Santa Clara County Office of Education

GROWING GARDENS

Survey Analysis and Report

January 2022

A report prepared for the Santa Clara County Office of Education

Acknowledgements

Under the direction of Dr. Mary Ann Dewan, Santa Clara County Superintendent of Schools, Dr. Dilafruz Williams designed the Growing Gardens survey with support from Brooke Reimer. The survey was administered by the Santa Clara County Office of Education.

Dr. Dilafruz Williams (biography in Appendix D) undertook and completed this Growing Gardens Survey Analysis and Report, with assistance from Jivahn Moradian. Mike Bromberg provided graphic design support. Thanks also to the respondents from schools and programs for their enthusiasm, participation, contributions, and insightful perspectives.

Photographs courtesy: Jennifer Anderson, Mike Bromberg, Djamila Moore/Grow Portland, Dilafruz Williams.

"A garden provides healthy connection to food and a quiet place where students can experience nature. The ability to integrate hands-on learning is limitless. I would love to see more support for schools to have a garden program."

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Survey Analysis and Report

Introduction

Schools and communities across the United States have expressed an increased interest in outdoor learning, garden-based learning, and nature-based learning as a growing body of research for the past several decades shows their positive outcomes for children and youth.

Garden-based education is an orientation to teaching and learning that uses gardens as the milieu for student engagement through meaningful and relevant curricular and instructional integration in schools. Various models and programs of garden-based education have emerged, along with garden curricula in schools and districts, many supported by state education departments, agriculture departments, and not-for-profit organizations. These curricula are often aligned with grade-level standards, particularly in subjects such as science, mathematics, and language arts, with science most readily linked to gardens. Likewise, nutrition and health education are drivers of the momentum to teach students to grow food, to eat healthy, and to be out-of-doors with and in nature.

The inclusion of gardens on educational campuses to grow food and to serve as a means of outdoor and nature education is not new. School gardens have historically been popular in the United States. Progressive educators, in the early 20th century, promoted school gardens because they provided a natural context for experiential and practical learning. By expanding the boundaries of education beyond classroom walls, gardens taught students countless lessons about life and values. During the World Wars, schoolground gardens thrived in terms of food production and as a means to promote good citizenship, hard work, discipline, and patriotism.

In the post-World War years, with the advancement of science and technology and with the mass production and industrialization of food, direct engagement with food and nature on school grounds was abandoned, while experimentation in school laboratories was embraced. School gardens, which had enjoyed strong ties to communities and families and which were integrated across school curricula, were no longer valued or seen as necessary for food production.

However, since the 1990s, there has been a surge of interest in school gardens across the country, as garden-based education is at the convergence of overlapping strands of public interests: (1) a heightened concern over food- and health-related matters; (2) a contemporary sedentary and indoor lifestyle and disconnection from nature increasingly affecting children and youth; and (3) a rise in student disengagement and lack of motivation, resulting in chronic school-dropout issues.

The resurgence of interest in garden-based education has led to revitalization and establishment of thousands of school gardens in rural and urban school districts across the country over the past 30 years. There are a variety of models and practices of garden-based education being embraced: Edible Schoolyards, Ethnobotanical Gardens, Green Schoolyards with Food Gardens, Learning Gardens, Learning Landscapes, Life Lab, Living Classrooms, Indigenous Cultural Gardens, Multicultural School Gardens, and Urban Harvest, among others. Starting as grass-roots initiatives, programs are often dependent on fostered partnerships and the financial and human resources available.

Research has confirmed the value and benefits of garden-based education and experiences with and in nature. Garden-based education enhances academic learning, promotes physical and mental wellbeing, and contributes to social bonding, motivational engagement, environmental stewardship, and community engagement, among other benefits (Appendix A). Garden-based education appeals to educators and policymakers because studies show its positive impact on test scores and grades, particularly in science, language arts, and math. In addition, school gardens show promise as tangible and pragmatic solutions to strengthening institutional and community bonds while also promoting the development of vocational skills, food literacy, healthy eating habits, and holistic growth of children and youth.

Climate-induced disasters are affecting human wellbeing in ever-increasing ways. Given the confluence of ecological and social crises that have characterized the start of the 21st century,

school gardens serve as viable and tangible opportunities for educators to engage and empower students. Since school gardens are necessarily embedded in local social, cultural, and ecological communities, educators and students alike are empowered with pedagogical principles of outdoor engagement with others through place-based connections.

In order to identify resources and expertise to support the expansion of outdoor education *vis a vis* gardens, Santa Clara County of Education (SCCOE) set out to conduct an inventory and to assess the state of gardens at school sites in the county.

Methodology and Survey Responses

A 23-question survey (Appendix B) was designed to gather data related to school gardens through the SurveyMonkey platform. The survey was sent electronically mid-May 2021 to administrators at 431 schools and programs in Santa Clara County, identified using the SCCOE database of schools in the county. Reminders were sent during the first two weeks of June, and the survey was closed mid-June 2021. Though 276 survey responses were received, 26 were deleted because of duplicate and blank responses, using the following methodology:

- When two responses from the same school were identical, one was removed. This was the case for one school.
- When two responses from the same school were given, and one provided substantially less detail than the other, that one was removed, even when some of the information between the responses was contradictory. This was the case for 13 schools.
- When two responses from the same school had somewhat equivalent detail, the most recent one was kept. This was the case for 2 schools.
- All blank responses that provided no information beyond whether or not the school had a garden were removed. This was the case for 4 responses.
- When a response contained analyzable information but left the school name blank, it was removed from the main quantitative analysis; however, the response was kept for qualitative analysis of the open-ended sections. This was the case for 4 responses.

- When a response appeared to have been filled out by a district office instead of a school site, it was removed from the main quantitative analysis but was kept for qualitative analysis of the open-ended sections. This was the case for 2 responses.

Thus, surveys from exactly 250 distinct schools and programs were used for the analysis, corresponding to a respectable 58% response rate. According to the schools' self-reporting, the survey covers over 145,000 students countywide.

The school districts and school names were manually lined up with those in the SCCOE database of county schools to facilitate data merging. Text entries for hours and number of students were changed to numerical values. When a range was given, the middle value was taken and was rounded if a decimal. If a reduced result was specified because of coronavirus, the pre-COVID-19 result was used. The school names were tracked to ensure they all matched the corresponding names in the SCCOE database. Of the 250 schools in the survey, 241 responses were matched. The remaining nine schools and programs were included in the survey analysis but were excluded from the correlational analysis related to the following information from the SCCOE database: Socio-Economic Status (Title 1), English Language Learners (ELL), Special Education (SPED), and Ethnicity/Race.

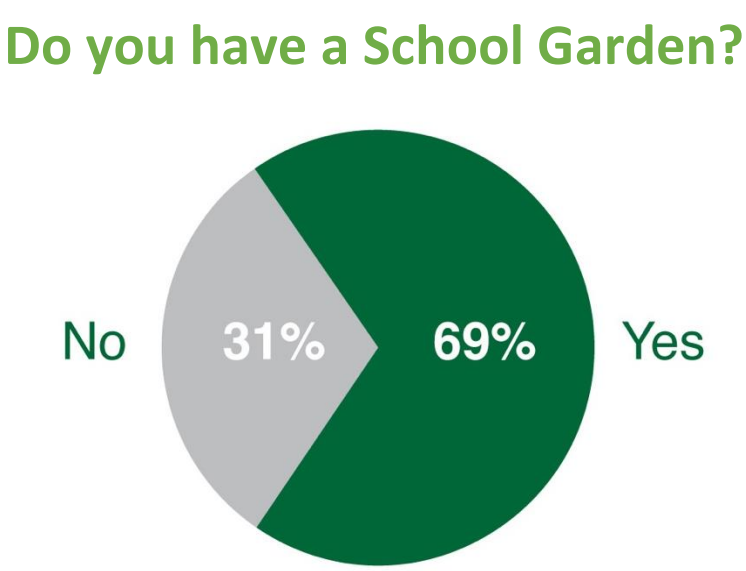
All school districts in the county are represented in this report. Elementary and middle/junior-high schools and programs had noticeably higher response rates. A majority of respondents (71%) served elementary-grade students, whereas 13% of respondents served high-school grade students. The data are limited by the fact that all of the responses reflect the opinions and observations of only the respondents to the survey.

