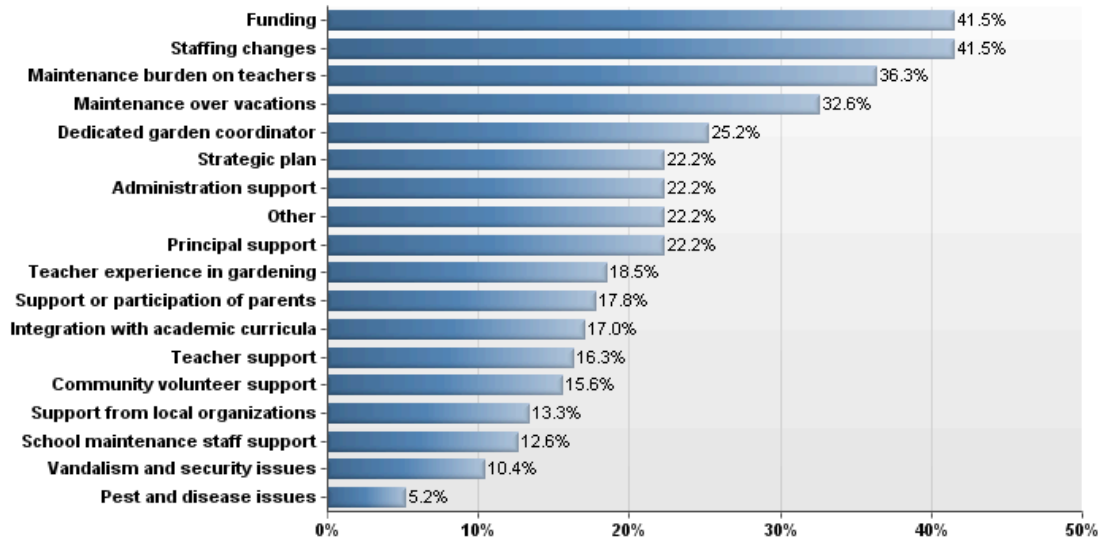


Figure 26 Reasons for discontinuation among discontinued school gardens (n=135).

Interest in Restarting a Failed School Garden

A total of 68% of respondents with discontinued school gardens said there was interest in restarting their school garden program, while 24% were unsure and only 7% said there was no interest (Figure 27). Strong majorities of respondents of all different roles (principals, teachers, etc.) responded yes, except for volunteers, who were more likely than the other respondents to indicate that they were unsure if there was interest in restarting the garden program at their schools (Figure 28).

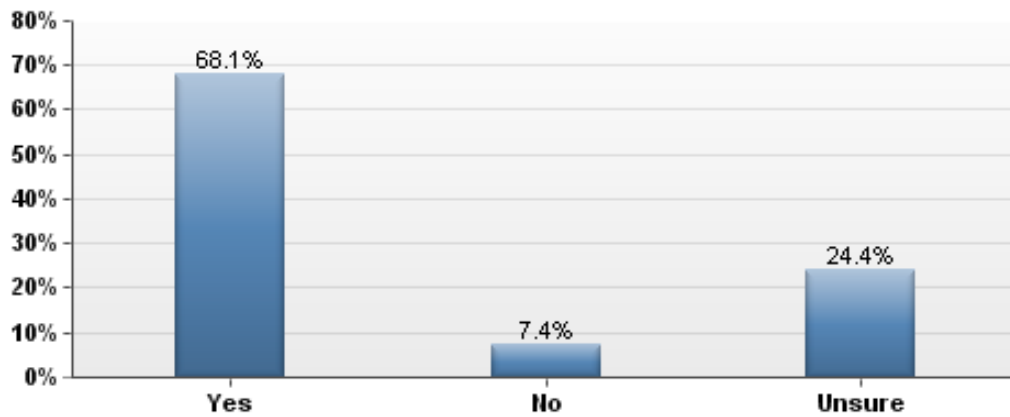


Figure 27 Responses to whether or not there was interest in restarting their program among discontinued school gardens (n=135).

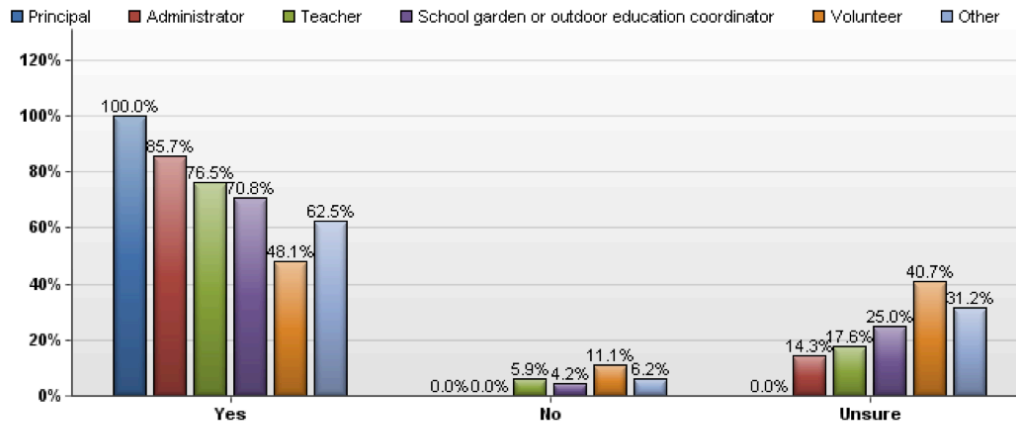


Figure 28 Interest in restarting discontinued school gardens by role of respondents (n[Principal]=3, n[Administrator]=7, n[Teacher]=85, n[Coordinator]=24, n[Volunteer]=27, n[Other]=15).

When respondents from discontinued school gardens were asked what support would be needed to restart their garden programs, their written comments highlighted

similar themes. A total of 130 comments were coded, representing 96.3% of the respondents for discontinued school gardens (Figure 29). Their answers indicated that funding, mentioned in 44.6% of the responses, was a high priority to them in order to be able to restart their programs, as well as support from all stakeholders (administration, community, and teachers). “Community” here includes parents, non-parent volunteers, and local organizations. They also needed better curriculum integration and materials and equipment, which were among the most frequently mentioned themes.

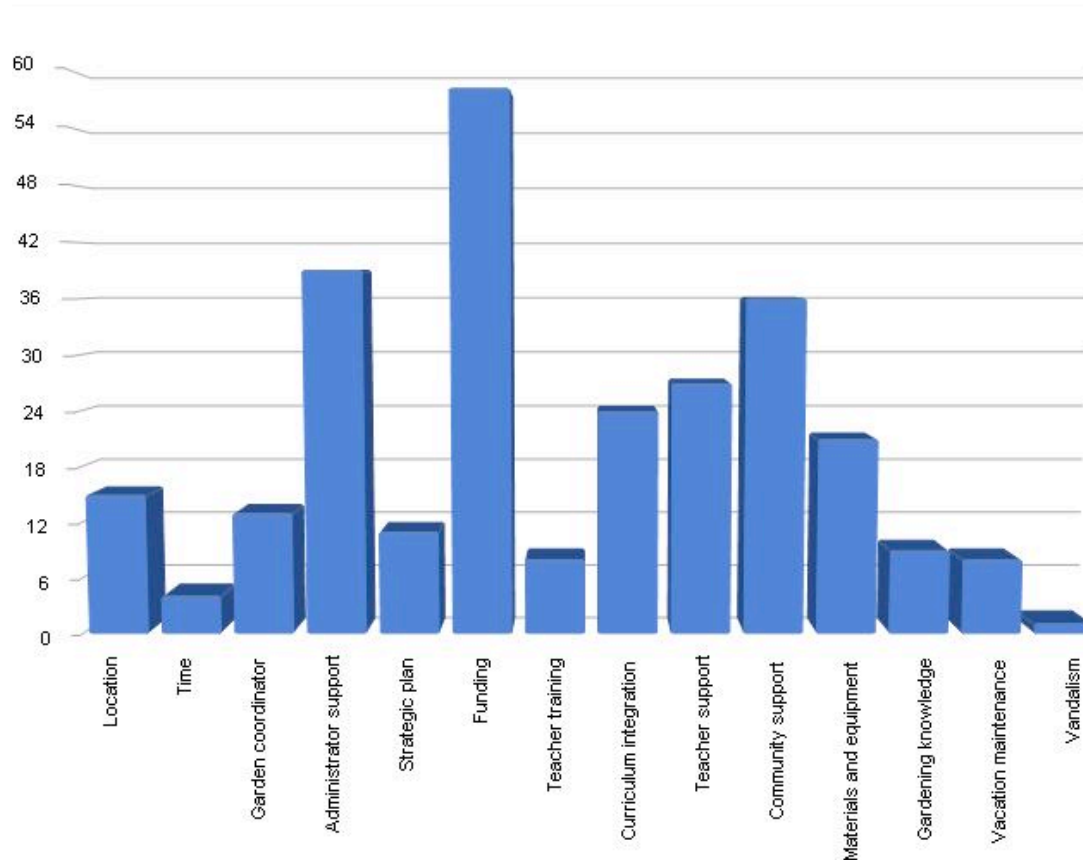


Figure 29 Coded themes for written responses regarding what support would be needed to restart the discontinued garden programs, by number of coding references.

Comparison of Responses by Role of Respondents

The responses to the main research question, regarding challenges to sustainability or reasons for discontinuation, were compared by the roles of respondents in order to determine whether there were differences in responses depending on their roles (Figures 30-31). Responses from maintenance staff were excluded from all comparisons because so few (n=4) participated in the survey and because they all identified as at least one other role as well (Figure 6).

Among respondents with current school gardens, administrators, principals, teachers, garden coordinators, volunteers, and “others” seemed to have a near universal concern with funding, lack of teacher experience with gardening, the maintenance burden on teachers, staffing changes leaving the garden without leadership, and maintenance over vacations (Table 1). These five were in fact the most common challenges overall, and have been color-coded throughout the tables for ease of interpretation. Only the volunteers included another option, lack of support from parents, among their top five selected reasons.

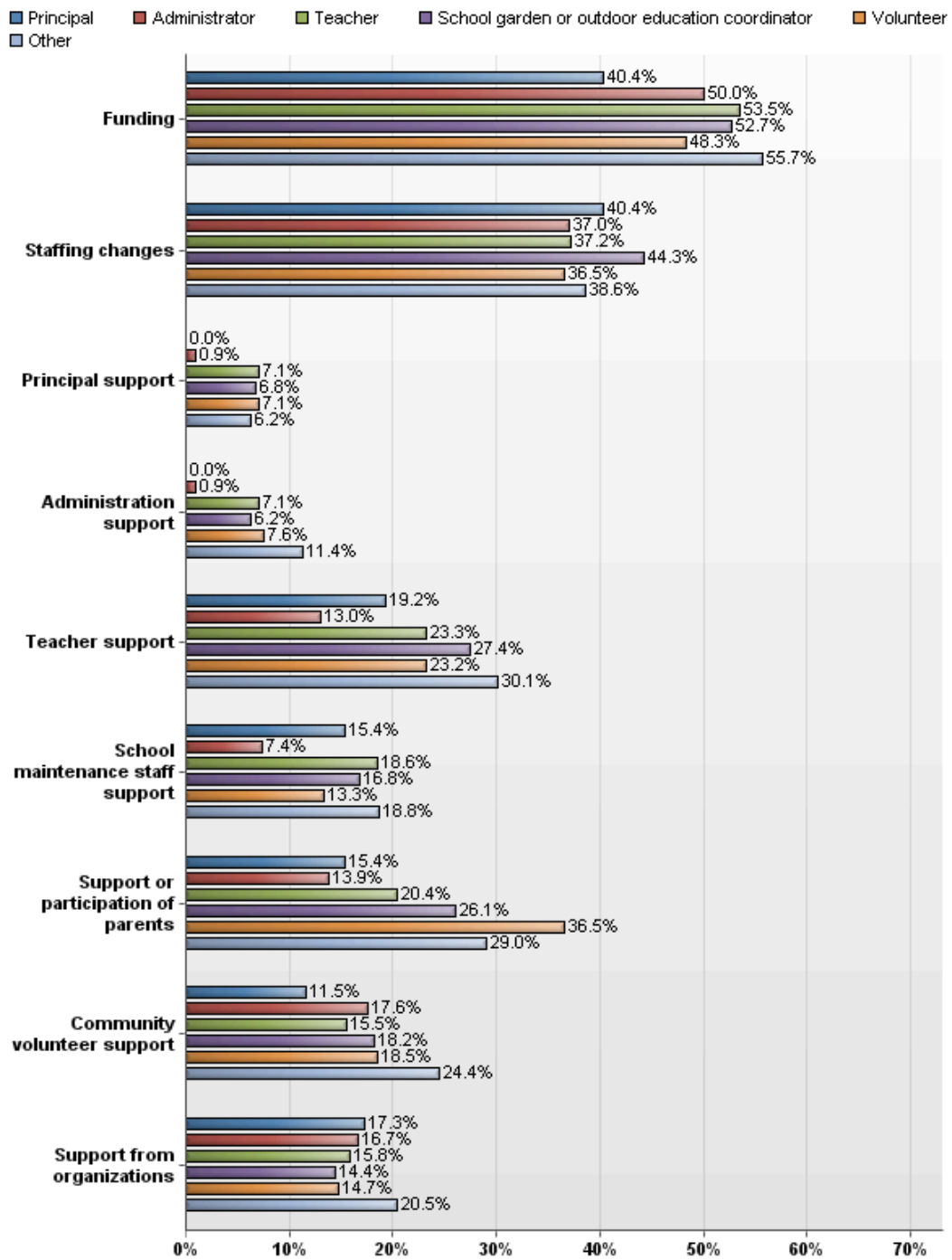


Figure 30 Comparison of challenges to sustainability by roles of respondents: Response options 1-9.

