

Using a Web-based Survey to Research the Benefits of Children Gardening

Tina M. Waliczek,¹ J.C. Bradley,² R.D. Lineberger,³ and J.M. Zajicek⁴

ADDITIONAL INDEX WORDS. **Aggie-horticulture, KinderGARDEN, Internet, self-esteem, interpersonal relationships, stress reduction, children's horticulture, school gardening, education**

SUMMARY. A survey, targeting adults working with youth in garden situations, was designed for delivery on the KinderGARDEN World Wide Web site. The goal of this survey was to investigate adults who are actively involved in gardening with children in school, community or home gardens on their perceptions of the benefits of children participating in gardening. Three hundred-twenty completed surveys were returned via e-mail during a period of 9 months. Fourteen questions were included on the survey requesting information concerning what types of gardening situations in which children were participants and the demographics of the children involved in gardening. Results of the study cover 128,836 children (youth under 18 years old) involved in gardening, primarily with teachers in school gardens. The children involved were generally 12 years of age or under and were growing food crops. Adults gardening with children reported benefits to children's self-esteem and reduction in stress levels. Adults were also interested in learning more about the psychological, nutritional and physical benefits of gardening. Comparisons between those adults involved in gardening found that parents' and teachers' ideas differed concerning the most important aspects of the gardening experience. Parents viewed food production as most important while teachers thought socializing and learning about plants were most important.

Historically, people have recognized gardens have more than economic value, especially for children (Bassett, 1979). Early in this century, gardens were incorporated into children's education to teach everything from responsibility to social skills (Kaiser, 1976; Montessori, 1912; Poroshina, 1985; Sarver, 1985). Today, children are entertained by and learn from computers and technology, and are generally spending less time outdoors exploring nature (Hart, 1994). The objectives of this study were to investigate the number of gardening programs available for children, the people involved in these programs, and what kinds of benefits adults perceive children are realizing from these programs.

Department of Horticultural Science, Texas A&M University, College Station, TX 77843-2133.

The cost of publishing this paper was defrayed in part by the payment of page charges. Under postal regulations, this paper therefore must be hereby marked *advertisement* solely to indicate this fact.

¹Graduate research assistant.

²Assistant professor, Department of Environmental Horticulture, University of Florida, Gainesville, FL 32611-0670.

³Professor.

⁴Professor.

Table 1. Questions and answers included in KinderGARDEN Internet survey.

Question	Answer
1) How are you involved with children and gardening?	Parent Teacher Relative Community gardener Other
2) Where do your children garden most?	Home School Relative's house Community garden Other
3) Do you garden with your children?	Yes No
4) Do you feel this activity brings you closer together?	Yes No
5) What kinds of things are grown in your children's garden?	Fruits Vegetables Flowers Other
6) How many children do you know that are involved in a gardening program or garden as a hobby?	
7) Gardening can provide human benefits to the body, mind, and spirit. Please indicate which of the following are important to you and the children with whom you garden	Growing fruit and vegetables for food Socializing with gardening friends Feeling relaxed and safe in a plant environment Learning about plants Improving home or community with plants and flowers Exercising for physical benefits Not applicable Other (please type below)
8) Indicate any garden benefits that you've observed in the children you work with	Stress reduction Improved self-esteem Less depression Better interpersonal relations Better physical condition Not applicable Other (please type below)
9) Do you feel that gardening has taught your children about nature and the environment?	Yes No
10) Indicate any children's gardening information or topic(s) you would be interested in having us post on this homepage	Physical benefits Psychological benefits Nutritional benefits Not applicable Other (please type)
11) Do the children you work with live in the city or in the country?	City Country
12) What is the age range (years) of the children with whom you work?	<8 9-12 13-15 16-18 >18
13) Please list any other comments about children's gardens below	
14) How did you find this survey	

Table 2. Demographic information provided from Internet survey posted on KinderGARDEN and the percentage of responses within each answer.