This document first provides an analysis of the survey results. Next, correlational analyses are presented for schools that responded to the survey with respect to variables related to Title 1, ELL, SPED, and Ethnicity/Race, drawing from the SCCOE database. Finally, limitations are discussed and recommendations are provided to establish and support growing gardens at schools in the county.

Results and Discussion

Analysis 1: Survey Insights About Garden Trends

Note: In this section, responses represented by bar charts had multiple choices, hence the totals add to more than 100%. Results have been rounded to the nearest decimal.

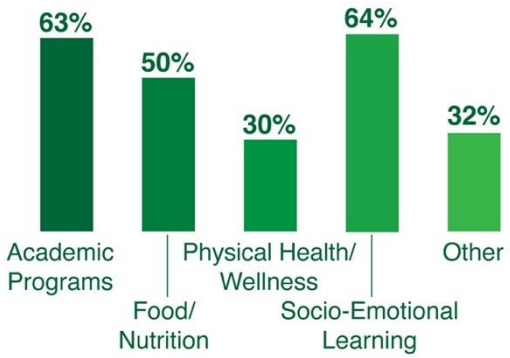


Of the 250 respondents, 69% stated that they have gardens. This corresponds to 70% of students in the contacted schools.

A. School Garden Purposes and Uses

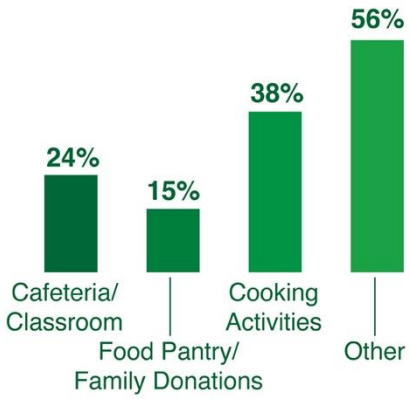
What has been the focus of the garden?

To the question regarding focus of the garden, there were 153 respondents. 63% indicated that their gardens were intended to support academic programs and 64% to promote socio-emotional learning/wellbeing. Food/nutrition was listed by half the respondents, while 30% marked physical health/wellness. Among the open-ended responses, 8 out of 46 (17%) indicated that the gardens were used for student clubs, especially environmental ones.



"Gardens provide socio-emotional benefits as well as hands-on learning of specific skills and applications of environmental concepts learned in science."

How was the harvest from the garden used?



Of the 149 respondents, 56% indicated that their gardens had some use beyond the listed options. Nonetheless, almost 40% of schools incorporated their gardens into cooking activities, and almost 25% used the produce in the cafeteria or classroom.

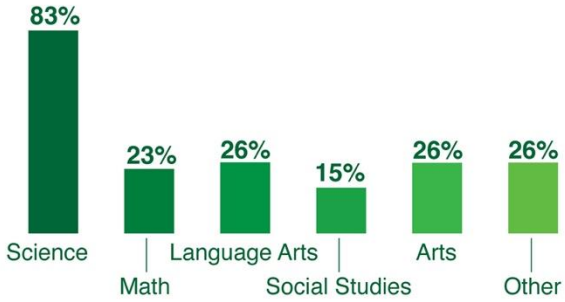
Table: Summary of Open-Ended Responses: Use of Harvest

Topics	# of Responses	% of Responses
No food produced, native plants grown, or garden in disrepair.	27	37%
Produce is given to staff and/or students.	15	21%
Produce is used for learning (especially science classes).	13	18%
Produce is used for tasting/small-scale harvesting.	5	7%
Produce is sold (e.g. at Farmers' markets).	3	4%
Produce is open to the community.	3	4%
Other	7	10%
Total	73	100%

The open-ended responses yielded further insights. A number of schools gave their gardens' produce to staff and students or used it for classroom learning. Some schools also used their produce for tasting and small-scale harvesting, sold it at farmers' markets, or offered it to the community.

"It's a great way to encourage students to understand the nutritional value of eating healthy, to getting involved in food science and natural science. To be aware of the environment and nature, and how to take care of their ecosystem."

What subjects were taught in the garden?



In keeping with national and international research, the leading subject taught in gardens was science. Over 80% of 137 respondents indicated that their gardens were used to support science classes. Other subjects linked with gardens were language arts (26%), arts (26%), math (23%), and social studies (15%). Thus, there is widespread use of gardens to teach various subjects.

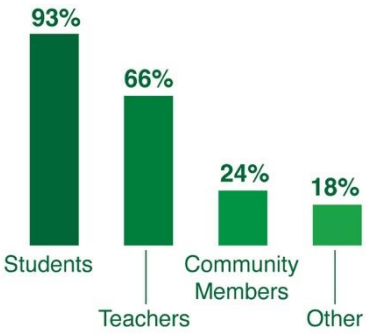
Table: Summary of Open-Ended Responses: Subjects Taught

Subjects	# of Responses	% of Responses
Nutrition and cooking classes	7	28%
Special education classes	6	24%
Gardening and horticulture	3	12%
Garden not used for academic purposes	4	16%
Other	5	20%
Total	25	100%

The open-ended responses indicated that gardens were also used for nutrition and cooking classes, special education classes, and for teaching students how to garden.

"Providing students with opportunities to learn in different ways and in different settings is critical to student engagement."

Who used the garden?



Almost all gardens were intended for student use. Only 7% of 153 respondents did not indicate that students used their gardens. 66% stated that teachers actively used the gardens whereas close to 25% of respondents reported that community members used their gardens.

Table: Summary of Open-Ended Responses: Partner Organizations

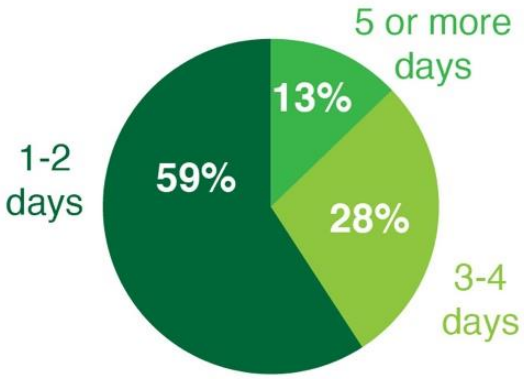
Organizations	# of Responses	% of Responses
Living Classroom	12	27%
Parents and/or teachers	7	16%
Boy/Girl Scouts or Youth Outside	6	13%
Other	20	44%
Total	45	100%

Over 25% of the open-ended responses conveyed that they partnered with Living Classroom, and over 13% indicated that they have partnered with local Boy and Girl Scouts groups and other outdoor youth groups. The "Other" category was quite variable, with 44% of responses being too unique to categorize efficiently. For instance, the partners included: university programs in the county, Lions Club, Kiwanis Club, non-profit organizations and other community organizations.

"It would be a way to build community, teach science concepts to our students, teach about responsibility."

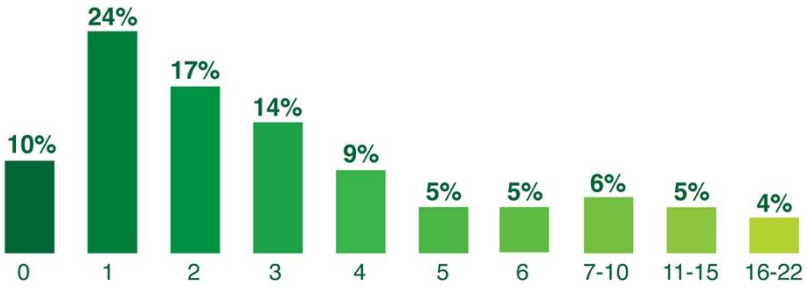
How often was the garden used per week?