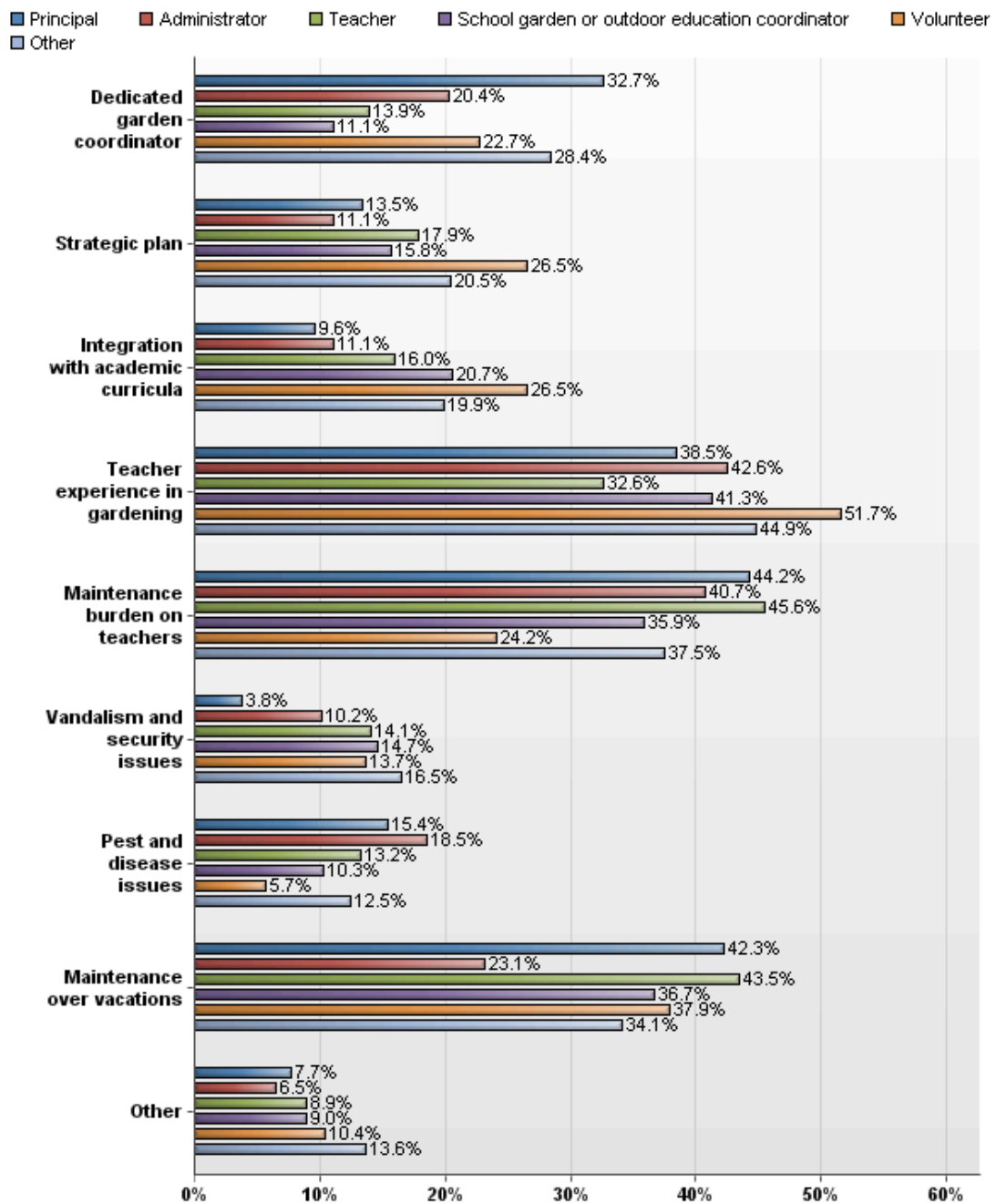


Figure 31 Comparison of challenges to sustainability by roles of respondents: Response options 10-18.

Table 1 Top challenges to sustainability by role of respondent.

Role	Top responses by percentage of respondents				
Administrators (n=108)	Funding (50.0%)	Teacher experience in gardening (42.6%)	Burden on teachers (40.7%)	Staff turnover (37.0%)	Vacation maintenance (23.1%)
Principals (n=52)	Burden on teachers (44.2%)	Vacation maintenance (42.3%)	Staff turnover (40.4%)	Funding (38.5%)	Teacher experience in gardening (32.7%)
Teachers (n=619)	Funding (53.5%)	Burden on teachers (45.6%)	Vacation maintenance (43.5%)	Staff turnover (37.2%)	Teacher experience in gardening (32.6%)
Garden Coordinators (n=368)	Funding (52.7%)	Staff turnover (44.3%)	Teacher experience in gardening (41.3%)	Vacation maintenance (36.7%)	Burden on teachers (35.9%)
Volunteers (n=211)	Teacher experience in gardening (51.7%)	Funding (48.3%)	Vacation maintenance (37.9%)	Staff turnover (36.5%)	Parent support (36.5%)
Other (n=176)	Funding (55.7%)	Teacher experience in gardening (44.9%)	Staff turnover (38.6%)	Burden on teachers (37.5%)	Vacation maintenance (34.1%)

Among discontinued school garden programs, the respondents indicated a similar pattern of reasons for discontinuation across roles, but with more variation than was observed among respondents with current school gardens (Figures 32-33). It was difficult to assess the relative importance of principals' and administrators' responses because of their small sample sizes (n=3 and n=7, respectively), so their responses

were excluded. There were no maintenance staff among the respondents with discontinued school gardens.

The top choices of reasons for discontinuation (Table 2) varied somewhat among the remaining categories of respondents – teachers, garden coordinators, volunteers, and “other.” Funding, staff turnover, the maintenance burden on teachers, and maintenance over vacations were the primary shared concerns. The top concerns indicated by garden coordinators also included “other” responses, the most common of which were related to school closures or construction taking away garden space. Among volunteers, the lack of a garden coordinator was the most common reason for discontinuation. Among the group of “others,” a lack of teacher support was the fifth most common reason, in addition to the four held in common by the other groups. In contrast with the respondents with current school gardens, no group of respondents among those with discontinued school gardens highlighted a lack of teacher experience in gardening as a top concern.

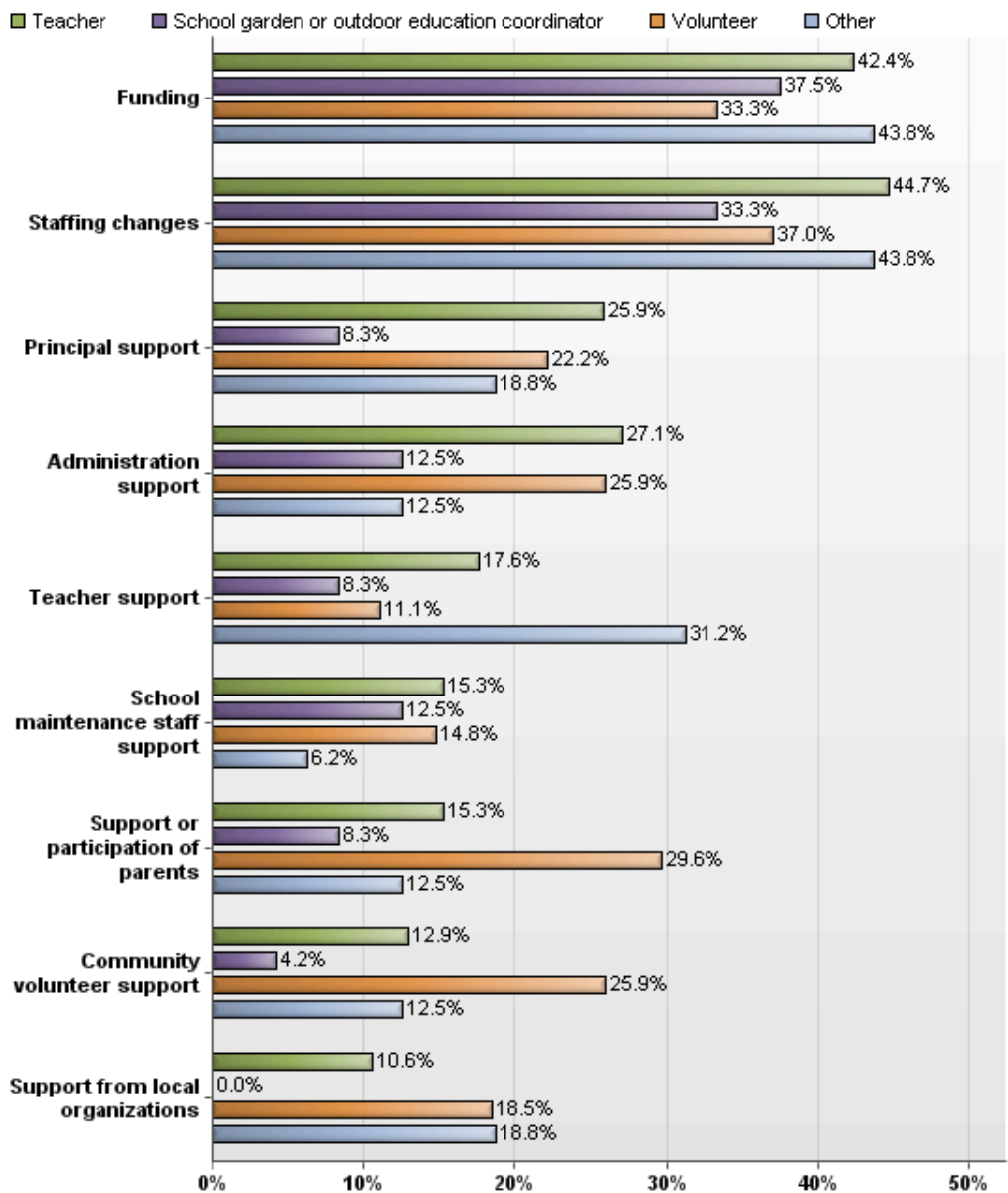


Figure 32 Comparison of reasons for discontinuation by roles of respondents: Response options 1-9.

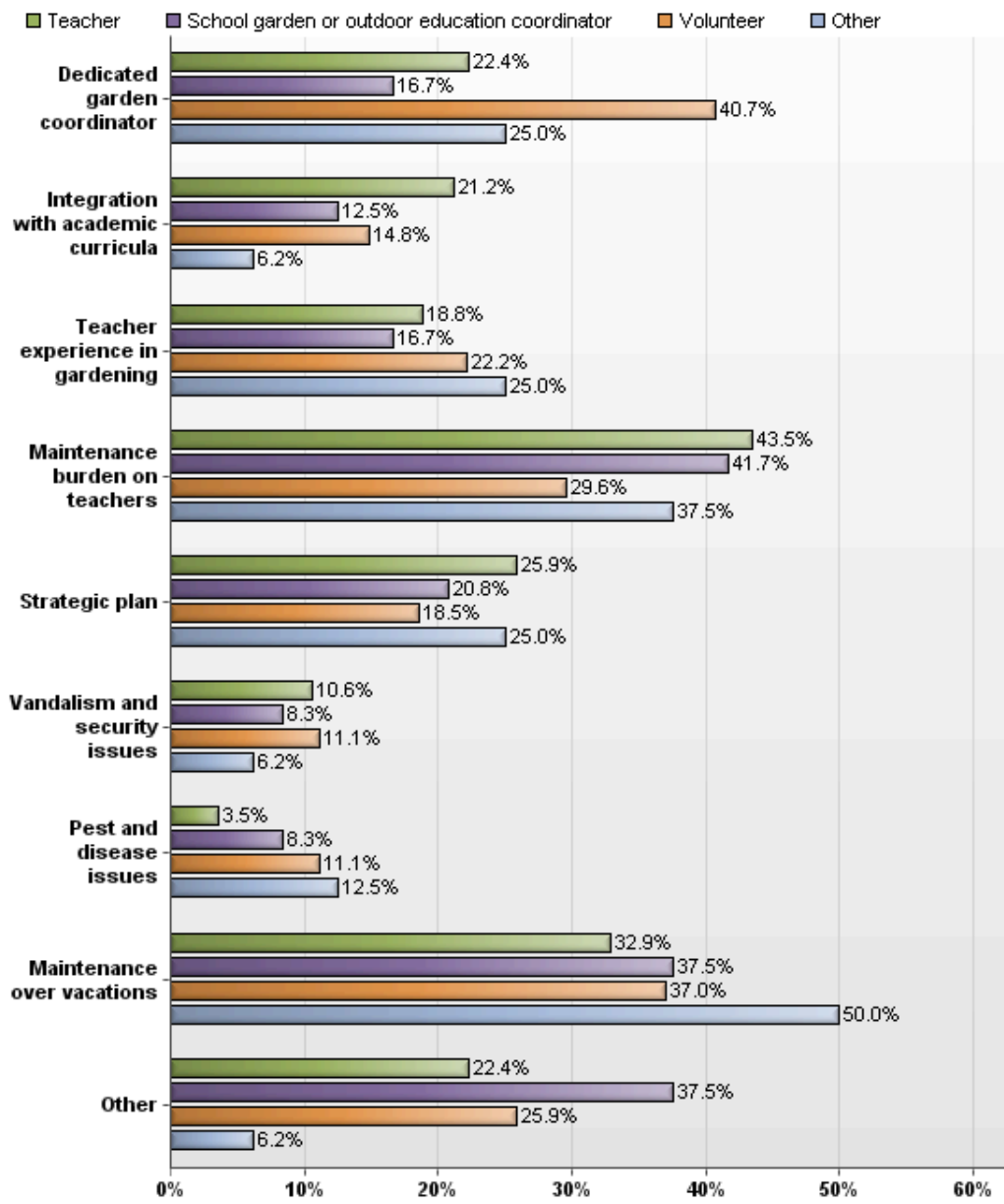


Figure 33 Comparison of reasons for discontinuation by role of respondent: Response options 10-18.

