

Educators' Perceptions Associated with School Garden Programs in Clark County, Nevada: Practices, Resources, Benefits and Barriers

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Abstract

Background: School garden programs have grown in popularity in the United States. Educators' attitudes, knowledge, and motivation are crucial to implementing comprehensive school garden programs. To expand school garden education, it is necessary to identify effective practices and determine the resources necessary to deliver these programs, as well as describe the benefits and barriers of using school gardens in order to provide the rationale for spending time and money on gardens.

Methods: Accordingly, the purpose of this study was to describe principals' and teachers' current practices, and to identify perceived benefits and barriers and report needed resources to operate successful school gardens. A survey was sent to 250 CCSD teachers and administrators using an electronic web site link. One hundred and nineteen educators completed the survey, 105 of which met criteria to be used in this study.

Results: Many educators with gardens perceive that students benefit from school garden programs. Significant differences between teachers and administrators in regards to the benefits of school gardens as well as operational factors such as when students used the gardens were noted.

Conclusion: This suggests a need for improved communication between these two groups to align expectations of school garden programs.

Keywords: Practices; Resources; Benefits and barriers

Introduction

School gardens were introduced in the U.S. at the end of 19th century. By 1918, every state in the U.S had at least one school using a garden. These gardens were created to enhance food production as a part of the war effort [1]. Throughout the 1900's the prevalence of and enthusiasm for school gardens has fluctuated. However, since First Lady Michelle Obama publically promoted the creation of vegetable gardens in 2009, their numbers have steadily grown [2].

Support for school gardens has come from various sources. State departments of education and university extension programs in Texas and California have actively promoted school gardening programs through teacher training curricula and research [3]. The California Department of Education launched an initiative, "A Garden in Every School," in 1995. Legislation was passed in 2006 making all K-12 California public schools eligible for grant monies to establish gardens that support the academic curriculum [4]. California now has an estimated 3,000 schools with gardens [5]. Two East Coast states have also established themselves as leaders in promoting school garden programs. More than 200 schools utilize garden curriculums that impact an estimated 11,000 students in New York. Additionally, Vermont has a program that operates in partnership with the National Gardening Association which provides garden training and teacher education [3].

School garden programs that incorporate outdoor classroom components provide an opportunity for students to learn science, math, social studies, language and visual arts through hands-on experiences [6,7]. Moreover, they may be impactful in addressing the current obesity crisis in the U.S., because garden programs promote healthier eating and opportunities for physical activity [8]. By allowing students to eat the produce that they have grown school gardens provide a unique opportunity for teachers to address the importance of vegetable and fruit consumption. Additionally, studies have shown that students exposed to school gardens have improved nutrition knowledge, increased consumption of, and enhanced preference for, fruits and vegetables [9-15].

Learning about agriculture through an academic curriculum also provides an opportunity for students to study vegetable and fruits, including where they come from, their nutritional benefits, and the concepts of composting and recycling [16]. Outdoor education additionally has the potential to enhance physical activity because of the weeding, watering, digging and other basic labor associated with garden maintenance [8,17,18].

School garden programs offer a modality to educate children in both academic areas and nutrition through hands-on learning experience. However, the utilization of school gardens, the style of instruction for teaching in the gardens, and its integration into academic curriculum vary by school and teacher. For instance, in some schools the gardens are open and available to students during lunch, recess or after school. In other schools students spend class time in the

garden while being exposed to an organized curriculum [8]. The amount of time students spend in gardens also varies. In some schools students visit the garden multiple times per week; while in the others they may only visit the garden once per month or less [9,10,19].

Graham and colleagues surveyed principals to determine the status of school gardens in California [20]. The most frequently cited reason for having a garden was to enhance academic instruction, usually in the subject areas of science, environmental studies, and nutrition. Principals also specifically noted that gardens effectively enhanced science instruction. Barriers to garden instruction were lack of time, lack of curricular materials linked to academic standards, and a paucity of teacher interest, knowledge, experience, and training [20].

A similar study was conducted with fourth grade teachers in California to assess perceived attitudes of, and barriers to, school garden programs [16]. Again, their main reason for using gardens was for the enhancement of academic instruction. The subjects taught most often were science, nutrition, environmental studies, language arts, and math. Teachers strongly agreed that resources and support needed for the school garden instruction included teacher training, curriculum materials, and nutrition education. The most common barrier to using the garden for academic instruction was time. Other barriers that teachers identified included the lack of teacher interest, experience, curricular materials and training.