Of the 148 respondents, only 13% indicated that their gardens were used every day of the week. Over half indicated that theirs were in use 1-2 days per week, whereas 28% used them 3-4 days per week.

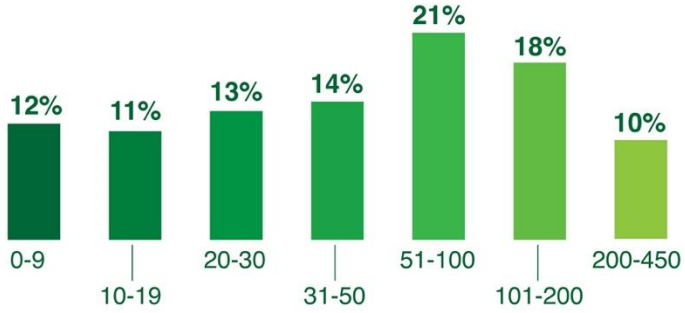


How many teachers used the garden during the week?

In most schools, a small number of teachers appeared to use the garden as indicated by 132 respondents. In about 25% of schools, a single teacher used it, and in about 65% of schools, three or fewer teachers used it. A small number of schools engaged a large number of teachers in garden-based education. Some schools also highlighted that a reduced number of teachers used the garden last year because of the COVID-19 pandemic; in these cases, whenever possible, the pre-pandemic number, if provided, was used for analysis.

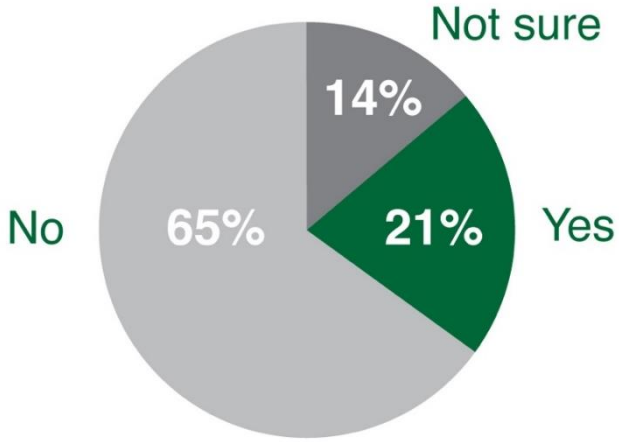


How many students used the garden during the week?



The number of students who used the garden varied widely as shared by the 135 respondents, but this was related to the size of the schools.

Have any after-school programs used the garden as part of their programming?



Most schools (65%) did not incorporate after-school programs in the gardens, whereas 21% did, as indicated by 160 respondents.

Table: Summary of Open-Ended Responses: Name of After-School Programs

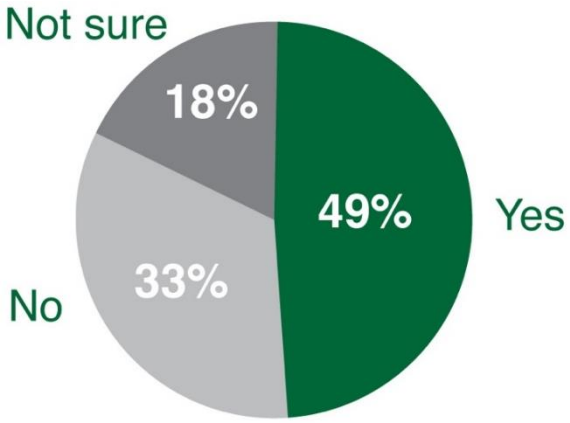
Organizations	# of Responses	% of Responses
After-School Environmental or Gardening Club	17	48%
Power School	2	6%
Citizen School	2	6%
Campbell Care	2	6%
Boy Scouts/YMCA	3	8%
Extended Care	3	8%
Other	7	19%
Total	36	100%

As seen in the Table, there were a variety of after-school clubs and partners that made use of the gardens, especially those that had environmental and gardening objectives. In the "Other" category were some community groups with whom the schools seemed to have on-going partnerships.

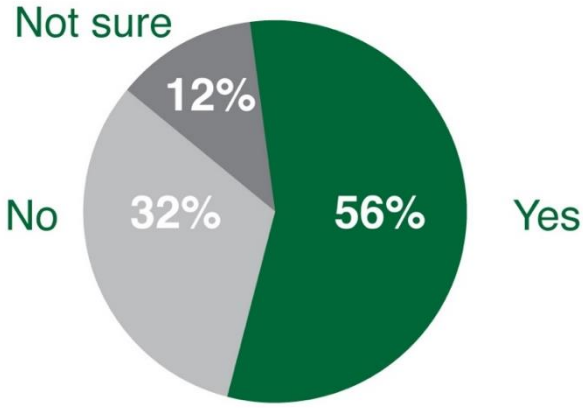
"We are a parent participation school. Our parents bring in their expertise. We grow, pick and cook what we grow."

B. Garden Maintenance

Was there a maintenance plan for the garden?



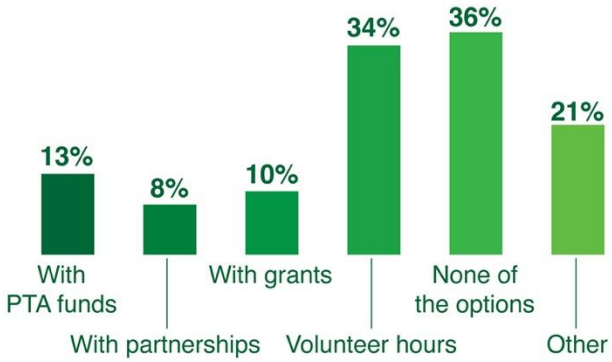
Was there a designated garden coordinator?



Of the 153 respondents, 48% indicated that there was a garden maintenance plan, and 56% mentioned that there was a designated coordinator for the garden. In contrast, 32% to 33% lacked each of these, respectively. While it is encouraging that more schools had garden coordinators than not, the number of schools lacking a clear maintenance plan illustrates a need in this area.

"Cultivating food does not have to be the only focus. Creating gardens to attract pollinators and build understanding of how we impact the environment is important."

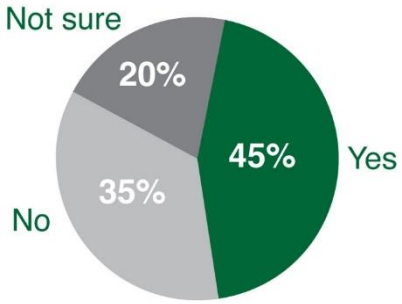
Was the garden coordinator compensated?



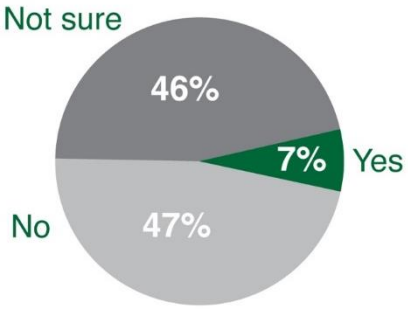
Of the 83 responses related to compensation for coordinators, it appears that garden coordinators were largely volunteers (34%). In contrast, only 13% and 10% were supported by PTA funds and grants, respectively. For 36% none of the options provided were relevant; however, 21% stated that the schools and/or districts themselves provided support through teacher or other personnel participation; some schools funded their partners for this service. Offering more financial incentives to the people in charge of managing school gardens could stimulate interest in this position and lead schools to hire more dedicated and trained garden coordinators.