Table 2 Top reasons for discontinuation by role of respondent.

Role	Top responses by percentage of respondents				
Teachers (n=85)	Staff turnover (44.7%)	Burden on teachers (43.5%)	Funding (42.4%)	Vacation maintenance (32.9%)	Admin support (27.1%)
Garden Coordinators (n=24)	Burden on teachers (41.7%)	Vacation maintenance (37.5%)	Funding (37.5%)	Other (37.5%)	Staff turnover (33.3%)
Volunteers (n=27)	Garden coordinator (40.7%)	Vacation maintenance (37.0%)	Staff turnover (37.0%)	Funding (33.3%)	Parent support / Burden on teachers (29.6%)
Other (n=16)	Vacation maintenance (50.0%)	Staff turnover (43.8%)	Funding (43.8%)	Burden on teachers (37.5%)	Teacher support (31.2%)

Comparison of Responses by School Characteristics

Responses regarding challenges to sustainability or reasons for discontinuation were compared by school demographics: school type (public, private, or charter); academic year type (traditional nine-month year or year-round); and school neighborhood classification (urban, suburban, or rural).

School Type

The comparison of responses by school type among extant school gardens (Figure 34) showed little difference in the composition of the top five most common challenges between groups (Table 3). Public, charter, and private school respondents

all highlighted funding, maintenance over vacations, lack of teacher experience in gardening, and staff changes as major concerns. Public and private school respondents also included the maintenance burden on teachers among their top five challenges, while charter school respondents indicated lack of parent support among their top five.

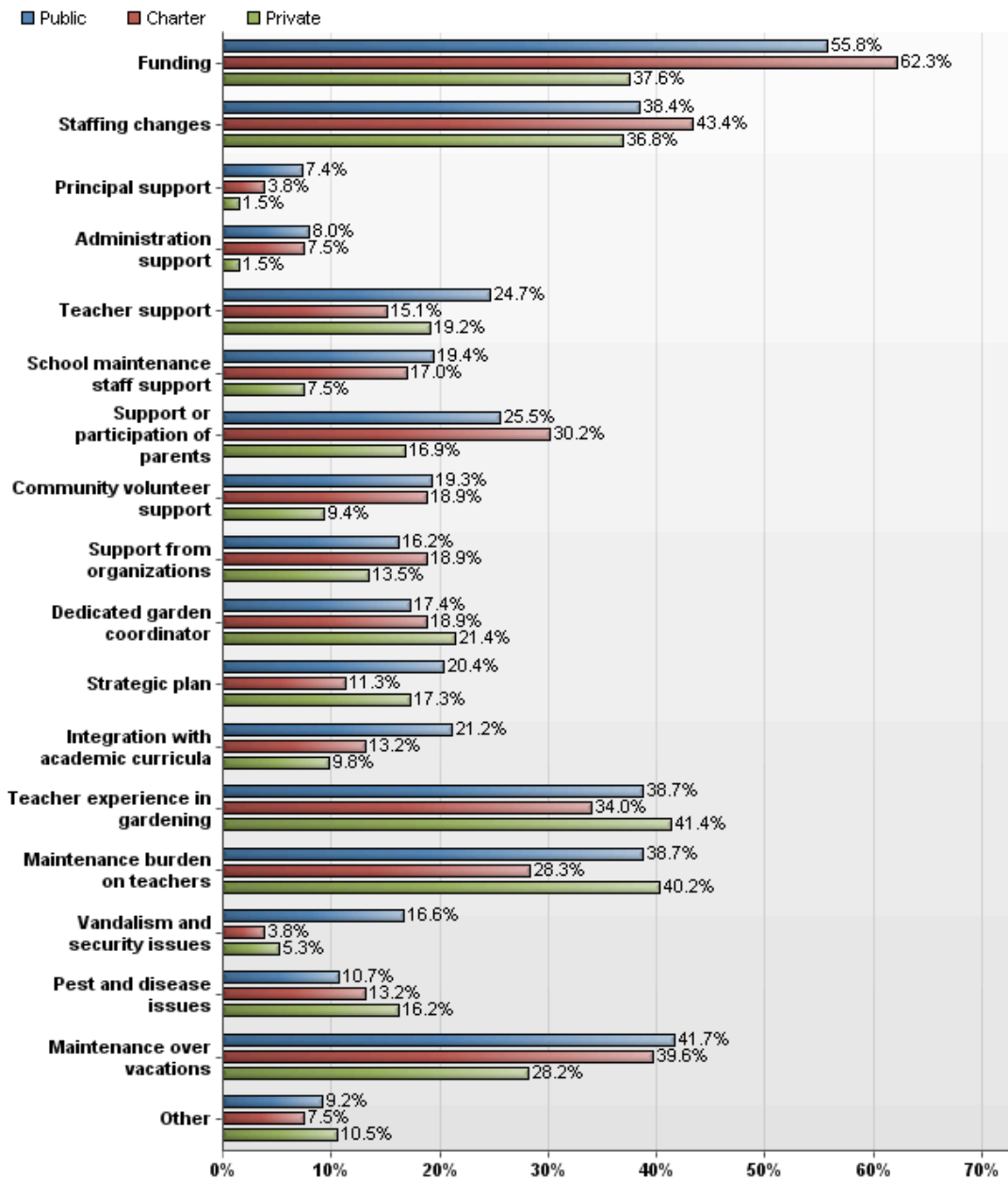


Figure 34 Comparison of challenges to sustainability by school type.

Table 3 Top challenges to sustainability by school type.

School Type	Top responses by percentage of respondents				
Public (n=835)	Funding (55.8%)	Vacation maintenance (42.3%)	Burden on teachers (38.7%)	Teacher experience in gardening (38.7%)	Staff turnover (38.4%)
Charter (n=53)	Funding (62.3%)	Staff turnover (43.4%)	Vacation maintenance (39.6%)	Teacher experience in gardening (34.0%)	Parent support (30.2%)
Private (n=266)	Teacher experience in gardening (41.4%)	Burden on teachers (40.2%)	Funding (37.6%)	Staff turnover (37.6%)	Vacation maintenance (28.2%)

Among discontinued school gardens, a comparison of the reasons for school garden discontinuation by school type (Figure 35) revealed that the most common reasons shared among the groups were funding, staff changes, the maintenance burden on teachers, and maintenance over vacations (Table 4). Public school respondents included “other” and a lack of a garden coordinator among their most common reasons for garden discontinuation. Private school respondents indicated a lack of a strategic plan among their top reasons. Charter school respondents were not included in this comparison due to small sample size (n=5).

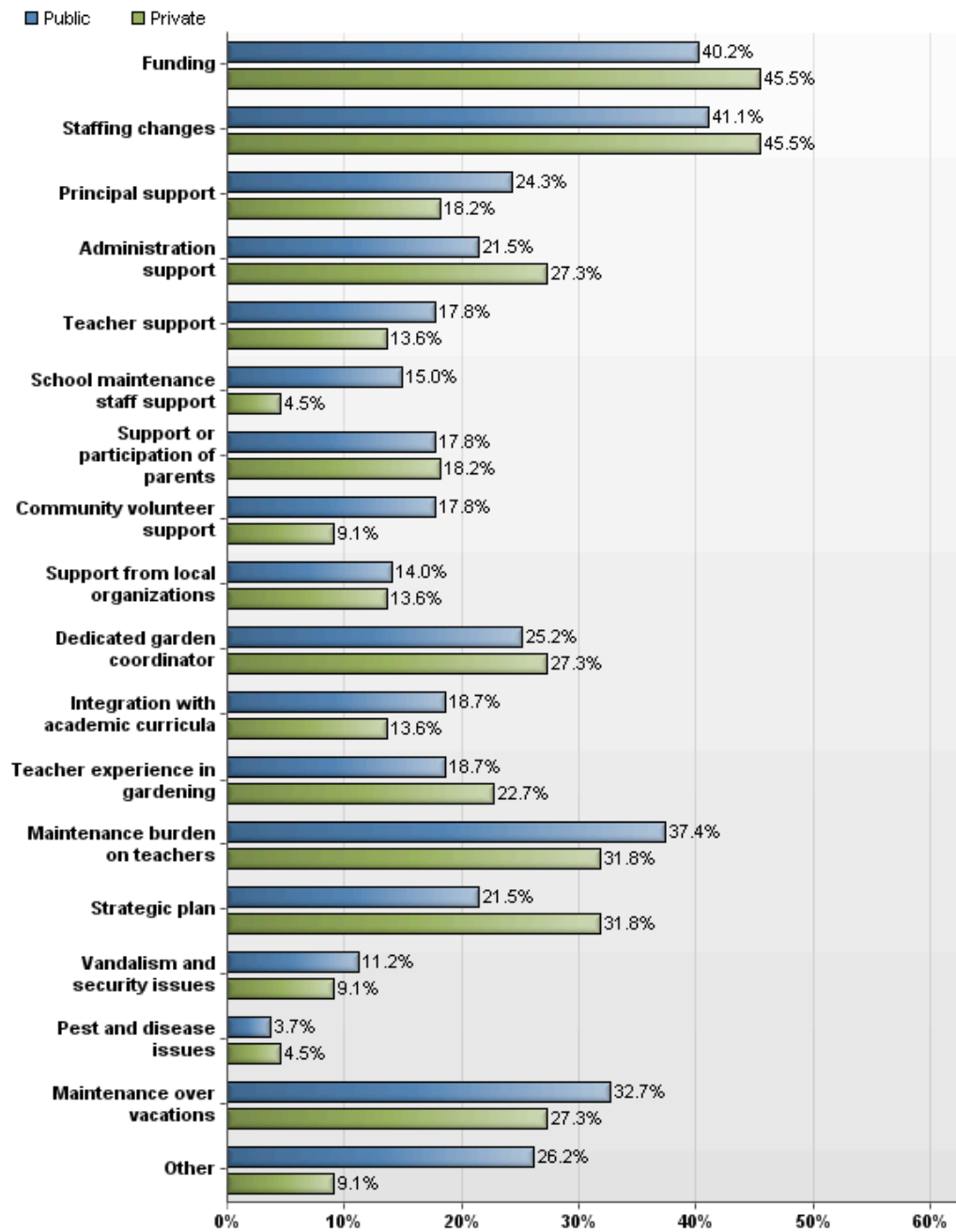


Figure 35 Comparison of reasons for discontinuation by school type.

Table 4 Top reasons for discontinuation by school type.

School Type	Top responses by percentage of respondents				
Public (n=107)	Staff turnover (41.4%)	Funding (40.2%)	Burden on teachers (37.4%)	Vacation maintenance (32.7%)	Other (26.2%)
Private (n=22)	Funding (45.5%)	Staff turnover (45.5%)	Burden on teachers (31.8%)	Strategic plan (31.8%)	Garden coordinator / Vacation maintenance / Admin support (27.3%)

Academic Year Type

A similar pattern emerged when comparing the responses by school year type (traditional nine-month versus year-round) (Figure 36), with one notable exception. The top challenges to sustainability among extant school garden respondents were funding, staff changes, lack of teacher experience in gardening, and the maintenance burden on teachers (Table 5). However, while maintenance over vacations was among the top five challenges for schools with the traditional nine-month school year, it was not a top concern for schools with year-round schedules.

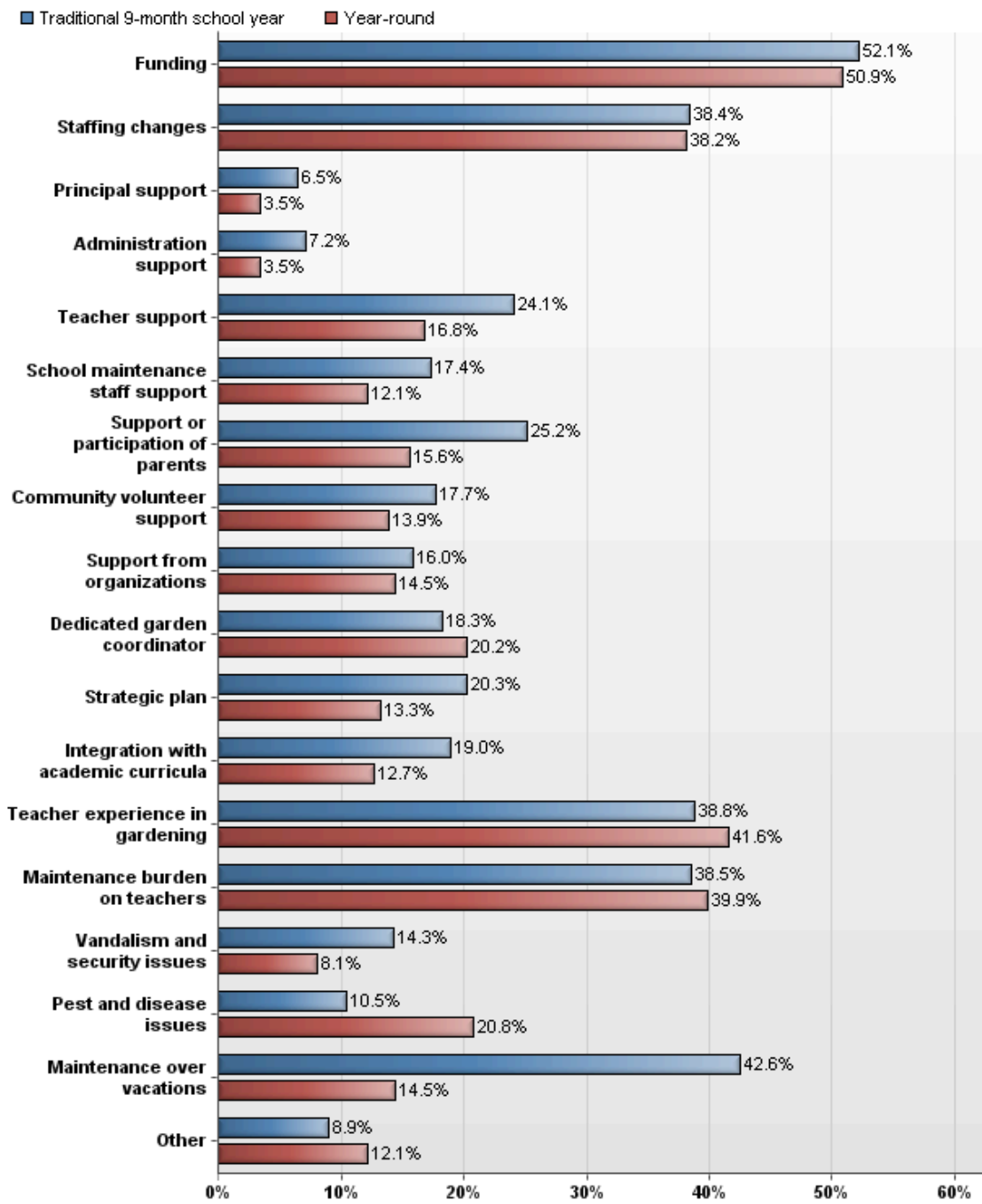


Figure 36 Comparison of challenges to sustainability by academic year type.