Because of the limited published research in this area, it is important to investigate educators' thoughts and perceptions about gardening programs. This study describes the current practices in school gardens as well as administrators' and teachers' perceptions about needed resources for effective garden instruction, benefits of using gardens, and barriers to the school garden programs in the Clark County School District (CCSD) in Nevada. Study objectives were:

1. To determine current practices within school garden programs.
2. To determine the resources, perceived benefits and barriers associated with the use of garden programs in schools as identified by administrators and teachers. A sub-purpose was the assess differences across teachers based on the amount of time spent in the gardens.

Methods

This study was collaboration between UNLV, CCSD and Green Our Planet. Green Our Planet is a non-profit organization that has helped over seventy schools establishes gardens in the CCSD. This research project was approved by UNLV's and CCSD's Institutional Review Boards.

Research design

The research design was cross-sectional. Invitations to participate in the study were emailed to a convenience sample of 250 CCSD administrators and teachers selected by members of the CCSD's upper administration. The survey was delivered through Qualtrics, an on-line survey system. An email invitation with a link to the electronic survey was provided to the educators.

Content of survey

The survey was developed by Life Lab in collaboration with the California School Garden Network. Additional questions were added to address our specific research objectives. The survey ultimately

consisted of 30 questions, the majority of which requested closed-ended responses; however, for each question participants had the opportunity to provide written comments. For most items, educators could select all answers that applied to their school/classroom. The survey was divided into four main sections: (1) current school garden practices; (2) resources required for successful use of school gardens; (3) barriers to having and using school gardens; and (4) the perceived benefits students receive from participation in school gardens.

Statistical analysis

Data were analyzed using SPSS21 to generate frequency distributions and to identify selected differences across groups. Differences in teachers' and administrators' responses to questions regarding resources, benefits and barriers were analyzed using Chi-Square and Fisher's Exact Tests. Statistical significance was achieved when $P \leq 0.05$. Additionally, teachers who use the garden one hour or less per month (Low Usage [LU]) and teachers who use the garden greater than one hour per month (High Usage [HU]) were compared using the same methods. Fisher's exact tests were used when a cell in 2×2 tables had a frequency of less than five.

Results

One hundred and twenty-nine educators started the survey and 119 completed at least 90% of it for a response rate of 51.6%, and a completion rate of 92.2%. Of the 119, most, [105 (88%)] of the respondents were employed at schools that had a garden while 14 (12%), did not. Only data from schools with gardens were used for this analysis.

Of the 105 respondents from schools with gardens, 81 were teachers and 24 were administrators. Responses were evaluated for the entire group, and then stratified by HU and LU teachers and administrators. Seventy teachers provided information about the amount of time they spend in the garden, 29 teachers were LU and 41 were HU.

When results were not significantly different between teacher groups, HU and LU, or between teachers and administrators, the data were combined. When there were significant differences between groups, results are presented separately.

Ninety-one percent of the educators were from elementary schools (pre-kindergarten through fifth grade) while 2% were from middle, and 7% were from high schools. Fifty-eight percent of the gardens had been installed at the school within the last year, while 30% had been built within 2-4 years, 4% in the past 5-10 years and 8% been in use for more than 10 years (Figure 1).

Educators indicated that they used the gardens for multiple teaching purposes. The most frequently mentioned subject areas were mathematics, English language arts, sciences, and health & nutrition education. More than 77% of educators identified each of these subjects as being taught in the garden, followed by history/social science (58%) and environmental studies (53%).

The most frequent times for using gardens were during class instruction (>90%), before or after school (25% and 24%, respectively), and during the summer (18%). Administrators were statistically more likely to report that gardens were used during lunch ($p=0.03$), after school ($p=0.02$) and at recess ($p=0.05$). School gardens were used mainly for academic instruction (38%), experiential learning (19%) and subject matter reinforcement (16%). Administrators also reported

that gardens were used for experiential learning more often than did teachers ($p=0.03$) (Figure 1).

Resources associated with the use of school gardens

The majority of educators indicated that an important resource which supports academic instruction in the garden was teacher training (61%). There were no significant differences between groups (HU/LU teachers or teachers/administrators); however, it is of note

that funding was the most frequent response provided by administrators (71%). Funding and access to garden based curriculum/education materials were also reported as important resources by teachers. When asked what kind of garden-based professional development educators had received during the past three years, the most frequent answer among all groups of educators was "no professional development" (33%) (Figure 2).