Question	Frequency	Proportion (%)
How are you involved with children and gardening?		
Parent	218	68.1
Teacher	61	19.1
Relative	11	3.4
Community gardener	10	3.1
Other	20	6.3
What is the age range of the children with whom you work?		
<8	259	81.2
9-12	54	16.9
13-15	4	1.3
16-18	2	0.6
Do the children you work with live in the city or in the country?		
City	204	63.8
Country	115	36.2

An additional objective was to experiment with conducting research using a survey tool posted on a Web site for children's gardening. Web-based surveys have been used successfully with customer satisfaction and market research (McCullough, 1998), employee opinion and training evaluations (Alesandrini, 1996), and in the travel and tourism industry (Schonland and Williams, 1996). Some of the positive attributes to Web-based surveys include the elimination of an interviewer which, in turn, reduces interviewer bias, the reduced cost of posting surveys on the Internet compared to mailing costs, and the increased speed of replies to surveys (McCullough, 1998). The drawbacks include, primarily, the bias in a sample that is attained since the population is limited to those who have a computer and access to the Internet (Maddox, 1997; Schonland and Williams, 1996).

Materials and methods

INSTRUMENTATION. The survey was designed and posted on KinderGARDEN (KinderGARDEN, 1996), one of many homepages on the Texas A&M University Horticulture Department network Web server, Aggie Horticulture (Aggie Horticulture, 1994). Aggie Horticulture has been officially online since October 1994. The mission of the server is to provide commercial and consumer horticulture information, and is utilized primarily by the Texas Agricultural Extension Service. However, horticulture department course Web sites are maintained here, and research information is also made

accessible to the public.

The KinderGARDEN homepage was designed to use the technology of the Internet to advance children's horticulture by providing garden-related activities to children, teachers, parents, and other adults. Located within this Web site are specific pages relating to school gardens, community gardens, and botanical gardens. There is also a "fun page" developed specifically for use by children. This page contains activities for youngsters to do independently or with some supervision, and it includes garden-related Web site links for children to visit.

The survey was designed to be answered by adults participating in gardening activities with children. To construct the tool, surveys with similar formats were located on the Internet and used as models. The survey sample included only adult respondents who volunteered to participate in the survey. The survey tool included 14 questions; 11 had preset answers for respondents to choose from and two of the 11 also had open-ended response areas for elaboration (Table 1). On questions with preset answers, respondents were limited to selecting the one option that they felt most important from the group of available answers. Three questions were strictly open-ended (Table 1).

DATA ANALYSIS. The data were analyzed using the Statistical Package for the Social Sciences (SPSS) for Windows release 7.5 (SPSS, 1997). Descriptive statistics and frequencies were used to summarize the demographic characteristics of children participat-

ing in gardening. Analysis of variance tests were conducted to determine differences between adults based on their involvement with children in the garden.

Results

Three hundred-twenty responses were collected via e-mail from October 1996 through June 1997. Due to the nature of the self-selection process, the responses acquired were adequate for supplying ideas and trends for the given sample population, but are not necessarily intended for generalizations to other populations. Adults responding to the survey reported a total of 128,836 children gardening in various programs (Table 1, question 6). Parents were the largest group of adults gardening (Table 2), and they tended to garden with their own children, and occasionally with neighborhood children and/or relative's children. However, from the initial 128,836 children reported, only 3% were involved in gardening with parents (Table 1, question 1). While parents generally garden with only a few children at a time, teachers generally garden with full classes of children. Therefore, 96% of the 128,836 children reported were gardening with teachers. Only a small percentage of children were involved in gardening with relatives or community gardeners. Demographic information also indicated most children involved in gardening were under 12 years of age (98.1%), and of those, most were under the age of 8 years (81.2%) (Table 2). Of the 128,836 children gardening, most were from

Table 3. Responses in categories answering survey question 5.

What kinds of things are grown in your children's garden?	Frequency	Proportion (%)
Fruit	121	37.8
Vegetables	155	48.4
Flowers	43	13.4
Other	1	0.4

Table 4. Responses in categories answering survey question 7.