Table 5 Top challenges to sustainability by academic year type.

Academic Year Type	Top responses by percentage of respondents				
Traditional (n=984)	Funding (52.1%)	Vacation maintenance (42.6%)	Teacher experience in gardening (38.8%)	Burden on teachers (38.5%)	Staff turnover (38.4%)
Year-round (n=173)	Funding (50.9%)	Teacher experience in gardening (41.6%)	Burden on teachers (39.9%)	Staff turnover (38.2%)	Pest and disease (20.8%)

Similarly, among respondents with discontinued gardens (Figure 37), year-round schools did not select maintenance over vacations as a top reason for discontinuation, while traditional academic year schools did (Table 6). Year-round school respondents chose a lack of a garden coordinator as one of their top reasons instead.

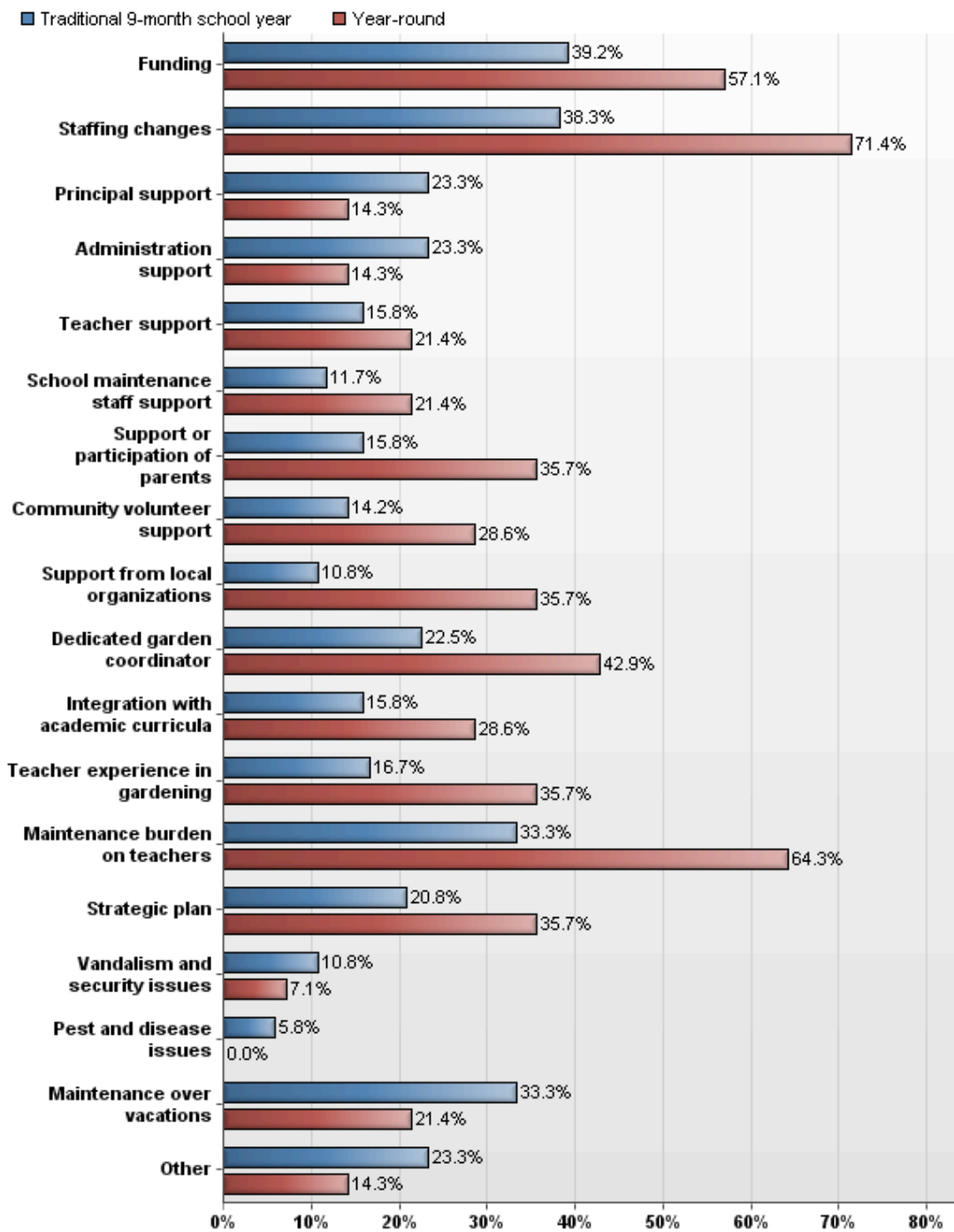


Figure 37 Comparison of reasons for discontinuation by academic year type.

Table 6 Top reasons for discontinuation by academic year type.

Academic Year Type	Top responses by percentage of respondents				
Traditional (n=120)	Funding (39.2%)	Staff turnover (38.3%)	Vacation maintenance (33.3%)	Burden on teachers (33.3%)	Admin support / Principal support / Other (23.3%)
Year-round (n=14)	Staff turnover (71.4%)	Burden on teachers (64.3%)	Funding (57.1%)	Garden coordinator (42.9%)	Strategic plan / Teacher experience in gardening / Local org. support / Parent support (35.7%)

School Neighborhood Classification

A comparison of the challenges to sustainability by school neighborhood classification (Figure 38) revealed no differences in the composition of the top five challenges (Table 8). Urban, suburban, and rural schools all indicated funding, lack of teacher experience in gardening, staff changes, maintenance over vacations, and the maintenance burden on teachers as their most common concerns.

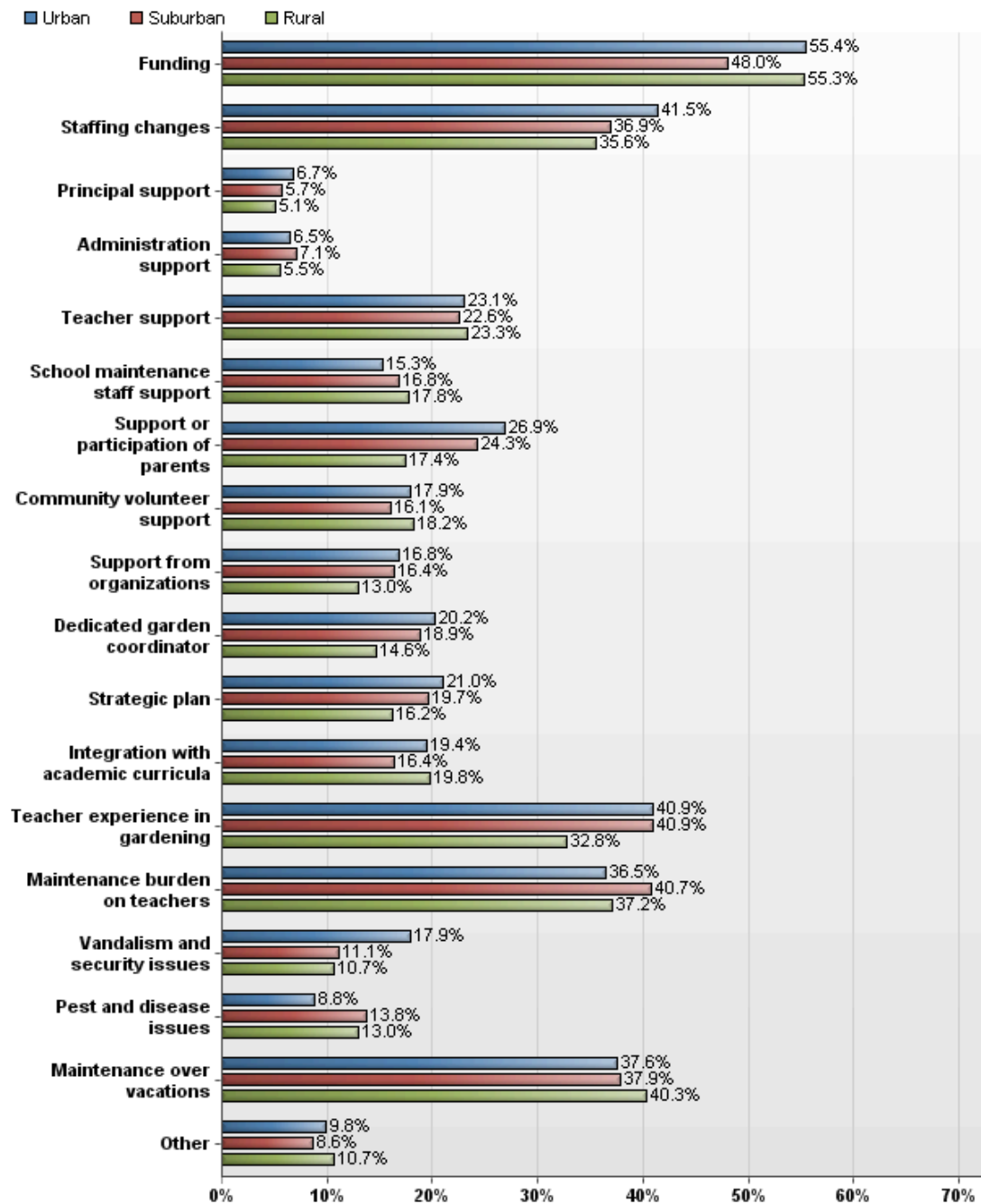


Figure 38 Comparison of challenges to sustainability by school neighborhood classification.

Table 7 Top challenges to sustainability by school neighborhood classification.

Neighborhood Type	Top responses by percentage of respondents				
Urban (n=386)	Funding (55.4%)	Staff turnover (41.5%)	Teacher experience in gardening (40.9%)	Vacation maintenance (37.6%)	Burden on teachers (36.5%)
Suburban (n=523)	Funding (48.0%)	Teacher experience in gardening (40.9%)	Burden on teachers (40.7%)	Vacation maintenance (37.9%)	Staff turnover (36.9%)
Rural (n=253)	Funding (55.3%)	Vacation maintenance (40.3%)	Burden on teachers (37.2%)	Staff turnover (35.6%)	Teacher experience in gardening (32.8%)

Respondents with discontinued school gardens indicated similar top reasons for discontinuation across neighborhood types (Figure 39) – funding, staff changes, and the maintenance burden on teachers (Table 8). However, rural school respondents did not indicate maintenance over vacations among their top reasons, while urban and suburban school respondents did. Lack of support from local organizations was another top reason for discontinuation among urban school respondents. A lack of a garden coordinator was another top reason among suburban school respondents.

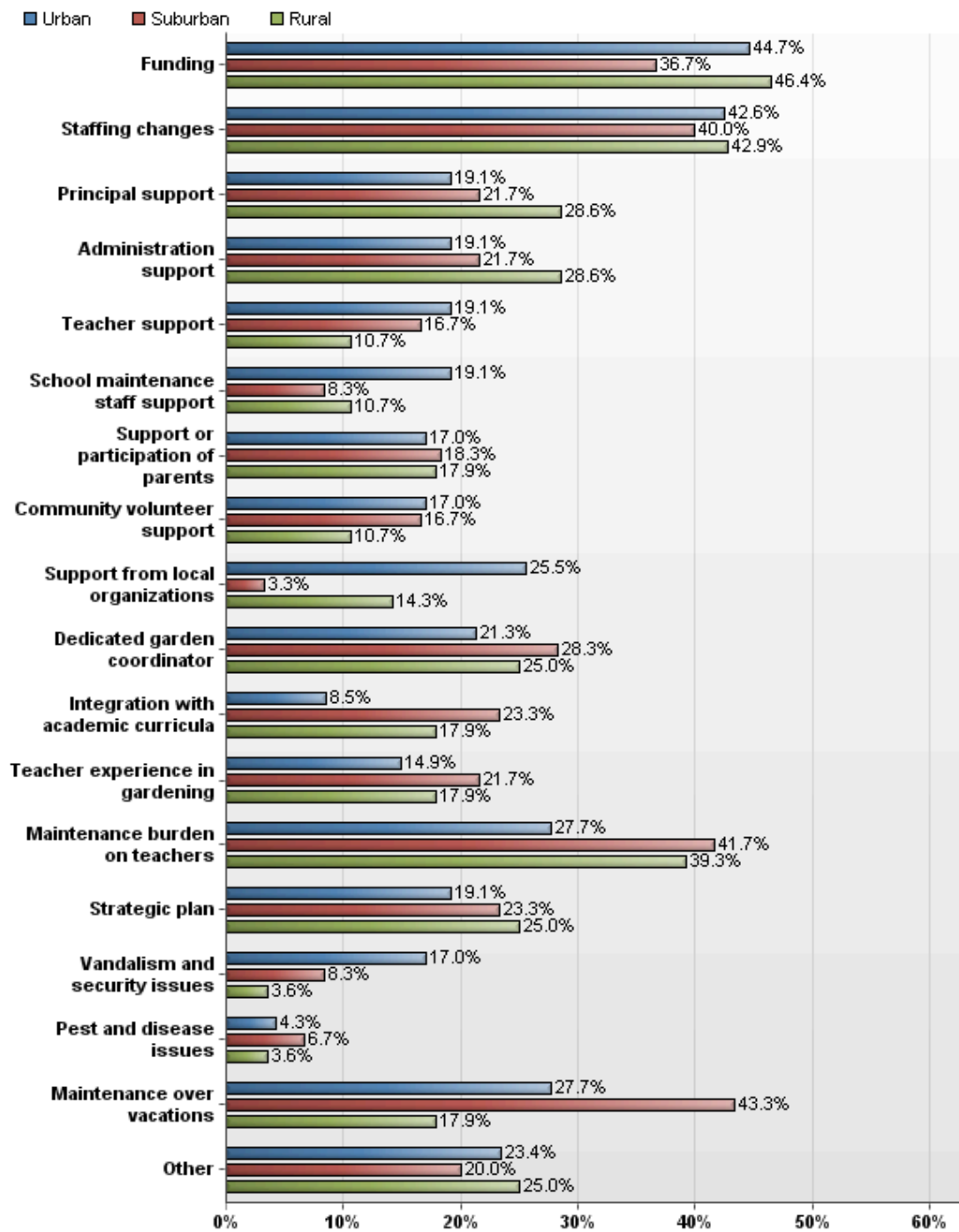


Figure 39 Comparison of reasons for discontinuation by school neighborhood classification.