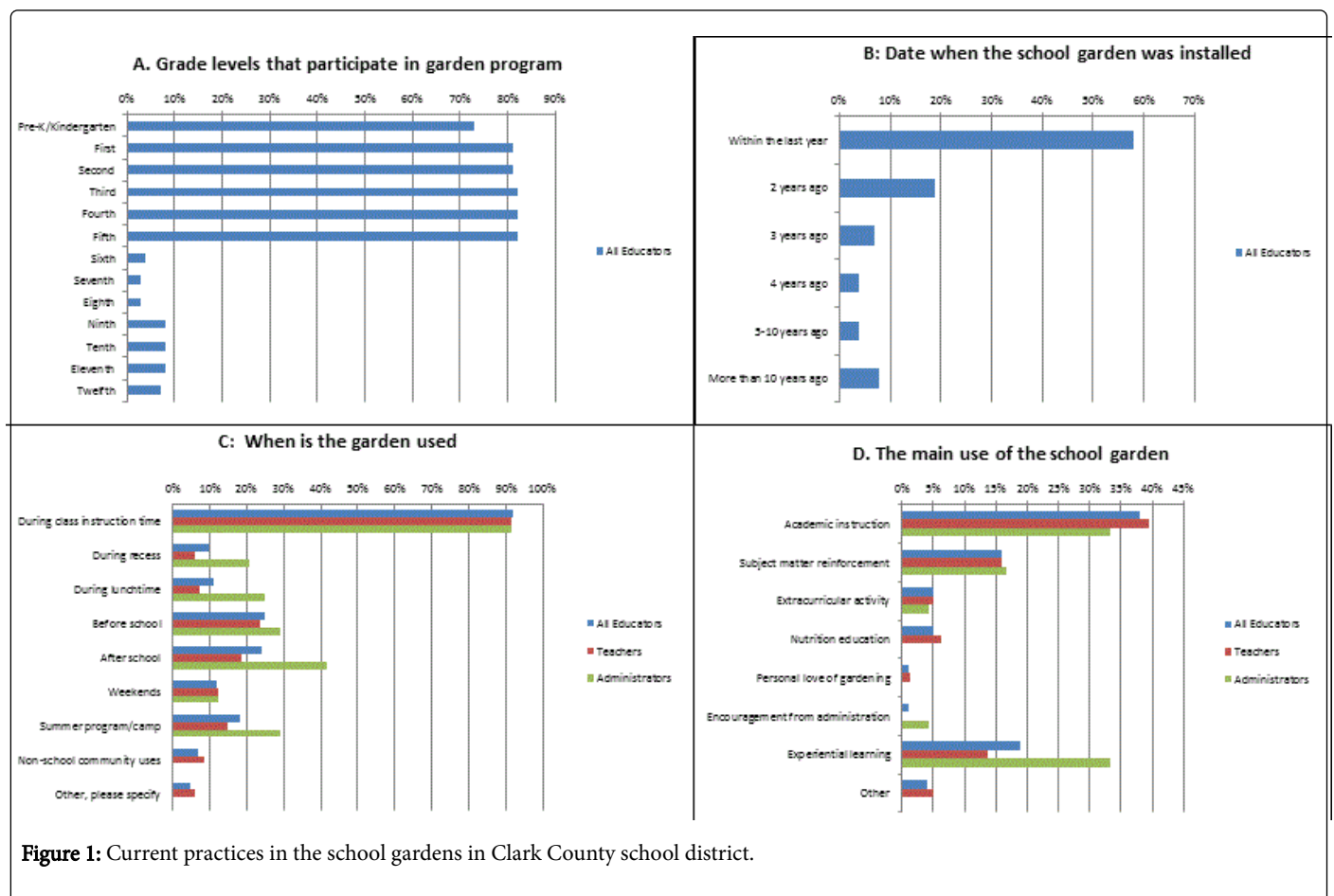


Figure 1: Current practices in the school gardens in Clark County school district.

Accordingly, educators would like to see certain professional development topics offered to improve their ability to use the gardens. The two topics selected most often by all educators were connecting the garden to common core English/Language Arts and Math (69%), and connecting the garden to Next Generation Science Standards (67%). There were however differences between educator groups for 'connecting the garden to the Next Generation Science standards' (NGSS), as HU were more apt to see NGSS as needed than did LU teachers. Administrators also identified garden-based learning in early childhood education more often than teachers ($p=0.02$) (Figure 2).