"It's an opportunity to cultivate stewardship of the land and builds the feeling of contributing to the community."

Were garden lessons integrated into grade-level curriculum?



Was the garden curriculum linked with the state Environmental Literacy Initiative?



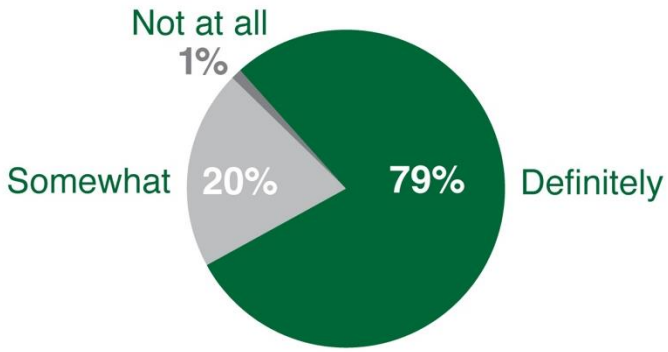
As was reported earlier, 63% of schools used their gardens in their academic programs. Of the 153 respondents to the question related to garden lessons being integrated with grade-level curriculum, only 45% shared that they did so. Furthermore, 7% of schools linked their garden curriculum to the Environmental Literacy Initiative (ELI), according to 153 respondents.

"A school garden would teach students many things about how to care for plants, grow their own produce, have pride in their labor, and increase the empathy our students have towards our environment."

C. Desired Support

Do you believe that a garden program would be important to have for your school/students?

Of the 216 respondents to the question, a large majority appeared to believe that school gardens were beneficial to both schools and students. Almost 80% of respondents indicated "definitely" and another 20% replied "somewhat" when asked this question. Only 3 respondents marked "not at all." Although these responses suggest a strong appreciation of school garden programs, it is likely that those who responded were already attuned to gardens or valued them on their campuses.



On the subject of the importance of garden programs, 125 open-ended answers were received. Although a comprehensive list of these responses is too extensive to provide here, some key insights are highlighted below:

- Many respondents indicated that they would like to further expand their garden programs or that they would like to create a program if they did not yet have one.
- Some respondents emphasized that they would like to have a garden but that no teacher or parent had stepped up to coordinate it.
- Some schools did not prioritize having a garden because their teachers did not have the time needed to maintain it, and their community lacked interest.
- In addition to lacking volunteers and coordinators, some schools faced the following challenges:

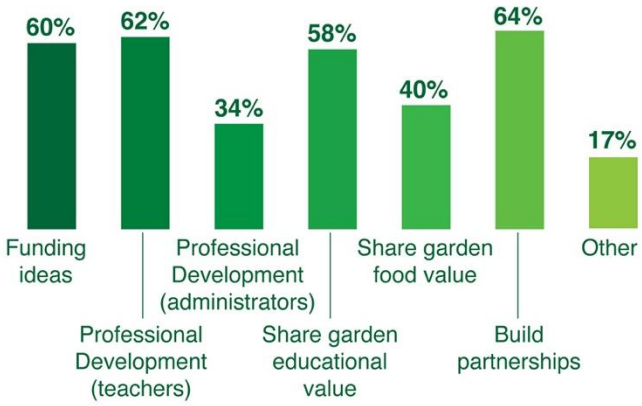
- Need for fence and locks to prevent vandalism.
- Concerns about garden maintenance during school holidays.
- Lack of space for a garden, or gardens being too small to be a good relaxation space.
- Lack of a convenient water source.
- Inability to incorporate gardens into class curriculum.

- Most respondents highlighted the positive aspects of gardens. A sample is presented below:
  - There is value in connecting with nature hands-on and being outside, which is a rarity in an urbanized environment. In the digital age, gardens help thei students.
  - Gardens enable students to understand the value of eating healthily and to learn about how food gets to the table.
  - A garden is a tool for environmental education and a good contribution for science classes, or even language arts classes.
  - Gardens help with building community, both within the school and with outside organizations, and with giving students responsibility.

  - Gardens can be psychologically soothing, especially for children with traumatic backgrounds.
- Multiple schools mentioned that their gardens were negatively impacted by the COVID-19 pandemic and they looked forward to reconnecting.
- One respondent stated “please help us get this going!”

As this question prompted extensive quotes, examples of responses are presented in Appendix C.

What support do you need to develop, expand, and/or continue your garden education program?



Overall, 205 respondents indicated substantial interest in support for their garden programs. Between 58% and 64% of respondents shared that they would benefit from: funding ideas, professional development for teachers, building partnerships, and information related to the educational value of gardens that they could share with parents, funders, and supporters. A smaller, yet still substantial, number desired professional development for administrators (34%) and needed information regarding the food value of gardens to share with parents, funders, and supporters (40%). This suggests that providing support to individual schools for gardens and garden-based education will require attention to the specific needs expressed by schools.

Table: Summary of Open-Ended Responses: Support Required

Supports Needed	# of Responses	% of Responses
Curriculum design, supplies, and space	8	24%
An initiator to take charge	7	21%
Volunteer support	6	18%
District support	3	9%
Funding	5	15%
Other	4	12%
Total	33	100%

Given the specificity of the open-ended responses, it is worth exploring these in more detail. Unsurprisingly, 24% of the 33 open-ended responses pointed to needing some combination of assistance in designing the garden-based curriculum, acquiring supplies, or obtaining an appropriate space. Fifteen percent (15%) also explicitly mentioned that they would need funding to be able to adequately expand and/or maintain their gardens. Interestingly, lack of human power was a critical point that was frequently brought up; around 20% of responses indicated a need either for leaders to take initiative in setting up the garden program or for motivated volunteers to assist in maintaining it. In addition, 3 respondents highlighted the need for proper coordination between the school and the district, which underlines how critical it is that the district be proactive. Among the responses classified as "Other," interesting points were raised:

- "Construction will make this difficult" and "not a priority at this time" highlight that not all schools will have the means to implement stellar garden programs, especially if a school is under construction, or that there is no motivation to make gardens a priority.
- "Our current garden space is out in the open and is regularly vandalized whenever something is planted. We need the area fenced in with fencing on the top as well. A door/gate with a lock is needed." This response highlights that even a well-maintained garden can still be at risk from environmental or community factors that are largely out of the school's or district's control. Not every school is likely to face the security challenges this respondent brings up, but support needs to be provided to those who do.
- "We have developed an amazing garden, Ag. Science program - would be willing to share it with other schools." This response encouragingly suggests that schools that have been successful in implementing enduring garden programs may be willing to share their experience with other schools. Gardens could potentially become an area of inter-school cooperation.

Analysis 2: Garden Correlation to Socioeconomic Status, SPED, ELL, Ethnicity/Race

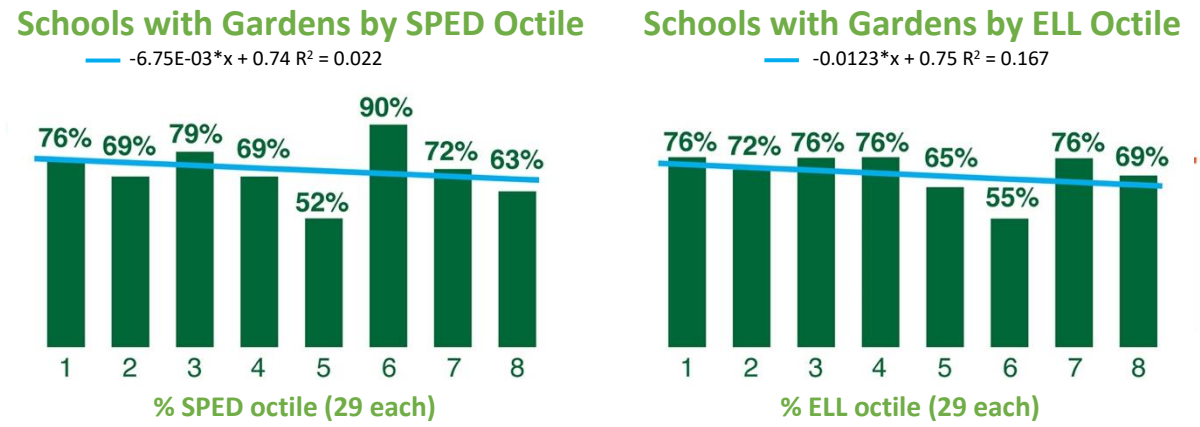
The 241 schools that could be linked to the SCCOE database were reviewed by socioeconomic category to identify whether garden prevalence is linked to this feature.