Table 8 Top reasons for discontinuation by school neighborhood classification.

Neighborhood Type	Top responses by percentage of respondents				
Urban (n=47)	Funding (44.7%)	Staff turnover (42.6%)	Burden on teachers (27.7%)	Vacation maintenance (27.7%)	Local org. support (25.5%)
Suburban (n=60)	Vacation maintenance (43.3%)	Burden on teachers (41.7%)	Staff turnover (40.0%)	Funding (36.7%)	Garden coordinator (28.3%)
Rural (n=28)	Funding (46.4%)	Staff turnover (42.9%)	Burden on teachers (39.3%)	Admin support (28.6%)	Principal support (28.6%)

Supporting Qualitative Data From Respondents' Comments

The final portion of the survey allowed the respondents to provide free-written comments. Comments that did not pertain to their programs or school gardens in general were excluded from the coding process. Of the extant school garden respondents, 356 contributed relevant comments, while 55 of the discontinued school garden respondents supplied comments, in addition to their written feedback regarding the support needed to restart their programs.

Themes From Extant School Garden Respondents' Comments

The comments in this group included both positive and negative remarks. The positives included perceived benefits of school gardening, hopes for program continuance or expansion, and successful strategies. The negatives included further

details or reinforcements of the challenges already mentioned in the preceding survey questions.

Among the positive remarks (Figure 40), hopes for program continuance or expansion were mentioned the most frequently (13.2% of the comments). Other positive themes were related to the perceived benefits of school gardening: the enjoyment and positive attitudes of students, staff, and community members (11.2%); the impact on student learning (10.1%); food education and health benefits (6.7%); increased exposure to nature for the students (3.4%); and beautification of the school (1.7%).

A total of 23.9% of the comments mentioned successful strategies or ways in which their school gardens dealt with long-term sustainability (Figure 41). The most common theme was cooperation with outside organizations (8.7%), including partnerships with local or national non-profits, master gardeners, and state or municipal agencies, or use of a curriculum provided by external organizations, such as the Junior Master Gardeners or Agriculture in the Classroom programs. Other successful strategies included having broad-based support within the school and community (4.2%), using the garden for a wide variety of projects or teaching goals (3.9%), specific fundraising tactics (3.7%), with plant or produce sales being the most commonly mentioned, locating the garden on a site shared by another organization that helped with its maintenance (2.5%), and having a plan for gradual growth of the program (0.8%).

Negative comments regarding the challenges to school garden program sustainability (Figure 42) highlighted the need for teacher and community support

(12.1% and 11.0%, respectively), concerns with the turnover of the leadership of garden programs (10.7%), funding (10.4%), and curriculum integration (9.3%).

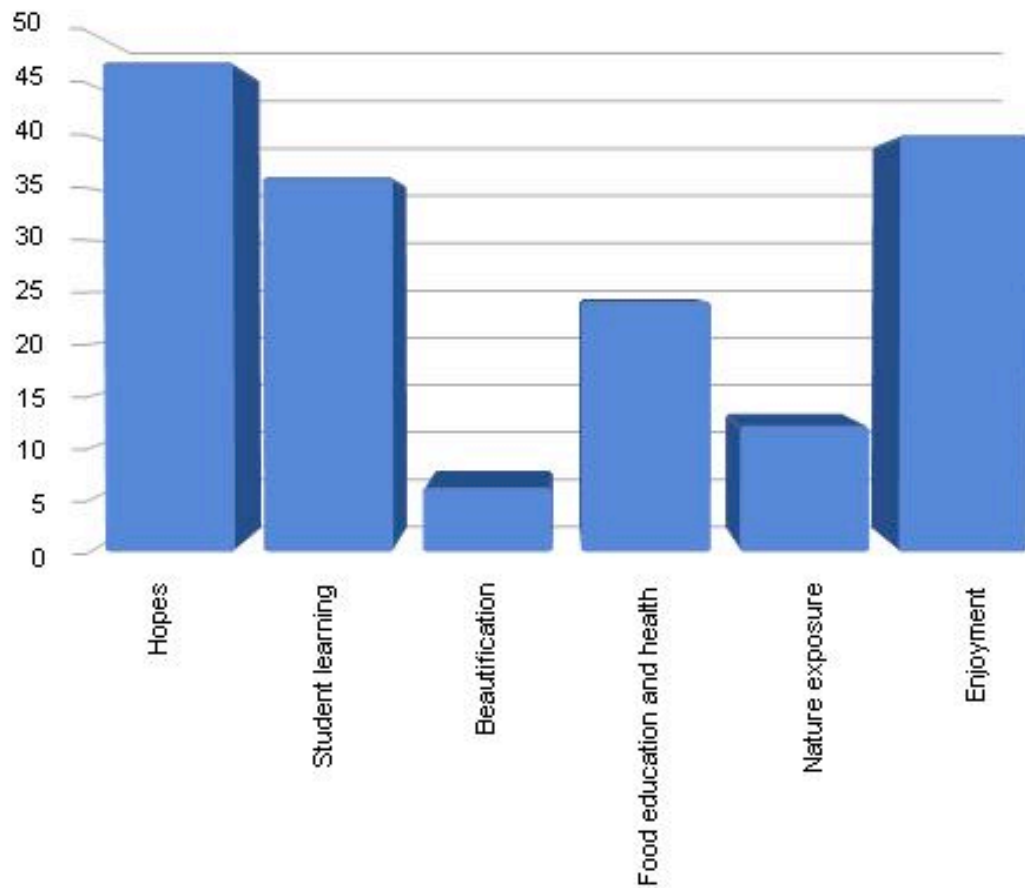


Figure 40 Positives themes from extant school garden comments, by number of coding references.

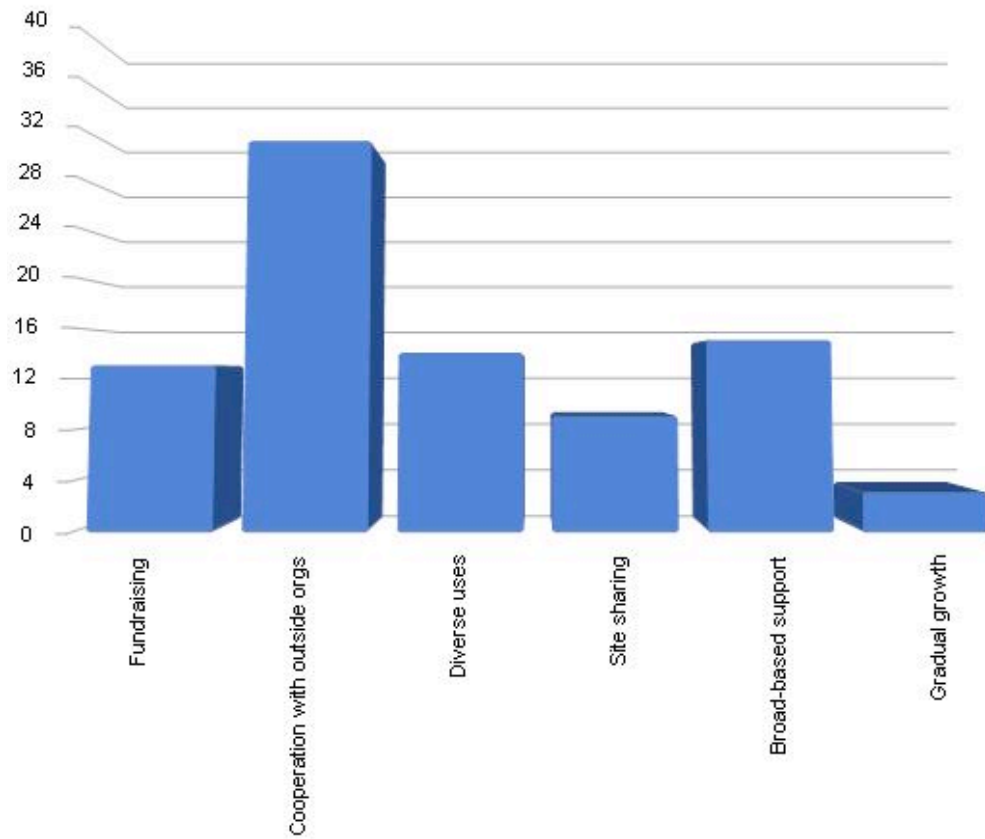


Figure 41 Themes regarding successful strategies from extant school garden comments, by number of coding references.

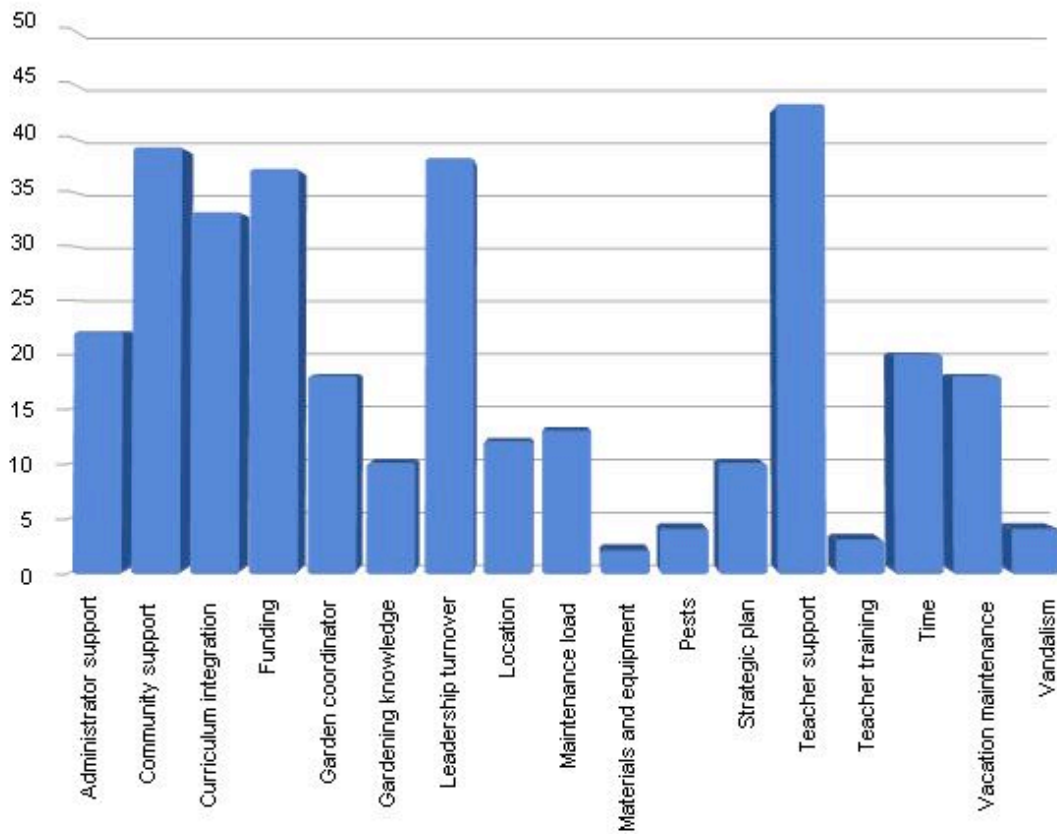


Figure 42 Themes regarding challenges to sustainability from extant school garden comments, by number of coding references.

Themes From Discontinued School Garden Respondents' Comments

The 55 comments in this group also included both positive and negative themes, most of them the same as with the extant school gardens.

Despite the fact that this set of comments came from respondents whose garden programs had failed, some positive themes emerged (Figure 43). A total of 21.8% of these comments mentioned specific hopes and plans for restarting, while 27.3% mentioned perceived benefits of school gardens, including food education and

health benefits, improved student learning, positive student attitudes toward and enjoyment of the gardens, and the benefits of exposing them to nature.

The themes relating to the reasons for discontinuation (Figure 44) highlighted problems with funding, turnover of the garden program leadership, administrator and teacher support, and other reasons mentioned previously in the survey.