The elements that educators agreed would lead to the success of school garden programs included motivated teachers (57%), funding (57%), administration support (56%), garden coordinator staff position

(54%), and time scheduled within the school day for garden instruction (54%). HU teachers and LU teachers differed on whether professional development was an important element influencing the success of a school garden program (Figure 2).

Barriers to having and using school gardens

Educators were asked what barriers or obstacles they experienced working in the garden. More than 50% of the educators indicated that the most common barriers was lack of time, followed by lack of experience (45%), and lack of training (34%). HU and LU teachers differed on a 'lack of interest in using the garden by teachers' which was selected more frequently by HU teachers ($p<0.01$) (Figure 3).

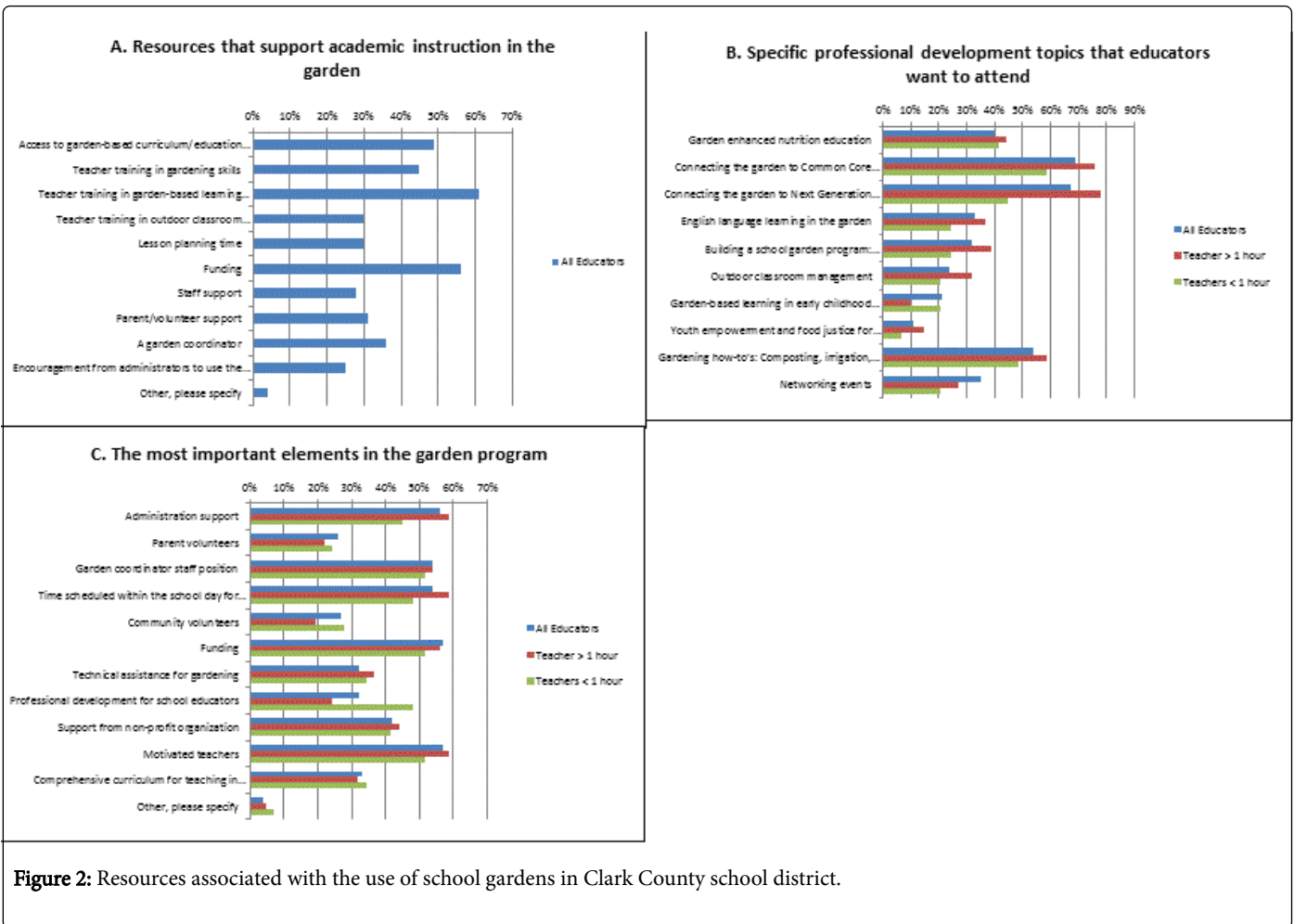


Figure 2: Resources associated with the use of school gardens in Clark County school district.