A. Title 1

The proportion of schools with gardens is almost identical for Title 1 schools as for non-Title 1 schools (69.4% vs. 69.2%). This suggests that of those who responded, Title 1 schools are not more or less likely than other schools to have a garden.

54.4% of the Title 1 schools on the SCCOE database responded, which is slightly less than the 57.3% of non-Title 1 schools that responded. This difference is small, indicating that Title 1 schools are not underrepresented in the analysis.

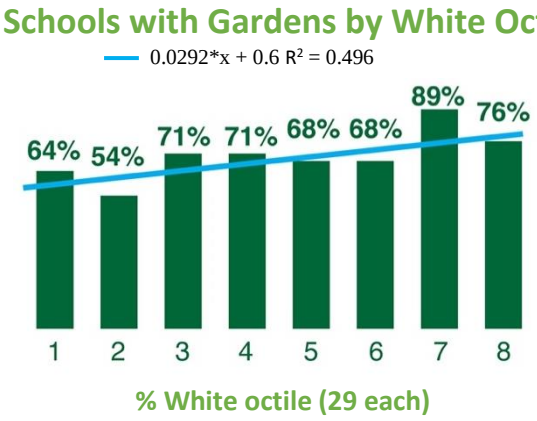
B. Special Education (SPED) and English Language Learners (ELL)

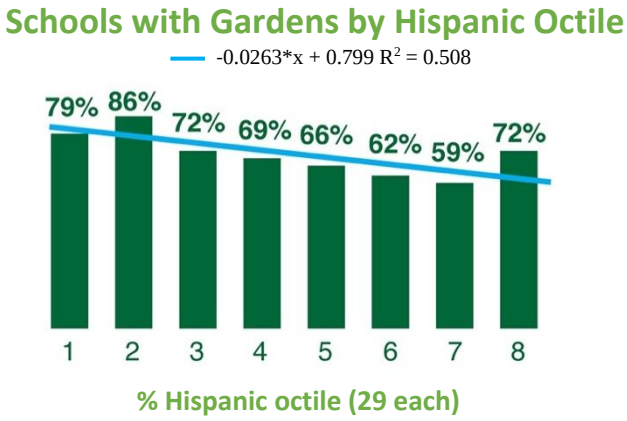


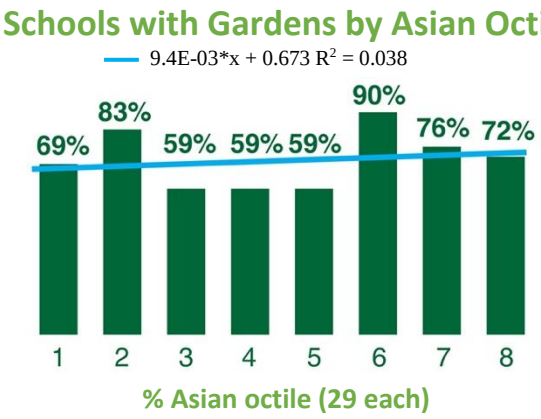
In order to determine whether having a high percentage of SPED or ELL students is correlated with garden prevalence, the 232 responding schools for which SPED and ELL data were available were segmented into 8 octiles (groupings along the range of SPED or ELL concentrations) of 29 schools each, and the percentage of schools with gardens was calculated for each octile. These are plotted in the figures above, along with their corresponding trendlines.

The trendlines have a slight negative slope, indicating that responding schools with high SPED or ELL concentrations are slightly less likely to have gardens. The SPED trendline's R^2 value of 0.022 is low, indicating that a school's percentage of SPED students is a poor predictor of whether or not it has a garden. The R^2 value of 0.167 for the ELL trendline is also quite low, though it is substantial enough that the percentage of ELL students might have slight correlation to garden prevalence. However, this analysis is *preliminary* and does not control for any other variables.

C. Race/Ethnicity







A similar methodology as in section B was used to determine whether a school's racial composition is correlated with having a garden. As shown above, of the responding schools, those with a greater percentage of White students are more likely to have a garden, whereas schools with a greater percentage of Hispanic students are less likely to have a garden. The R^2 values are both around 0.5, which suggests a reasonably good fit, even though the relationship itself is relatively weak. Nonetheless, it does appear that ethnicity is likely a factor that is correlated with school gardens.

Interestingly, the percentage of Asian students in a school does not seem to have a correlation with garden prevalence. Although the best fit trend line does have a positive slope, it is low (with a coefficient under 0.1), and the R^2 is below 0.04, indicating a weak relationship.

Limitations

Prior to administering the survey, all 431 schools in the SCCOE database were independently researched via Google search engine, and a review of the school websites was conducted. This enabled the creation of an inventory/list of 131 county schools that likely have gardens. However, not all schools on the list responded to the survey, while others not on the list indicated in the survey that they had gardens. Hence, there are likely more schools with gardens than are accounted for in the survey. Furthermore, although special care was taken to document the methodology and minimize transcription errors, manual correction of districts and school names was unavoidable.

Although all 431 schools in the district were contacted, respondents from schools with gardens or with an interest in garden education are more likely to have responded. There may also be some effects of COVID-19 restrictions in 2020–2021 on survey responses. It is also possible that outdoor-learning initiatives through school gardens are viewed as a positive opportunity by schools either without gardens or those that have historically had gardens but that are struggling with lack of funding to sustain them, thus, likely skewing their representation among respondents by motivating both groups to respond to the survey. Furthermore, the responses reflect only the observations and opinions of the respondents to the survey.

Findings and Recommendations

Key Findings

Note: For each of the following findings, the number of respondents varied as presented in the Results and Discussion Section.

Interest in school gardens: Interest in school gardens is quite robust, with a 58% response rate from 431 schools and programs surveyed in Santa Clara County; 69% of responding schools and programs (172) have gardens.

Importance of gardens: 79% of respondents *definitely* believe in, and 20% *somewhat* believe in, the importance of gardens. Only 3 respondents do not feel gardens are important.

Focus of gardens: There is strong, well-rounded focus of gardens: Socio-emotional learning/wellbeing (64%), academic learning (63%), food and nutrition (50%), physical health/wellness (30%).

Subjects taught: Predominantly science (83%), but also language arts (26%), arts (26%), math (23%), and social studies (15%) are connected with gardens.

Garden lessons and Environmental Literacy Plan (ELI): 45% of schools integrate gardens with grade-level curricula; and 7% link gardens with the Environmental Literacy Initiative.

Users/constituents: 93% of gardens are used by students, 66% by teachers, and 24% by community members.

After-school usage: A variety of programs, partners, and school clubs access the gardens.

Maintenance plan: 49% have some maintenance plan; however, most need a variety of supports for design and maintenance during and after school.

Garden coordinators: 56% have garden coordinators, but they are largely uncompensated, with many of the gardens often managed by volunteers. Some are supported through PTA efforts, grants, and partnerships.

Long-term partnerships: There are on-going (some long-term) partnerships with non-profits, universities, and community agencies for academic integration with gardens and also for food production and distribution.