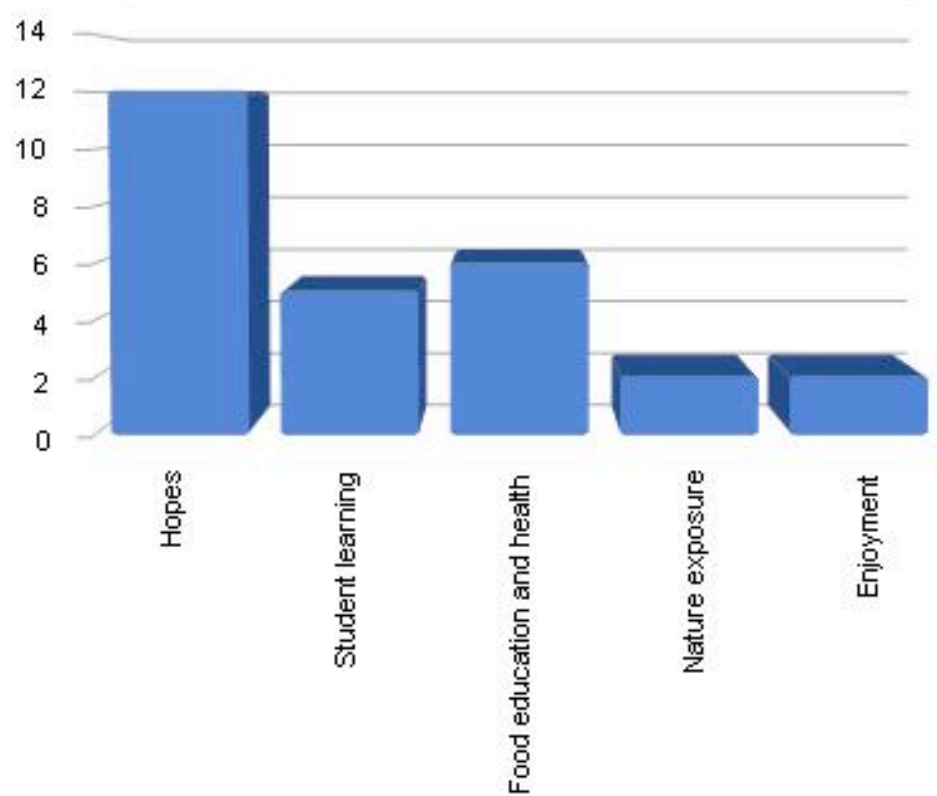


Figure 43 Positive themes from discontinued school garden comments, by number of coding references.

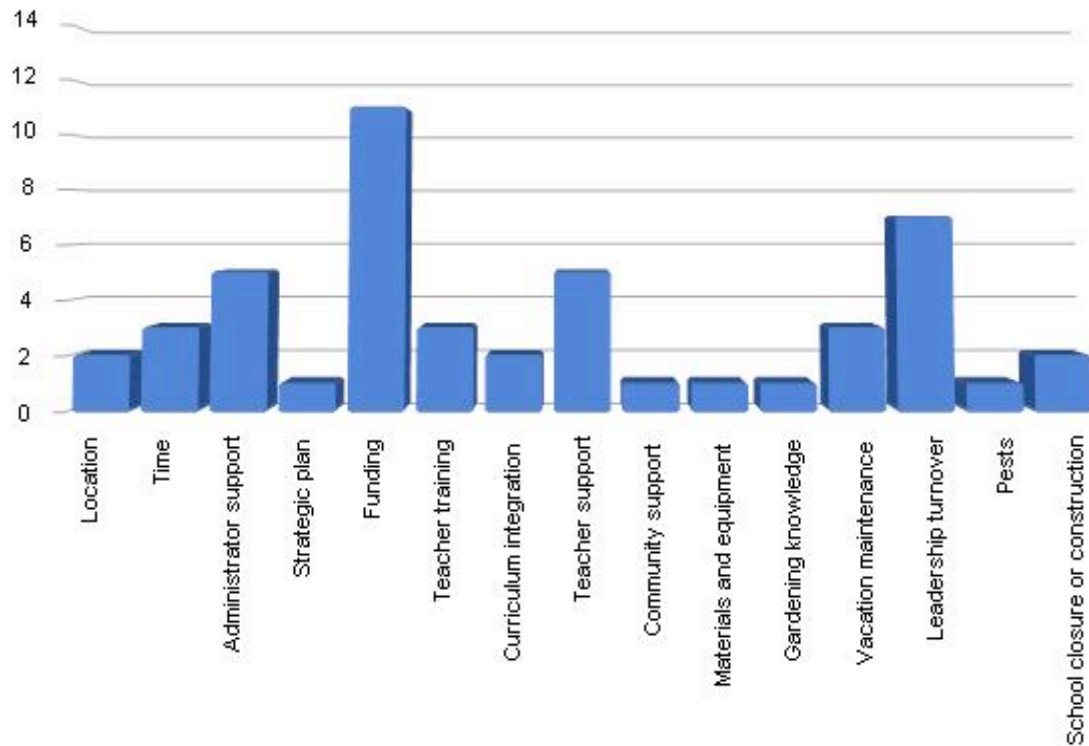


Figure 44 Themes regarding reasons for discontinuation from discontinued school garden comments, by number of coding references.

Other Survey Data Collected

The survey captured some data that are not treated in this thesis due to its inconsistent quality or because time did not allow for further investigation. Data on total school enrollment numbers and numbers of students who actually participated in their school garden programs were collected in order to calculate the percentages of each school's student body that participated in their school gardens. The responses to these categories were inconsistent and often missing altogether, however. Data regarding the percentages of students who qualified for free or reduced-price lunch, a common measure of student poverty levels at schools, were similarly inconsistent or

missing. The inconsistency was possibly due to the survey respondents' lack of familiarity with these figures with respect to their own schools.

The data collected for grade levels included at the respondents' schools were not treated in detail in this thesis. A common problem with the categorizations used in the survey arose from the fact that many schools are not organized according to typical grade level groupings. For example, the "elementary" school category included various combinations of grade levels from pre-kindergarten to grade 6, such as K through 3, K through 2, pre-kindergarten through 6, or 3 through 5, etc.

Another survey question asked respondents with extant gardens whether there had ever been any substantial break in their continuity, with 21% indicating that there had been such a break in their program's history. These school gardens provide an interesting point of further investigation, which could potentially lead to more specific recommendations for discontinued school gardens and their supporters seeking to start over.

Other data collected but not analyzed herein include the geographical locations of the respondent schools. An additional point of analysis on which to follow up would be to determine the effect, if any, of geographical location (and related variables such as climate) on the success rate and the nature of the challenges of school gardens.

Chapter 5

DISCUSSION

School garden practitioners face challenges and pitfalls even as they continue to express enthusiasm for and confidence in the benefits of using gardens to teach in schools. Several specific challenges have emerged as the most prevalent issues in the perceptions of the school garden organizers surveyed in this research. The most commonly highlighted problems from both extant and discontinued school gardens were funding, a leadership vacuum following staff (or volunteer) turnover, overburdening teachers with maintenance, and garden maintenance over vacations. A lack of teacher experience in gardening was also a major concern indicated by extant school gardens, but not by discontinued school gardens. All these barriers and concerns are encompassed by two essential factors: a lack of broad-based support and a lack of strategic planning.

The findings of this research complement what other studies have found regarding the reasons for school garden failure or the barriers to starting a school garden. The report on school gardens in the LAUSD (Azuma, Horan and Gottlieb, 2001) determined that the reasons for school garden discontinuation within that district were teacher overload, lack of funding, and loss of space, which were common problems among the discontinued garden respondents in this research. DeMarco, Relf and McDaniel (1999) also identified other factors essential to school garden success including student and faculty commitment, physical resources (including space,

funding, and equipment), and faculty knowledge of gardening and curriculum integration.

Major Challenges

This research demonstrated that most school garden organizers have similar concerns regarding the long-term maintenance of their programs regardless of differences in their roles at their respective schools and in the general characteristics of their schools.

Funding

Funding was a universally highlighted issue across respondent roles and school demographic types. A total of 52.1% of extant school garden respondents and 41.5% of discontinued school garden respondents indicated funding as a challenge or reason for discontinuation (Figures 25-26). Funding was consistently one of the most-selected responses for all groups, although it was a more pressing challenge for extant gardens at public and charter schools (55.8% and 62.3% respectively) than at private schools (37.6%) (Table 3). When discontinued school garden respondents were asked what kind of support they would need in order to restart their programs, funding was the most often mentioned as at least one part of what they would need. One wrote, “Money is always the first step lacking.” Another respondent wrote, “Like all good ideas, it is only as good as the people and money behind them. The expense isn't too great, but it is a challenge in these economic times to add anything in the way of another specialist activity.” Lack of funding was also one of the top reasons for garden failure among LAUSD schools (Azuma, Horan and Gottlieb, 2001). DeMarco, Relf

and McDaniel (1999) found that resources such as funding, along with adequate space and equipment, were perceived as essential to school garden success.

The economic recession and state budget cuts to education in recent years were cited by multiple respondents as causes for their funding difficulties, especially at public and charter schools. Thirty states have cut funding for K-12 education to below pre-2008 levels; California alone has seen a reduction of more than 20% in K-12 education spending since the 2007-2008 fiscal year (Oliff and Leachman, 2011). A California respondent wrote, “We are in budgetary meltdown and school districts are in the thick of the desperation. To suggest that our individual school gardens at the elementary level have taken a ‘hit’ is to understate the obvious.” Another commented, “With our government's funding of education/science and the state of California in such big trouble economically I guess I should say goodbye to our school garden.”

Funding was often mentioned in connection with the need to hire a garden coordinator. One respondent, a Master Gardener working with several school gardens, observed that the most successful programs in his experience had at least one or two paid employees to lead them, noting that “just as a library functions best with a dedicated librarian, a school garden needs a gardener/educator.” Other similar comments included “I think it would be very beneficial for the implementation and sustainability for school garden programs to make funding available for garden coordinators/teachers”; “One [of] our major issues for continuity is obtaining funding to employ a garden coordinator. The position is too extensive for the current volunteer issue”; and finally, “My only comment is this: if you pay a garden co-ordinator, the project has a much greater chance at success.” The ability to pay at least a part-time

coordinator is a clear advantage for school gardens that manage to secure the funding for it, according to Ozer (2007), and Bucklin-Sporer and Pringle (2010).

Leadership Turnover

Staff turnover was also a major concern among schools of all types and neighborhood classifications. Teachers formed the largest group of respondents to the survey, with 54.1% identifying as teachers (Figure 1), and 29.7% of those also identifying as their school's garden coordinator or outdoor education coordinator (Figure 4). Since a majority of the school garden programs participating in the survey relied on teachers for leadership, it follows that school gardens are especially vulnerable to unstable employment conditions for teachers, which have become worse lately due to the economic recession. From 2008-2011, school districts across the U.S. cut 278,000 jobs in response to deep cuts in education funding (Oliff and Leachman, 2011). Even without the recession, however, the teaching profession is subject to high turnover for reasons besides retirement, including job dissatisfaction and switching to other jobs (Ingersoll, 2001). Some respondents also pointed out that changes in principals can lead to uncertainties, since an incoming principal may not support a school garden at all, or to the same degree as the previous one. The constant flux of parent volunteers due to students moving on or graduating can also result in a school garden's loss of leadership without a plan or consistent method of passing down responsibilities to new volunteers.

Garden Maintenance Overburdening Teachers

According to the survey responses, respondents felt that school garden programs have been overburdening teachers by relying on them for a majority of the

garden maintenance. This was true for both extant and discontinued school gardens (Figures 15 and 21, respectively). Teacher overload was also cited as one of the major reasons for garden failure in Azuma, Horan and Gottlieb (2001). School gardens exist primarily to be used by teachers and their students, and garden maintenance would naturally be involved in the use of a garden for teaching and learning. However, in combination with many written complaints about the limited time teachers have for “extra” activities after having to teach to standardized tests, this factor points to an area where school garden sustainability could be improved by spreading the garden maintenance load more equally among the adult participants. “There is no time, funding or help and one teacher who has no support can not [sic] do it” was a typical comment regarding the burden on teachers. The increasing pressure on teachers from high-stakes testing, in the wake of educational policies such as the No Child Left Behind Act of 2001 (Valli and Buese, 2007), limits their ability to attend to basic garden maintenance. Louv also noted that “the wave of test-based education reform that became dominant in the late 1990’s leaves little room for hands-on experience in nature” (2005, p. 134).

The lack of time for both teaching and general garden maintenance is an important barrier to school garden success, and one that is related to other challenges. For example, the lack of a dedicated garden coordinator or at least a consistent volunteer base contributes to the overburdening of teachers. A parent volunteer wrote, “There’s insufficient support for the teachers to do planning for garden based lessons on top of everything else they do, and we could really use a full-time garden coordinator to help!” A better integration of gardening and curriculum is also needed in order to help teachers fulfill their teaching requirements while maintaining the

garden itself. As one survey respondent wrote, “I have found that teachers have the desire to do the gardening, but so much emphasis is on the high stakes standardized tests that there is NO TIME for the gardens.” Similarly, one teacher wrote, “It seems to be a goal of so many of us but seems to be impossible in the current ed environment with less funding, more rules, and less time to teach anything other than the standards.”

Maintenance Over Vacations

Lapses in garden maintenance over school vacations was another factor that both extant and discontinued garden respondents highlighted as a major concern. Schools with year-round schedules did not indicate this factor as a major problem, demonstrating that long summer vacations pose a significant challenge to maintaining school gardens. For schools with traditional schedules, some respondents indicated that maintenance over summer vacations was a challenge because it was difficult to enlist enough people to help with watering, weeding, and harvesting on a regular basis. This challenge is related to one of a lack of support from all stakeholders, from school staff to community volunteers, in much the same way that a lack of support contributes to the overburdening of teachers. It could also be a result of a lack of planning, since a fair amount of organization is needed to coordinate summer help, assuming there are willing volunteers.