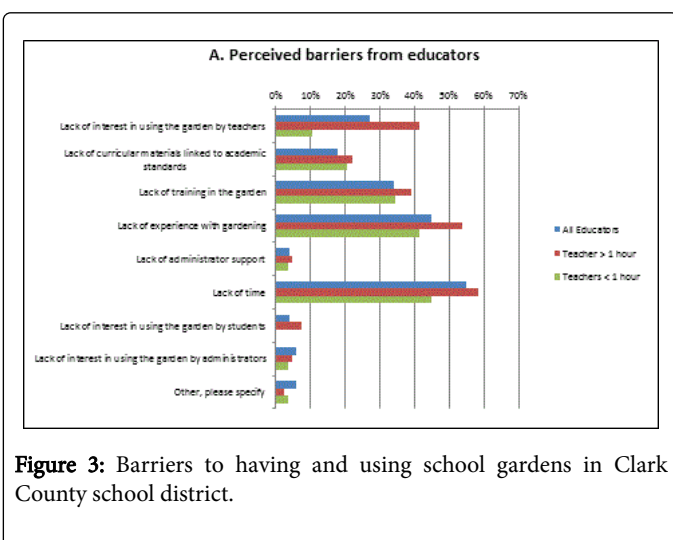


Figure 3: Barriers to having and using school gardens in Clark County school district.

The perceived benefits students receive when school gardens are incorporated into the school curriculum

The most prevalent perceived benefits of school gardens among teachers were increased nutrition knowledge (76%), they are fun for teachers and students (74%) and they provide a powerful learning tool

(72%). Administrators answered quite differently and considered improved social skills (43%) and increased community engagement (64%) as major benefits of school gardens. Other significant differences between teachers and administrators, were that teachers perceived that gardens increased nutrition knowledge ($p<0.01$), improved test scores ($p<0.01$), increased parent engagement ($p=0.02$), are a powerful learning tools ($p=0.01$), are fun for teachers and students ($P<0.01$) and are an important part of the curriculum ($p<0.01$) at higher rates than did administrators (Figure 4).

As can be seen in Figure 4, more than 50% of educators believed that improved environmental awareness (71%), attitude towards school (60%), and improvements in health and nutrition (60%) were positive aspects of the garden program with no differences between groups.

Student behavior changes since the establishment of their school garden were also observed. The most frequently reported change was that students showed a greater interest in eating healthier foods (60%). A higher proportion of HU teachers indicated that students were more engaged in school (51.2%) when compared to LU teachers (27.6%) ($p<0.05$), and combined teacher data on school engagement was more frequently reported (43.2%) than among administrators (20.8%) ($p<0.05$) (Figure 4).

When educators were asked 'what skills have you seen students acquire through the use of your school garden', the majority selected the ability to recognize different vegetables (71%), followed by the

ability to understand and complete gardening activities (63%), concern for the environment (63%), and knowledge of gardening activities such as soil/composting/insects/irrigation systems (64%).