Needing supports: Respondents need support as follows: to build partnerships (64%), for professional development of teachers (62%), for funding ideas (60%), to share gardens for educational value with parents and supporters (58%), to share gardens for food value with parents and supporters (40%), and for professional development of administrators (34%).

Equity and inclusion: Title 1 schools are not underrepresented in the data. However, while there is no causal relationship, and the analysis is preliminary and does not control for other variables,

the trendlines for schools with higher numbers of SPED students, ELL students, and students of color (especially Hispanic) indicate that they are slightly less likely to have gardens.

Recommendations

A four-pronged interconnected strategy is recommended to promote, support, and strengthen garden-based education in Santa Clara County. The framework for recommendations is developed based on participants' expressed needs and interests. As seen in *Figure 1*, at the core of the recommendations are equity and inclusion to support diverse students.

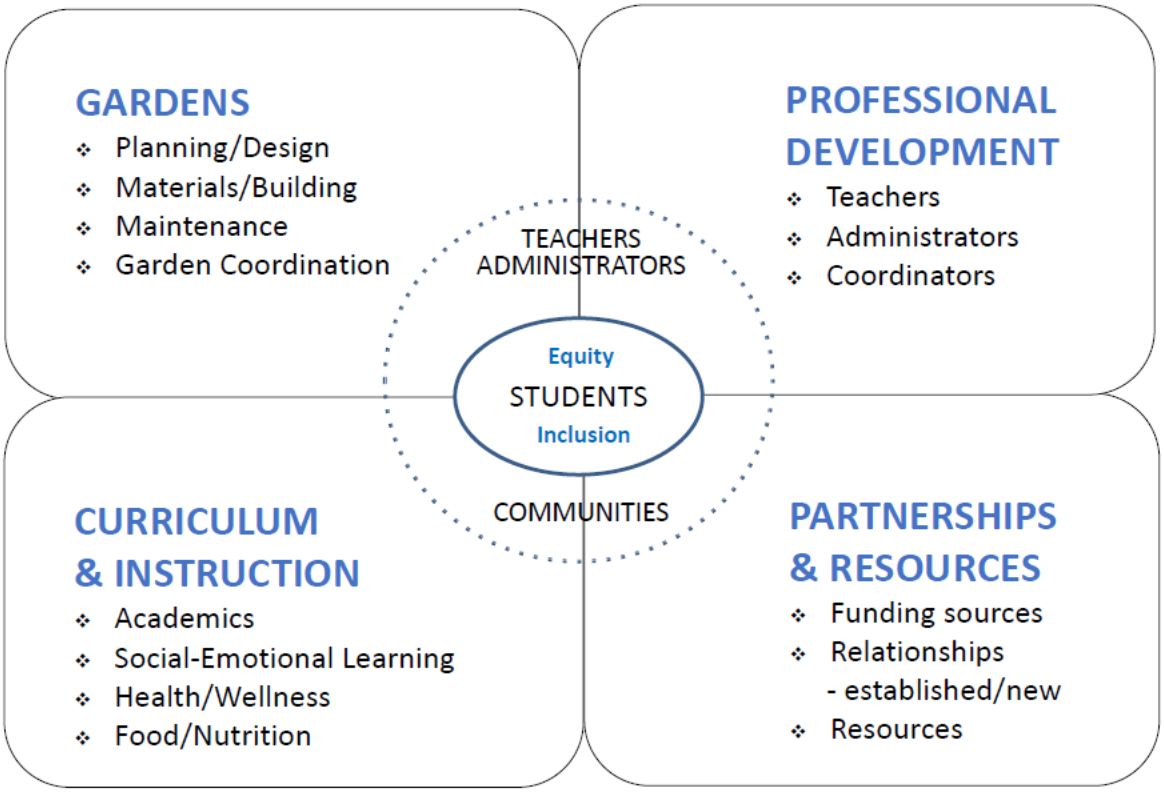


Figure 1: Four-Pronged Interconnected Approach to Advance Garden Education

Gardens

Several respondents firmly believe in the importance of school gardens but need support in starting and building gardens, designing them for their particular school grounds, accessing materials to build beds and garden paths, and creating comfortable places for students to learn outdoors in the gardens. Some respondents need support for maintenance and even to deal with vandalism. Some need access to water. It is recommended that schools that have indicated an interest in gardens be supported in the specific ways they need. Since many schools already partner with community-based non-profit organizations, garden models that are working across county schools can be shared with others for adoption. It is also recommended that each school

create a designated garden coordinator position to support maintenance and to support teachers when students learn outdoors in the gardens. Some proven and workable models are Life Lab, Living Classroom, and Learning Gardens at school sites (Appendix E).

Curriculum and Instruction

Respondents who are interested in either starting gardens or strengthening their already-existing garden programs would like support in integration of the gardens with curricula. There are many curricular sources with links to subject standards available through Life Lab, Living Classroom, Edible Schoolyard, and other organizations (Appendix E). For instructional support, the book Learning Gardens and Sustainability Education: Bringing Life to Schools and Schools to Life by Williams and Brown provides innumerable examples of high-quality student work indicative of instruction that integrates gardens and classrooms. The California Environmental Literacy Plan, though not familiar to most of the respondents, can also be integrated with gardens to gain a broader environmental perspective. Professional development that supports teachers and coordinators would enable the quick adoption of curricula already being used by many schools in the county and elsewhere.

Professional Development

Since many respondents indicated a need for, and an interest in, professional development, it is recommended that the county consider an overall coordinated plan to offer administrators and teachers choices to develop and/or enhance their skills in garden-based education. Garden coordinators would benefit from inclusion in this initiative. Because schools are at different stages of development for growing gardens, they could choose from a variety of professional development options: garden design and maintenance, curriculum and instruction, integration of garden learning with academic learning, building and sustaining partnerships, accessing financial resources and support. Schools would benefit if clustered by areas of interest because they fall on a continuum of experience with gardens on their campuses.

Partnerships and Resources

Several schools indicated that they need resources either to start up garden programs or to sustain established programs. It is strongly recommended that the SCCOE facilitate securing public funds for schools, especially those with a large number of SPED students, ELL students, and students of color to ensure equity and inclusion of diverse students. Clusters of schools could partner to seek funds and share resources. Since numerous schools already have existing garden programs, they could serve as credible examples for others. As listed by survey respondents, there are innumerable community organizations, higher-education institutions, PTAs, non-profit organizations, clubs, and others that have partnered with schools. It is recommended that there be coordinated efforts to secure resources and include key community partners for the initiation of new gardens at schools and continuation of established programs.

In conclusion, gardens on school grounds and engagement in outdoor learning are interlocking mechanisms that offer possibilities for academic learning, socio-emotional learning, and health and wellbeing, as indicated by participants in this Growing Gardens survey. Clearly, there is

considerable enthusiasm for garden-based education, as this survey validates the needs and interests expressed by participating schools. The time is ripe to support schools. To ensure momentum and sustenance of garden-based education, evaluation of ongoing programs and responses to identified needs must also be integral to this initiative. Moreover, continued research of participating and non-participating schools will provide additional data to optimize successful school garden programs to serve students in Santa Clara County.

Appendix A: Outcomes of Garden-Based and Nature-Based Education

Syntheses and meta-analyses of innumerable research studies published since 1990 show a preponderance of *benefits* and *positive outcomes* of garden-based education and of connecting students with the outdoors and nature. These outcomes fall under three broad overlapping categories: academic outcomes; social, emotional, behavioral outcomes; and health-related outcomes. For example, the following four meta-analyses covered over 130 studies:

- Williams and Dixon (2011) synthesized 48 studies examining academic outcomes.
- Gill (2014) synthesized 61 studies on the benefits of children's engagement with nature.
- Berezowitz, Bontrager, and Schoeller (2015) conducted a meta-analysis of 12 studies with dietary measures in food and nutrition programs using school gardens.
- Schneider, Pharr, and Bungum (2017) reviewed 14 studies to examine the impact of school garden participation on nutritional knowledge, fruit/vegetable consumption, taste preferences, physical activity, and math/science academic achievement.