The challenge of consistent garden maintenance in schools with long summer vacations stems from two factors: the lack of school personnel over the summer, if no summer programs are offered, and the coinciding of the prime growing season with the vacation period. Summer school programming has been facing reduction or elimination more often than not since the recession (California State PTA, 2009),

leaving school gardens organizers with less support for summer garden maintenance. While it is possible to structure garden lessons around fast-growing crops for spring and fall, leaving the garden fallow during the summer, most school gardens in locations with short growing seasons must contend with having a limited time to grow plants outdoors while school is in session. Comments such as “Our short growing season also means the gardens can only be used for a short period of time” came from respondents in Canada, Maine, Massachusetts, Pennsylvania, Ohio, and Montana. Only 20.0% of the extant school garden respondents and 6.7% of the discontinued school garden respondents indicated that their garden programs included greenhouses that would facilitate growing plants through the school year (Figures 16 and 22, respectively). Growing popular summer crops such as tomatoes requires regular summer maintenance or summer school programming that makes use of the garden, either of which would require coordination, labor, and possibly funding. However, as mentioned above, funding is itself a common challenge, and the task of coordinating and securing the necessary manpower for simple maintenance often proves to be difficult given the reliance on already-overburdened teachers for school garden coordination.

Teachers’ Lack of Experience With Gardening

Lack of teacher experience or training in gardening was one of the top concerns for most of the respondents with extant school gardens, but it was not among the top concerns of the respondents with discontinued school gardens. This may reflect a difference in priorities or in organization between the two groups, although these extant school gardens do not all necessarily represent successful and sustainable models – most were five years old or newer (Figure 14).

This particular challenge includes both the teachers' lack of basic horticultural knowledge, and a lack of garden-based teaching knowledge. The lack of horticultural knowledge can limit teachers' enthusiasm for using a garden to teach, leading to hesitation and an unwillingness to participate or plan lessons around an unfamiliar subject. In Graham and Zidenberg-Cherr's (2005) study, lack of gardening experience and training were among the most commonly cited barriers to beginning a school garden among California fourth-grade teachers. Similarly, a questionnaire of all California principals found that lack of teacher knowledge, training and experience were among the factors that most limited the use of gardening in instruction (Graham, et al., 2005). One respondent wrote, "My experience is that the teachers have limited knowledge about gardening and do not have the confidence to bring it into the classroom." Another exasperated survey respondent, herself a teacher, wrote, "Teachers tell me they don't know a plant from a weed." The lack of knowledge about garden-based teaching techniques, or outdoor classroom management, could also pose a barrier to teachers who may be wary of teaching in a less-controlled environment such as a garden. A Master Gardener volunteer noted that "teachers need to be taught how to teach outside the box, or room."

Discrepancies Between Respondents' Perceptions and Published Advice

It is worth noting that major school gardening publications such as Bucklin-Sporer and Pringle's *How to Grow a School Garden* (2010) tend to emphasize both having a strategic plan and the securing of broad-based support in order to establish and maintain a successful school garden program. In their outlined steps for organizing a school garden, Bucklin-Sporer and Pringle recommended that at least six months to a year be spent on the planning process, from initial research on school

gardens to forming a committee and establishing goals. Similarly, the Desmond, Grieshop and Subramaniam (2004) report listed planning as a key second step after getting all parties involved to be informed about garden-based learning, and supplied a detailed description of what strategic planning would look like for a school garden program. The plan should have both an “emphasis on developing a significant connection with the community” and a focus “on long-term sustainability of the site and curriculum” (Desmond, Grieshop and Subramaniam, 2004, p. 48). The authors also noted that “there is a growing realization that a garden co-ordinator or strategic plan...must be in place to effectively engage these resources as educational tools. Relying on overworked teachers, custodians, ground-keepers or transient volunteers is not a sustainable strategy” (Desmond, Grieshop and Subramaniam, 2004, p. 71). In the California School Garden Network’s (CSGN) handbook, “Gardens for Learning,” a full chapter each is dedicated to the planning process and to strategies for sustaining a school garden (2006). CSGN’s recommended planning process begins with securing the principal’s approval and a network of supporters before developing a written plan outlining goals for the garden. Their strategies for sustainability also rely on a strong network of support within the school and in the community for promotion to the public and funding.

While this research indicated that broad-based support was in general a critical issue to the respondents, the lack of a strategic plan was not among the most common challenges indicated by the survey respondents. Only 19.3% of extant school garden respondents and 22.2% of discontinued school garden respondents indicated it as a problem (Figures 25-26). This discrepancy between the perceptions of the respondents and the advice of major school garden publications may be due to a lack of experience

in strategic planning among the teachers, parents, and others who typically start school gardens on a purely voluntary basis. Many begin simply out of enthusiasm for the idea and the gardens' potential benefits, and some initial success is easily obtained because a garden can be relatively inexpensive and simple to install, given the reliance of most school gardens on donations and grants (Ozer, 2007). However, a majority of the gardens in this research that failed did so within their first three years (Figure 19). The discontinuations were most often due to a general over-reliance on classroom teachers, lapses in maintenance over school breaks, and a lack of stable funding, all of which could potentially be resolved by having a strategic plan in place. A written plan can not only provide strategies for long-term funding and leadership, but also serve as an important recruiting tool when looking for support within a school and in the community at large (Bucklin-Sporer and Pringle, 2010).

Suggestions for Further Research

This research touched on several points that lend themselves to further investigation. The first would be to follow up on those school garden organizers that were able to restart their programs after a significant break in usage. A total of 248 out of 1,161 extant school garden respondents in the survey indicated that they had restarted their gardens after a major break in continuity. Investigating how they were able to begin again could lead to more specific recommendations for garden programs that have been discontinued. A handful of respondents also indicated that they had no challenges – these would be worth a closer look to determine whether there are any characteristics common to the group that might contribute to a model of sustainability.

It would also be worthwhile to examine those school gardens that have been in existence for a longer period of time – over five, ten, or twenty years – and determine

whether they have commonalities relating to their longevity that other, newer school gardens could replicate. This would be an important step toward constructing a data-driven model of sustainability for school gardens.

Another of the data points the survey instrument attempted to capture, the percentage of students at each school qualified for free or reduced-price lunch, would be a useful factor to investigate further as well. Does the socioeconomic status of a school's students and their families affect the type and scope of challenges school garden programs face? For example, a school garden program located in a poor urban neighborhood may find it more difficult to recruit parent or community member volunteers because stress caused by economic hardship leaves them little time or energy to spare for participation in school activities (Gutman and Eccles, 1999).

Conclusions

This research demonstrated that the vast majority of school gardens programs face challenges to their continuing maintenance, and that a similar pattern of challenges is shared across many school gardens regardless of the type, academic year schedule, and neighborhood classification of the schools. The most common challenges examined in this research point to more general issues which might be addressed by careful strategic planning and more emphasis on securing broad-based support from the beginning. As one survey respondent noted, "It does take a village to keep it going, as a living garden is not a static venture."

While most school gardens have some struggles in maintaining their programs over the long term, this research also found that a substantial number of school gardens were able to start over after a break in continuity, and nearly all of the discontinued school garden respondents intended to try again. The school garden

movement appears to be alive and growing despite setbacks to individual programs and continuing challenges to sustainability.

Chapter 6

RECOMMENDATIONS

School gardens are a product of the needs and resources of their respective communities. Consequently, there are practically as many different ways of running a successful school garden as there are school gardens. However, it is possible and perhaps simpler to determine the major challenges or stumbling blocks common to most school gardens. These recommendations are based on avoiding the pitfalls highlighted in this research and on the advice of major school garden guidebooks and manuals, in particular Bucklin-Sporer and Pringle's *How to Grow a School Garden* (2010), Desmond, Grieshop and Subramaniam's garden-based learning report (2004), the NGA KidsGardening website, and the California School Garden Network's "Gardens For Learning" manual (2006).

Strategic Planning

A strategic plan can contribute to long-term program sustainability by giving school garden organizers a process by which to handle major obstacles. It would potentially lessen the challenges of recruiting a consistent volunteer base, distributing garden maintenance responsibilities more equally among adult and student participants, organizing maintenance over the summers, and securing funding annually. A stable funding plan could in turn make it possible to hire a dedicated coordinator to further reduce the burden on classroom teachers to organize outdoor lessons and take care of the garden.

Broad-Based Support

Securing broad-based support requires getting representatives from all types of stakeholders to participate in both planning and maintenance – at a minimum, the principal, multiple teachers, parents, community members, and students if they are old enough. Working with some external group such as a parent-teacher association or a school garden non-profit organization would offer stability in leadership and guidance, and in some cases funding. Assistance or leadership from such groups would make the garden program less prone to discontinuation due to school staff turnover.

Recommendations for Outside Organizations

One of the major challenges, lack of teacher experience or training in gardening, could be addressed by local public gardens, gardening organizations, and university Cooperative Extension offices. These organizations are already equipped with local gardening expertise, and most have missions incorporating public education. The popularity of school gardens offers an opportunity for these entities to develop training programs or workshops in garden-based teaching, outdoor classroom management, and general gardening knowledge for teachers. The development of garden-based teaching materials and curricula that satisfy academic standards could also be an area where these organizations can offer their support to school garden programs. A few such efforts already exist or are in development, including the Chicago Botanic Garden's teacher training and school garden support programs, Cleveland Botanical Garden's school gardening workshops, Brooklyn Botanic Garden's professional development and curriculum options, and Longwood Gardens' National Teacher Institute for Garden-based Learning, in partnership with the National Gardening Association.

Resources

Some survey respondents commented that advice on gardening and school garden organization could sometimes be difficult to obtain, or at least they did not know of a reliable place to look for such information, which added to their challenges. The following is a list of general resources which this researcher found helpful, and most of which were mentioned by other survey respondents as good resources in their school gardening efforts.

- National Gardening Association KidsGardening (KidsGardening.com)
- California School Garden Network (csgn.org)
- US Botanic Garden and Chicago Botanic Garden's School Garden Wizard (schoolgardenwizard.org)
- Cornell University's Garden-Based Learning site (gardening.cornell.edu)
- Cooperative Extension, specifically the 4-H and Junior Master Gardener programs
- USDA's Agriculture in the Classroom program (agclassroom.org)

There is in fact a wealth of resources dedicated to helping school garden organizers establish and sustain their programs, but it may be that some disconnect remains between these available resources and their intended audiences. Some of these resources have been developed only recently, given the rapid rise in popularity of school gardens in the last decade. Bucklin-Sporer and Pringle's comprehensive guide *How to Grow a School Garden* was published only in 2010, a year before this research was conducted. Given the growing number of websites and organizations offering school gardening guides, a central point of resources and networking would be helpful

to many school garden practitioners who may not have time to sort through multiple overlapping school garden websites.

Closer collaboration between horticultural organizations such as the NGA and federal or state education departments could potentially help bridge the gap between those with the gardening knowledge and interested teachers who have little or no personal experience in gardening and are unfamiliar with what gardening resources are available. In other words, teachers and other garden organizers who are not already gardeners themselves need to be met where they are – in their capacities as professional educators, or community members with a stake in their children’s education.

Several survey respondents also mentioned specifically that they had difficulties winning grants because not enough of their student populations were of disadvantaged or low-income backgrounds to be considered a priority for funding. Because school gardens can address a variety of needs, it is possible that grant funding for a diverse range of causes would apply to them, but school garden organizers may not be aware of these grants and know of no central place to search for them. Again, a disconnect remains between some school garden organizers and the available databases of funding sources.

School garden organizers and supporters of all kinds have an opportunity to turn the momentum of the last two decades of school garden enthusiasm into lasting improvements in basic education. With greater coordination of resources and knowledge, and more research on sustainable models, school gardens are poised to become as accepted a part of children’s education as libraries and computer labs, and perhaps even more integral to their health and well-being.

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Appendix A

**UNIVERSITY OF DELAWARE HUMAN SUBJECTS REVIEW BOARD
CERTIFICATION OF TRAINING**

Certification of Human Subjects Training

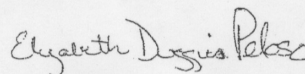
The University of Delaware certifies that Felicia Yu
(Name of researcher)

attended an institutional training session on the use of human subjects in research on

August 30, 2010
(Date)

The session included the following topics:

- The Belmont Report
- Federal regulations for using humans in research (45 CFR 46)
- The University's Federalwide Assurance
- Informed consent
- Institutional procedures
- Sources for additional information.



Elizabeth Duggins Peloso
Director of Compliance

Research Office
University of Delaware
Newark DE 19716
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Appendix B

**EXEMPTED PROTOCOL FROM UNIVERSITY OF DELAWARE OFFICE
OF THE VICE PROVOST FOR RESEARCH**

HUMAN SUBJECTS PROTOCOL
University of Delaware

Protocol Title: Thesis: School garden sustainability: Major challenges to the long-term maintenance and success of school garden programs

Principal Investigator

Name: Felicia Yu
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Advisor (if student PI):

Name: Dr. Robert Lyons
Contact Phone Number: (302) 831-2517
Email Address: rlyons@udel.edu

Other Investigators:

Investigator Assurance:

By submitting this protocol, I acknowledge that this project will be conducted in strict accordance with the procedures described. I will not make any modifications to this protocol without prior approval by the HSRB. Should any unanticipated problems involving risk to subjects, including breaches of guaranteed confidentiality occur during this project, I will report such events to the Chair, Human Subjects Review Board immediately.

1. **Is this project externally funded?**

If so, please list the funding source: Longwood Gardens

2. **Project Staff**

Please list personnel, including students, who will be working with human subjects on this protocol (insert additional rows as needed):

NAME	ROLE	HS TRAINING COMPLETE?
Felicia Yu	Student conducting the research	Yes

3. **Special Populations**

Does this project involve any of the following:

Research on Children? No

Research with Prisoners? No

Research with any other vulnerable population (please describe)? No

4. RESEARCH ABSTRACT Please provide a brief description in LAY language (understandable to an 8th grade student) of the aims of this project.