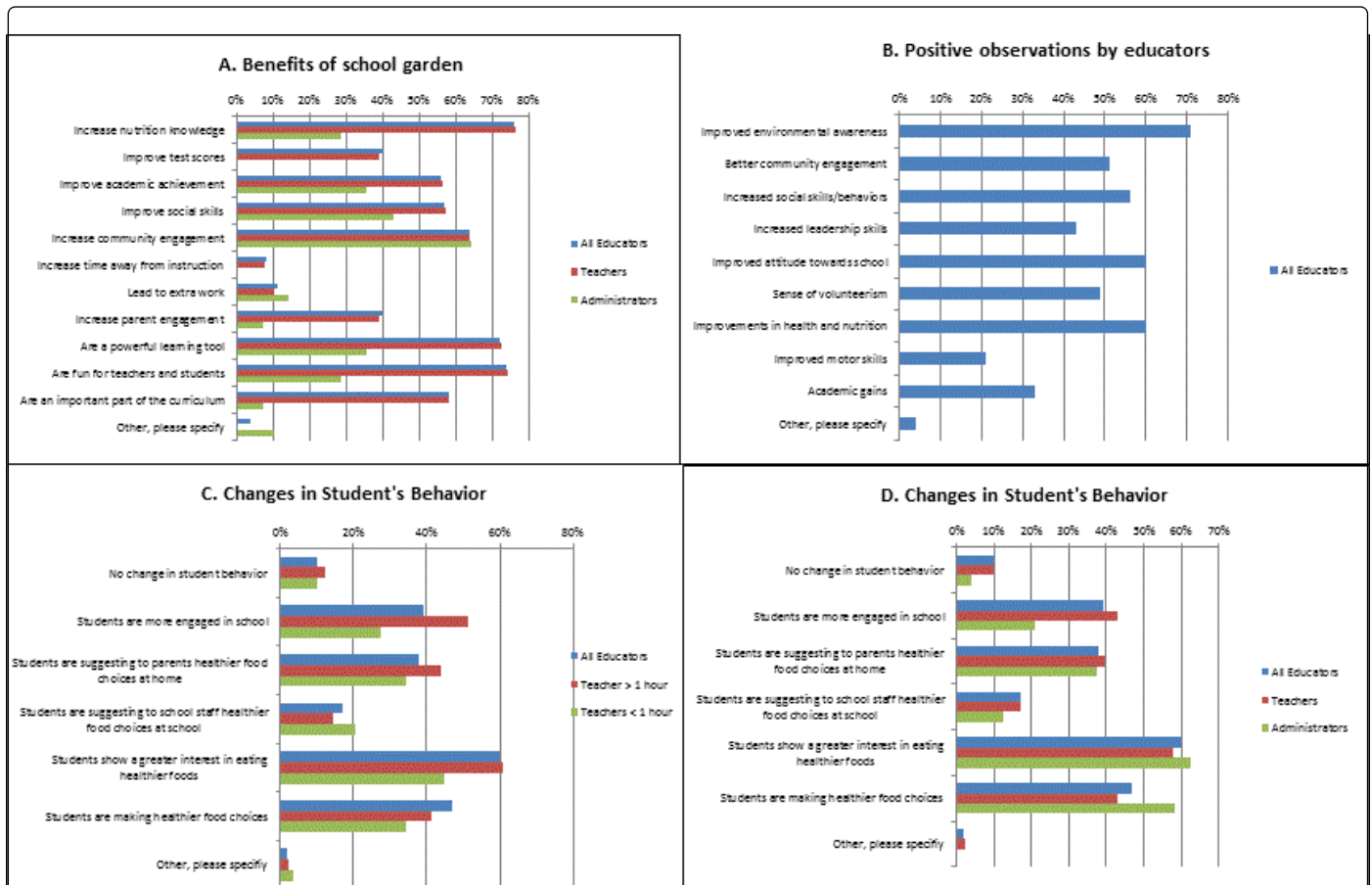


Figure 4: The perceived benefits of incorporating gardens into school curriculum in Clark County school district.

Discussion

While our study supported findings from previous studies regarding the use of school gardens, the most interesting findings highlighted the difference in perceptions between teachers and administrators, and teachers based on time spend in the garden regarding important resources for garden instruction and perceived benefits of school gardens [16,20-22].

The differences noted between administrator and teacher responses may be the most important, and, concerning. Because these two groups largely did not agree upon the perceived benefits accrued by the students as a result of exposure to school gardens, it is reasonable to assume that they also have differing expectations. Such differences could lead to misunderstandings about why valuable classroom time is spent in the gardens, and financial support from administrators for the gardens could be withdrawn if this misunderstanding should persist. Our finding that teachers and administrators, again largely did not agree on the times of day that the gardens are used supports the notion that these two groups are not "on the same page" in terms of when and why class time is used in the gardens.

It is also interesting that teachers and administrators differed on school garden's influence on tests. Thus it is clear that research should

be done assessing any influence that the gardens might have on these tests, if any. Should test score improvements be observed subsequent to school garden exposure it is likely that garden use would be expanded with the possibility of being institutionalized as a teaching method?

Only 4-5% of teachers indicated that administrative support was a barrier to using the school garden. This is interesting because most teachers report receiving support, even though there is not agreement on the benefits of and barriers to spending time in school gardens. Again, this suggests that unless the groups come to agreement on these issues, the support that teachers now report may dwindle.