Grades and/or test scores linked with curriculum/subjects showed positive results for direct academic outcomes. Science was the most reported subject linked with the garden; other subjects linked with the garden were language arts, math, and writing. There were also positive indirect academic outcomes related to attentional functioning, sense of curiosity and wonder, multi-sensory learning, food literacy and healthy eating habits, physical activity, environmental stewardship, school bonding, community/parental involvement/intergenerational learning, motivational engagement, social and moral development, and vocational skills.

Not many longitudinal studies have been conducted. One, related to an NSF-funded project and entitled *Science in the Learning Gardens*, was published in 2019 based on linking middle school science curricula with gardens as milieus for learning. The project, which was initiated in 2014, followed a cohort of 113 sixth-grade students in a Title 1 middle school with large percentages of immigrant students and students of color. The results show promise of motivational engagement among 6th and 7th graders, along with improved science grades and science identity development (Williams et al., 2019).

There are recent syntheses of a large number of studies that show positive outcomes of nature experiences (which also include school gardens) for improvement of academic learning and adoption of environmental behaviors; some of the studies also show causal outcomes (Ardoin et al., 2020; Kuo et al., 2019; Williams, 2018).

The *Oxford Research Encyclopedia of Education* offers the history, curricular and pedagogical approaches, and research outcomes in the section on **garden-based education** (see Williams, 2018).

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Appendix B: Survey

Garden Survey

1. Your School District:

2. Your School Name:

3. Grades served at your school. Check all that apply.

- [ ] Pre-K
- [ ] Elementary
- [ ] Middle/Jr. High
- [ ] High

4. Approximate number of students at your school:

* 5. Do you have a school garden?

- ◯ Yes
- ◯ No

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Garden Survey

Please answer the following with reference to pre-Covid-19 times.

* 6. Was there a designated garden coordinator?

- ◯ Yes
- ◯ No
- ◯ Not Sure

7. Is there a maintenance plan for the garden?

- ◯ Yes
- ◯ No

8. How often was the garden used per week?

- ◯ 1-2 days
- ◯ 3-4 days
- ◯ 5 or more days

9. What has been the focus of the garden? Check all that apply.

- ☐ Academic Program
- ☐ Food/Nutrition
- ☐ Physical Health/Wellness
- ☐ Social-Emotional Learning/Wellbeing
- ☐ Other (please specify)

10. How was the harvest from the garden used? Check all that apply.

- ☐ Served in cafeteria/classroom
- ☐ Donated to local food pantry or families
- ☐ Cooking activities
- ☐ Other (please specify)

11. Who uses the garden? Check all that apply.

- [ ] Students
- [ ] Teachers
- [ ] Community Members
- [ ] Other (please specify)

12. About how many teachers used the garden during the week?

13. About how many students used the garden during the week?

Garden Lessons and Curriculum

14. Were garden lessons integrated into grade-level curriculum?

- ◯ Yes
- ◯ No
- ◯ Not Sure

15. Was the garden curriculum linked with the state Environmental Literacy Initiative?

- ◯ Yes
- ◯ No

16. What subjects were taught in the garden? Check all that apply.

- [ ] Science
- [ ] Math
- [ ] Language Arts
- [ ] Social Studies
- [ ] Arts
- [ ] Other (please specify)

After-School Programs

17. Are there after-school programs that have used the garden as part of their programming?

- ◯ Yes
- ◯ No
- ◯ Not Sure

18. What were the organization(s) you partnered with to offer garden education? (e.g. non-profit, university/college/business). Please provide the names of the organizations:

19. What was the after-school program named?

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Garden Survey

20. How many hours per week did the garden coordinator work?

21. Was the garden coordinator compensated? If yes, check all that apply.

- [ ] With PTA funds
- [ ] By a partnership
- [ ] With grants
- [ ] Volunteer hours
- [ ] Other (please specify)
- [ ] No, none of the above

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Appendix C: Respondent Quotes

Survey Question: Do you believe that a garden program would be important to have for your school/ students?

Since 125 open-ended comments were received, one-third are presented below to illustrate a range of responses.

"It's a great way to encourage students to understand the nutritional value of eating healthy, to getting involved in food science and natural science. To be aware of the environment and nature, and how to take care of their ecosystem."

"I think it is important to cultivate the mindset around environmental autonomy and sustainability with real-life practices."

"Students take away the importance of not only eating healthy food but also the importance of growing their own sustainable food source. They learn about the environment, their bodies, and the food chain while they garden. Additionally, students learn about the greater global impacts that growing your own sustainable food has and what certain food which are grown in massive scales do to our environment."

"I think that all schools should have gardens. It provides a healthy connection to food and a quiet place where students can experience nature. The ability to integrate hands on learning is limitless. I would love to see more support for schools to have a garden program. Cultivating food does not have to be the primary focus. Creating gardens to attract pollinators and build understanding of how we impact the environment is important."

"We do have a huge area in the back of our school that we would like to dedicate towards a school garden. Our teachers and community feel that our school focus should be sustainable living with an emphasis on growing food and vegetables. We would like to start unit lessons integrating science, language arts, and math for all grade levels at our school."

"As the principal, I am interested in using our garden beds to the max to allow students and other community members to collaborate through gardening."

"It would be a way to build community, teach science concepts to our students, teach about responsibility."

"We have been wanting to use one of our areas for a school garden and outdoor learning space. It would lend well to our science curriculum as well as teaching community and providing students with responsibility and pride in their campus."

"Socio-emotional benefits as well as hands-on learning of specific skills as well as applications of environmental concepts learned in science."

"I'd like our garden to become a more robust part of the school. It is currently in disrepair and needs lots of attention to be usable."

“Students get to interact with different adults on campus. They get to be outside, explore nature, and experience the seasons and lifecycles. They learn about the interconnectedness of weather, plants, and animals. Gardening provides an outlet for students and addresses multiple learning modalities. I think it could be better if we had the time and energy to explicitly align our garden program to our core instructional program. Right now, it's an extra, a supplement, and an enrichment.”

“Being in a downtown area, many students do not have space at home for a garden. Ideally, we would have a garden on-site so students could cultivate and learn about how to grow and sustain one.”

“This garden was designed as a propagation garden to grow and provide succulents to our community and other schools. We do not use it for instruction currently.”

“We received a garden grant this year to support the work of having a garden program and make it happen. Due to school closures this has gotten a slow start, but we have partnered with other garden coordinators in the district and the work of writing lesson plans has begun. We are linking lessons to social studies and science curriculums from our FOSS kits, and each grade level will have at least 2 lessons taught to each class. Our focus is not only on the academics but also on wellness/sensory needs in addition to healthy eating.”

“We are a parent participation school. Our parents bring in their expertise. We grow vegetable and fruits. The centers are science, literature, math, and experiencing new food. We grow, pick and cook what we grow.”

“I think gardening is VERY important, but I do not think it should be mandatory.”

“We are hiring a person to oversee the gardens, organize parent volunteers and choose a curriculum so it becomes a weekly event for students.”

“The space was meant to serve as an outdoor science lab. We have struggled to maintain due its location and manpower.”

“We are also creating two outdoor learning areas, which are being designed by our students.”

“Recognizing that urban farming will become important in the future, and the need for students to be outdoors growing food and plants, our hope is to grow a robust environmental science/garden program that exists as integral to our environmental science class, and includes field trips to our district's farm and possibly other community gardens in the future.”

“I am looking to bring Living Classroom to our school next year as they have standards-aligned lessons for each grade level. I will be paying them to maintain the garden as well. Students need to be exposed to learning outside of the classroom, and gardens are a great opportunity.”