This thesis research aims to examine the sustainability of school garden programs from the perspective of the challenges they face after they have been established. The research will include schools that currently have school gardens, and schools that used to have a school garden but no longer. By determining the most common challenges to the maintenance of existing school gardens and the most common reasons for school garden failure, I hope to shed light on the most essential factors needed to run a school garden program successfully over the long term.

5. PROCEDURES Describe all procedures involving human subjects for this protocol. Include copies of all surveys and research measures.

I will be conducting this research through an online survey developed in Qualtrics, case studies, and in-person or phone interviews which will involve human subjects.

6. STUDY POPULATION AND RECRUITMENT

Describe who and how many subjects will be invited to participate. Include age, gender and other pertinent information. Attach all recruitment fliers, letters, or other recruitment materials to be used.

The target population consists of adults over 18, of either gender, who are involved in establishing and/or managing school garden programs, including teachers, principals, and community volunteers. The survey will be distributed as a pilot to a subset of 9 respondents from the Los Angeles County Master Gardeners School Gardening listserv, who volunteered to take the survey in response to an appeal forwarded through the listserv's administrator. Then the survey will be distributed to school garden practitioners on the listserv of the National Gardening Association (NGA), with the permission of the president of NGA.

Describe what exclusionary criteria, if any will be applied.

Subjects will ideally consist of those individuals who have the most knowledge of and responsibility for their respective school garden program, or those who were most involved in the former school garden program, if that were the case.

Describe what (if any) conditions will result in PI termination of subject participation.

If any subjects decide not to participate, I will terminate their participation.

7. RISKS AND BENEFITS

Describe the risks to participants (risks listed here should be included in the consent document). If risk is more than minimal, please justify.

The participants have the option to include contact information if they are interested in being contacted for follow-up interviews or case studies, or in receiving a summary of the survey results; otherwise, all survey answers will be anonymous. The risk of the research being conducted through this thesis is less than minimal.

What steps will be taken to minimize risks?

I will inform survey participants that their participation is totally voluntary. Survey participants will never be required to include contact information in order to complete the survey. Contact information can be included if they are interested in being contacted for the results of the survey or for further interviews or case studies. Keeping participants anonymous will help reduce risks.

Describe any direct benefits to participants.

If they are interested in receiving the survey results, survey participants will have the option of providing their contact information and having a summary of the results sent to them electronically.

Describe any future benefits to this class of participants.

The research I am conducting will potentially improve their understanding and practice of school garden program establishment and management.

If there is a Data Monitoring Committee (DMC) in place for this project, please describe when and how often it meets.

My thesis advisory committee will meet three times during the research. We met first in March, and will meet again in early fall between September and November. The last thesis advisory committee meeting (thesis defense) will occur at the end of the research analysis and writing of the thesis.

8. COMPENSATION

Will participants be compensated for participation? No

If so, please include details.

9. DATA

Will subjects be anonymous to the researcher? Yes, unless contact information is voluntarily supplied.

If subjects are identifiable, will their identities be kept confidential? Yes

How and how long will data be stored? On my personal computer or paper records for up to 2 years.

How will data be destroyed? Any electronic data will be deleted and any paper data will be shredded.

How will data be analyzed and reported? I will export the Qualtrics reports to Excel and analyze the data via the spreadsheet software. Chi Square, correlation with Pearson's r , and other statistical tests will be used to analyze the data appropriately. The results will be presented and reported through text in the final report and with graphs/charts.

10. CONFIDENTIALITY

Will participants be audiotaped, photographed or videotaped during this study? Yes

How will subject identity be protected? If requested I will maintain confidential interviews with participants and only share information that they allow. If subjects are identifiable in photographs, the images will not be published without their consent.

Is there a Certificate of Confidentiality in place for this project? (If so, please provide a copy). ??

11. CONSENT and ASSENT

____ Consent forms will be used and are attached for review.

____ Additionally, child assent forms will be used and are attached.

X Consent forms will not be used (Justify request for waiver). ??

12. Other IRB Approval

Has this protocol been submitted to any other IRBs? No

If so, please list along with protocol title, number, and expiration date.

13. Supporting Documentation

Please list all additional documents uploaded to IRBNet in support of this application.

Request for participation distributed to NGA listserv members
Survey questionnaire
Interview questions

Rev. 09/2008

Appendix C

**NOTIFICATION OF APPROVAL FOR EXEMPTION OF RESEARCH
PROTOCOL**

DATE:	May 27, 2011
TO:	Felicia Yu
FROM:	University of Delaware IRB
STUDY TITLE:	[245956-1] Thesis: School garden sustainability: Major challenges to the long-term maintenance and success of school garden programs
SUBMISSION TYPE:	New Project
ACTION:	DETERMINATION OF EXEMPT STATUS
DECISION DATE:	May 27, 2011
REVIEW CATEGORY:	Exemption category # 2

Thank you for your submission of New Project materials for this research study. The University of Delaware IRB has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations.

We will put a copy of this correspondence on file in our office. Please remember to notify us if you make any substantial changes to the project.

If you have any questions, please contact Elizabeth Peloso at 302-831-8619 or epeloso@udel.edu. Please include your study title and reference number in all correspondence with this office.

Appendix D

SURVEY INSTRUMENT

School Garden Sustainability Survey

Q1.1 Survey of school garden practitioners: An effort to understand the most common challenges to school garden program sustainability. This survey is being conducted as a part of the research for an M.S. thesis in the Longwood Graduate Program in Public Horticulture at the University of Delaware. The goal of this research is to shed light on what's essential for the long-term maintenance and success of school gardens, by examining the most common challenges faced by existing school gardens and the factors that lead to school garden discontinuation. The survey is meant for the individual who has been most involved with their respective school garden (as a coordinator, garden committee member, school principal, classroom teacher, parent volunteer, etc.), whether the school garden is currently in use or has been discontinued. It should take 5-10 minutes. Your participation is entirely voluntary, and your responses will be kept confidential. Note: For the purposes of this study, "school garden" is defined as a planted area on school grounds, including containers, that is used by teachers and students for instructional purposes. This study had been reviewed and approved by the Institutional Review Board at the University of Delaware. If you have questions or concerns, please contact the researcher, Felicia Yu, at fwyu@udel.edu, or 302-831-2517. Thank you for your participation!

Q1.2 What is your role at your school? You may choose more than one, if applicable.

- Principal
- Administrator (besides Principal)
- Teacher
- School garden or outdoor education coordinator
- Maintenance or custodial staff
- Volunteer: (please specify if a parent, Master Gardener, etc.) _____
- Other: _____

Q1.3 Please fill out the following information for your SCHOOL.

School Name

School Address

Address 2

City

State

Zip Code

Country

District (if applicable)

Number of students enrolled

Percentage of students eligible for free or reduced-price lunch, if applicable

Q1.4 School type

- Public
- Charter
- Private

Q1.5 Academic schedule

- Traditional 9-month school year
- Year-round

Q1.6 Grade levels included at your school

- Pre-kindergarten
- Elementary
- K-8
- Middle or junior high
- High school or senior high
- Other: _____

Answer If Grade levels included at your school High school or senior high Is Selected

Q1.7 High school type

- Regular high school
- Vocational high school
- Continuation high school
- Other: _____

Q1.8 School neighborhood type

- Urban
- Suburban
- Rural

Q1.9 Which of the following describes your school:

- We currently have a school garden
- We previously had a school garden but it no longer exists or is no longer in use for instructional purposes

Q2.1 How long have you had your garden?

- less than 1 year
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- more than 20 years

Q2.2 Who maintains the garden? Choose all that apply.

- Teachers
- School maintenance staff
- Parents
- Students
- Volunteers (not parents of students)
- Other: _____

Q2.3 Has there ever been any substantial break in continuity (ie. a year or more) in the use or maintenance of the garden?

- Yes
- No
- Unsure

Q2.4 How many of the school's students use the garden in instructional activities? (best estimate)

Please enter a number:

Q2.5 Which of the following are included in your garden? Choose all that apply.

- Vegetables
- Flowers
- Herbs
- Fruit/nut trees
- Wildlife habitat
- Butterfly garden
- Native plant garden
- Greenhouse
- Composting area
- Vermiculture (worm composting)
- Container plantings
- Other: _____

Q2.6 What is your garden used for? Choose all that apply.

- Science
- Math
- Language Arts
- Physical Education
- Social Studies
- Health/Nutrition
- Art
- Other academic subjects: _____
- Produce for the cafeteria
- Cooking classes
- To donate produce to food bank or other organizations
- Sales/business ventures
- Other food production uses: _____
- Vocational training in gardening or agriculture
- Other vocational training: _____
- Other uses: _____

Q2.7 What are the biggest challenges to your garden's continuance and success?

Choose all that apply.

- Not enough stable funding
- Future staff changes may leave the garden without leadership
- Lack of principal support
- Lack of administration support
- Lack of teacher support
- Lack of school maintenance staff support
- Lack of support or participation of parents
- Lack of community volunteer support
- Lack of support from local organizations (public gardens, local businesses, garden clubs, etc.)
- Lack of a dedicated school garden coordinator
- No development or use of a written strategic plan
- Poor integration with academic curricula and state/federal testing standards
- Lack of teacher experience in gardening and garden-based teaching
- Garden maintenance overburdening the teachers
- Vandalism and security issues
- Pest and disease issues
- Not enough or no maintenance over school vacations
- Other: _____

Q3.1 For how many years was your garden maintained?

- less than 1 year
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- more than 20 years

Q3.2 When did your garden program end? Please provide your best estimate if unsure.

- before 1980
- 1980
- 1981
- 1982
- 1983
- 1984
- 1985
- 1986
- 1987
- 1988
- 1989
- 1990
- 1991
- 1992
- 1993
- 1994
- 1995
- 1996
- 1997
- 1998
- 1999
- 2000
- 2001
- 2002
- 2003
- 2004
- 2005
- 2006
- 2007
- 2008
- 2009
- 2010
- 2011

Q3.3 Who maintained the garden? Choose all that apply.

- Teachers
- School maintenance staff
- Outdoor education/garden coordinator
- Parents
- Students
- Volunteers (not parents of students)
- Other: _____

Q3.4 How many of the school's students used the garden in instructional activities?
(best estimate)

Please enter a number:

Q3.5 Which of the following were included in your garden? Choose all that apply.

- Vegetables
- Flowers
- Herbs
- Fruit/nut trees
- Wildlife habitat
- Butterfly garden
- Native plant garden
- Greenhouse
- Composting area
- Vermiculture (worm composting)
- Container plantings
- Other: _____

Q3.6 What was your garden used for? Choose all that apply.

- Science
- Math
- Language Arts
- Physical Education
- Social Studies
- Health/Nutrition
- Art
- Other academic subjects: _____
- Produce for the cafeteria
- Cooking classes
- To donate produce to food banks or other organizations
- Sales/business ventures
- Other food production uses: _____
- Vocational training in gardening or agriculture
- Other vocational training: _____
- Other uses: _____

Q3.7 What led to the garden's discontinuation? Choose all that apply. Note: "support" can include any kind - financial, in-kind, vocal, etc.

- Not enough funding
- Staff changes left the garden without leadership
- Lack of principal support
- Lack of administration support
- Lack of teacher support
- Lack of school maintenance staff support
- Lack of support or participation of parents
- Lack of community volunteer support
- Lack of support from local organizations (public gardens, local businesses, garden clubs, etc.)
- Lack of a dedicated school garden coordinator
- Poor integration with academic curricula and state/federal testing standards
- Lack of teacher experience in gardening and garden-based teaching
- Maintenance requirements overburdened the teachers
- No development or use of a written strategic plan
- Vandalism and security issues
- Overwhelming pest and disease issues
- Insufficient or lack of maintenance over school vacations
- Other: _____

Q3.8 Is there any interest in restarting a garden at your school?

- Yes
- No
- Unsure

Q3.9 What support would you need in order to restart the garden?

Q4.1 Are you interested in:

	Yes	No
participating in follow-up interviews to support this M.S. thesis research?	<input type="radio"/>	<input type="radio"/>
having your school serve as a case study for this M.S. thesis research?	<input type="radio"/>	<input type="radio"/>
receiving a summary of the results of this survey?	<input type="radio"/>	<input type="radio"/>

Q4.2 If you indicated "yes" to any of the above, please provide your contact information. It will not be shared, or kept beyond the timeframe of this thesis research.

Your Name

Email

Phone number (nnn-xxx-xxxx)

Q4.3 Any comments for the researcher?

Appendix E

NATIONAL GARDENING ASSOCIATION EMAIL BLAST

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NATIONAL
Gardening
ASSOCIATION

When You Garden, You Grow®

Dear National Gardening Association Friend,

I'd like to ask you to participate in a School Garden Programs Sustainability survey, as part of my M.S. thesis research at the University of Delaware. This short 5-10 minute survey targets school garden practitioners and educators like you, in helping to shed light on the challenges of sustaining and managing school gardens successfully.

In addition to your participation in the survey, I will need your help reaching those who have been involved in school gardens that are no longer active. *If you know of a school where they used to have a garden at one time, please forward this survey to the person who would have the most knowledge of the former school garden program there.*

I sincerely appreciate your time and consideration in taking this survey. Your responses are very important, and will help advance our understanding of how to sustain school garden programs over the long term.

TAKE SURVEY

Many thanks,

Felicia Yu

Longwood Graduate Fellow,
Longwood Graduate Program

Want to unsubscribe, or change your email address on record? [Manage your account »](#)

National Gardening Association | 1100 Dorset Street, South Burlington, VT 05403 | (802) 863-5251