One step that teachers might take would be to invite administrators into the gardens to observe the learning that takes place in that setting. It is also imperative that research be conducted that could potentially provide evidence of benefits that take place in the gardens. This information can be presented to administrators to justify the time and money spent in that setting. The research should not only address academic learning, but utilitarian benefits such as incidental physical activity done in the process of gardening should also be investigated. Items that inquired about perceived teacher needs to operate successful garden also elicited interesting information. Educators would like to see curricula developed that connect garden instruction to common core English/Language Arts and Math, and to Next Generation Science

Standards. This is not unexpected because these are the most frequently taught subjects in the gardens. This finding supports the work of Skelly and Bradley who found that educators need additional materials to help them effectively teach science lessons in gardens [22]. There was also significant difference based on time spent in the garden, with HU teachers more likely to want professional development to connect the garden to Next Generation Science Standards. This is possibly because teachers that spend more time in the garden are more likely to teach a larger variety of subjects while there, and they would especially like to improve their science knowledge.

Teachers and administrators also differed on the resources needed to support academic instruction in the gardens. Teacher training was selected most frequently by teachers as the most needed resource, while administrators indicated that funding was most important. Graham and colleague found similar differences between teachers and principals in California [16,20]. This difference may however be nuanced. It is possible that teachers and administrators do not disagree on this issue; rather, it may be a matter of viewpoint. Teachers could be responding to their immediate classroom needs, while principals may see it in a different context. Administrators may fully agree that more resources and training are needed, but that funding will be needed to provide them.

Strength of this study that none of the previous studies assessed was the perceived benefits of using school gardens. This question produced a number of significant differences between teachers and administrators, with the teachers selecting the following benefits more often: increase nutrition knowledge, improve test scores, increase parent engagement, provide a powerful learning tools, gardens are fun for teachers and students, and gardens are an important part of the curriculum. Teachers may have perceived more benefits related to school gardens because they encounter the benefits first hand. They are with the students when they learn and experience the garden so they can directly perceive the positive outcomes. On the other hand, administrators are likely to be more removed from the garden and its effect on students. Again, it may be important for administrators to experience the impact of the garden first hand to understand their value.

There were also significant differences in the answers between HU and LU teachers regarding what changes they had seen in the student's behavior. HU teachers were more likely to indicate that school engagement was enhanced compared to LU teachers. This finding suggests that benefits may not be seen until a threshold of time is spent in the gardens. However, because the amount of time to be spent in the gardens was not randomly assigned, it is possible that HU teachers are more venturesome and possibly more effective teachers than LU teachers. It is also possible that HU teachers are more committed to using gardens as a teaching modality and are more apt to notice and report positive student behaviors, and attribute these differences to the gardens. Qualitative data indicated that HU made comments such as , "The students love going out to the garden and the excitement of learning outside continues throughout the day," "The garden is a great teaching tool", and "The garden has opened the students up to the idea of gardening and has introduced them to different types of produce."

The most frequently identified barriers to using school gardens were: lack of time, lack of experience with gardening and lack of training. These findings are consistent with other studies indicating that teachers may need data and research findings to effectively advocate for permission to spend more time in the gardens as well as request garden training [16,20].

The primary limitation of this study was that participants were selected from only a few schools from CCSD. Thus, the results may not be generalizable to other schools in the CCSD or to school garden programs in other states. This study may have also had selection bias due to preference and interest in school gardens of some educators. Teachers interested in school gardens may have been more likely to participate in the survey than teachers with no interest in school gardens. Teachers and administrators were not necessarily from the same schools.

Implications for schools

The number of school garden programs has increased in the United States and teachers have more opportunities to provide outdoor, hands-on lessons for their students. School garden programs appear to provide several health and educational benefits to students and teachers are aware that the garden can be a powerful learning tool. In addition, the results of this study indicate that teachers need additional professional development to improve their garden-related knowledge as well as administrator support. Differences in perceived benefits as well as necessary resources were found between teachers and administrators. Administrators could benefit from spending time in the gardens to observe the learning that takes place in that setting and its benefits. This could lead to greater administrator support for funding of gardens, spending class time teaching in gardens and teacher training for more effective use of the garden. Teacher interest and administrator support are important components of a successful school garden. In order for children to learn and fully experiences the garden, their teachers must be interested in the garden and administrator supportive of the garden, first.

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