“Creating a garden at our school would be a great learning resource for our students and community. It would provide a community responsibility to care for and maintain our garden while teaching the benefits of healthy eating and how different plants and vegetables are grown.”

“It's an opportunity to cultivate stewardship of the land and builds the feeling of contributing to the community.”

“Yes, but we struggle to run the garden. It is very time consuming.”

“It's hard to fit it in right now. Teachers are struggling to complete all their curriculum.”

“We are a Health Science Academy and we are wanting to incorporate the school garden into many subject areas, and not just science.”

“Gardening is calming and therapeutic. It would be great for our Quest elective and some of our students with exceptional needs.”

“All of MVWSD schools have gardens that are cared for through our partnership with Living Classroom. Living Classroom also leads hands on lessons and provides training for docents to lead lessons.”

“The plan needs to be fully developed in order to fully implement.”

“It is important for students to learn and understand the nature of plant development, food production and the role plants have in the relationship to humans and the planet. A garden program speaks to the importance of the role of plant production (for food, biome success, interaction the fauna) and the role of humans in food production and maintaining a vibrant and healthy biodiversity across the planet. A garden program can help students begin to understand how destructive the history of human supremacy has been on Earth, as we developed agriculture. Students can begin to understand how humans can better interact and become a productive and symbiotic member of the natural world and less of a destructive master of it…”

“We have a teacher who has a passion for gardening and created a flower and vegetable garden in a patch of land outside of her room. She uses her own tools and the students in her class assist her in tending the garden. Over the past 3 years, the garden has become a source of pride for the entire school and students look forward to being in this teacher’s class in order to participate in the garden.”

“Specific curriculum for varied grade levels and a maintenance plan is needed.”

“We have had trouble integrating the garden into curriculum over the years, due to the various standards and time requirements of our classes.”

“In support of the culture of our school community the garden was used to provide volunteer access and share in traditions of the area. As a DLI school many of our parents can access the school through service regardless of the language they speak. The farm working culture is a prideful understanding of history and learning.”

“We had started a garden and our mod/severe class was managing it, but then COVID-19 happened.”

“A school garden would teach students many things about how to care for plants, grow their own produce, have pride in their labor, and increase the empathy our students have towards our environment.”

“Providing students with opportunities to learn in different way and in different settings is critical to student engagement. We would love to provide a garden setting for students.”

“Our garden was developed by students and built with our school and extended community. Teachers use the space as an outdoor learning environment. Teachers also use the space to allow students to plant and take ownership of growing vegetables. In turn, students are able to learn about plant cycle and how the product can be used.”

“…we have a great garden that parents have supported for several years. Parent volunteers have run a program called "LexEcology" to help students become more engaged in the garden during lunch times. Teachers would bring their students there occasionally. It depended on their units of inquiry. We are an IB school, so units are integrated. The garden is definitely a point of pride at our school. We would like a trained garden coordinator to teach students occasionally throughout the year, but currently our Home and School Club/PTA is not permitted to "pay for people". It would be great if the district could fund a position at some point, or if we could find an outside source of funding. Our desire is to share the garden with other schools or community organizations. We have compost bins, worm bins, root bins, native species garden, greenhouse, outdoor chalkboard, butterfly garden, bee box, bat box, and a rain water catchment system.”

“We want the garden to thrive and be a place for project-based learning, where kids can learn to synergize to help things grow and learn about science.”

“It can be useful when teachers take the time to incorporate it into lessons and units.”

“Gives students an opportunity to work with their hands, to work outside the classroom, to learn outside the classroom, to have a space where SEL can be implemented, to learn something new and outside of academics, to meet new friends, to learn skills such as patience, perseverance, accountability, and responsibility.”

Appendix D: Biography of Report Author

Dilafruz Williams, PhD is Professor of Leadership for Sustainability Education in the department of Educational Leadership and Policy at Portland State University in Portland, Oregon, where she has taught since 1990. With dozens of partners, she has designed, co-founded, and supported several cutting-edge initiatives, such as: Learning Gardens Laboratory, Leadership for Sustainability Education master's program, Sunnyside Environmental School, and an NSF-funded project, Science in the Learning Gardens: Factors that Support Ethnic and Racial Minority Students in Low-Income Schools.

A prolific scholar, Dr. Williams has authored over 70 chapters, journal articles, and curriculum resource guides and has given close to 200 invited lectures, symposia, and conference papers. Her research has focused extensively on garden-based education, environmental education, place-based education, urban education, and service learning. Her co-authored book, *Learning Gardens and Sustainability Education: Bringing Life to Schools and Schools to Life* (Routledge, 2012), presents a practical model of student engagement with gardens, that serve as milieus for learning. She is also co-editor of *Ecological Education in Action: On Weaving Education, Culture, and the Environment* (SUNY, 1999).

Dr. Williams has given workshops and keynote addresses in Australia, Austria, Canada, India, Nepal, New Zealand, Seoul-Korea, South Africa, and the United States. She is the recipient of several awards and honors. She was elected city-wide to the Portland School Board, 2003-2011. She has graduate degrees from Bombay, Syracuse, and Harvard Universities in the sciences, public administration, and education. Her passion for gardens is evident in her own delight in engagement with soil, plants, and wildlife in the multitude of manifestations of wonders and mystery that a garden offers.

For her research, curriculum, instruction, and projects see http://learning-gardens.org/ and https://sites.google.com/pdx.edu/dilafruz/.

Appendix E: Resources for Schools

Sample Websites/School Garden Programs

Several of the following sites provide practical guidelines for:

- Starting a school garden
- Developing curricula with links to various subjects/standards for adoption/adaptation
- Implementing *available* curricula for various grade levels and linked with subject standards
- Creating partnerships, building networks, leveraging human and financial support
- Seeking other resources – financial and material

- Living Classroom: https://www.living-classroom.org/
- Life Lab: https://lifelab.org/
- School Garden Support Organizational Network: https://www.sgsonetwork.org/
- Edible Schoolyard: https://edibleschoolyard.org/
- Growing Gardens/ for Growing Minds/Santa Clara County's Walden West Program: http://www.waldenwest.org/school_programs/gardens.asp
- Learning Gardens: https://learning-gardens.org/

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- California Native Plant Society: https://www.cnps.org/
- California School Garden Network: http://www.csgn.org/california
- School Garden Network: https://www.schoolgardens.org/
- California Environmental Literacy Initiative: https://ca-eli.org/
- Big Green: Learning Garden: https://biggreen.org/
- Growing Minds: Farm to School: https://growing-minds.org/
- Growing Gardens: http://www.growing-gardens.org/
- The Slow Food USA School Garden Network: https://slowfoodusa.org/school-gardens/
- Farm to School: National network: http://www.farmtoschool.org/about/what-is-farm-to-school

Sample Books: School Gardens/Curriculum/Instruction

- The School Garden Curriculum: An Integrated K-8 Guide for Discovering Science, Ecology and Whole-Systems Thinking. (2019). Author: Kaci Rae Christopher. Press: New Society Publishers.
- The Growing Classroom: Life Lab. Also available, dozens of *Curriculum and Activity Guides with Subject Standards.*
- How to Grow a School Garden: A Complete Guide for Parents and Teachers. (2010). Authors: Arden Bucklin-Sporer and Rachel Pringle. Press: Timber.
- The Garden Classroom: Hands-On Activities in Math, Science, Literacy & Art. (2015). Author: Cathy James.
- Learning Gardens and Sustainability Education: Bringing Life to Schools and Schools to Life. (2012). Authors: Dilafruz Williams and Jonathan Brown, Press: Routledge.
- Recipes for a Successful School Garden: A Guide for Parents and Teachers. (2020). Authors: Elizabeth Ebinger and Maggie Tuohy.