Which of the following are important to you and the children with whom you garden	Frequency	Proportion (%)
Growing fruit and vegetables for food	223	70.1
Socializing with gardening friends	24	7.5
Feeling relaxed and safe in a plant environment	30	9.4
Learning about plants	37	11.7
Improving home or community with plants and flowers	2	0.7
Exercising for physical benefits	0	0
Not applicable	0	0
Other	2	0.6

Table 5. Responses in categories answering survey question 8.

Indicate any garden benefits you've observed in the children you work with	Frequency	Proportion (%)
Stress reduction	116	37.7
Improved self-esteem	148	48.1
Less depression	13	4.2
Better physical condition	3	0.9
Not applicable	11	3.6
Other	17	5.5

Table 6. Analysis of variance comparing adult responses to survey question 7, "Gardening can provide human benefits to the body, mind, and spirit. Please indicate which of the following are important to you and the children with whom you work."

Group	Sum of squares	df	Mean square	F	P
Between groups	12.92	4	3.23	2.27	0.062*
Within groups	446.01	313	1.43		
Total	458.92	317			

*Significant at $P \leq 0.10$.

cities (63.8%), and approximately one-third of the children resided in more rural areas (36.2%) (Table 2).

In response to question 5, "What kind of things are grown in your children's garden," adults reported that children grew primarily food crops (86.2%), and a small percentage (13.4%) grew flowers (Table 3). In open-ended response areas on the survey, respondents indicated they would like to learn more about types of floral

crops that are easy, fun, and fast to grow with children.

Besides demographic information, the survey asked questions to determine what benefits the adults perceived the children were gaining from gardening. All adults felt gardening brought them closer to the children with whom they worked (100%). Historically, gardens have been thought to be good for children's socialization and interpersonal relation-

ships (Montessori, 1912). Recent research has provided evidence that outdoor programs can increase socialization among children and family members (Henneberry and Robertson, 1983), and community gardens can increase socialization among adults (Waliczek et al., 1996). Additionally, all adults felt that working in the garden taught their children about nature and the environment (100%). Historically, gardens were used by schools to teach "nature study" (Bailey, 1909). More recent research has found that experiences with vegetation not only teach children about nature, but also can positively affect their environmental dispositions (Dressner and Gill, 1994; Harvey, 1989).

In response to question 7, "Gardening can provide human benefits to the body, mind, and spirit. Please indicate which of the following are important to you and the children with whom you garden," the answer "growing fruits and vegetables" was the most often mentioned (70.1%). However, "learning about plants" (11.7%), "socializing with gardening friends" (7.5%), and "feeling relaxed with gardening friends" (9.4%) were also mentioned as important attributes of the garden experience (Table 4). Community garden studies have indicated that while people garden for reasons such as food and health, they are often receiving benefits to their self-esteem, and social well-being (Gordon and Dotter, 1996; Patel, 1991; Waliczek et al., 1996) and possibly in other areas. For example, a research study involving home gardeners found that people residing in homes with food gardens realized economic benefits while finding gardening a source of pleasure and relaxation (Soleri, 1986). Studies conducted with home and community gardeners have also shown that gardeners progress with years of experience from requiring "tangible" benefits, such as fruits/vegetables and/or economic benefits, to growing flowers for peace and tranquility or simply going to the garden for the opportunity to be with others (Kaplan, 1973; Kaplan and Kaplan, 1987; Shoemaker, 1982).

In response to question 8, "Indicate any garden benefits that you've observed in the children you work with," adults were asked to record the benefits they have actually observed in children. A high percentage of adults

reported noticing benefits to self-esteem (48.1%) and stress reduction (37.7%) (Table 5). An "other" category for this question allowed respondents to include comments in an open-ended response area. Respondents often noted other benefits of gardening related to academics, such as the application of school science lessons and learning about ecosystems. They also often included descriptions of the nutritional benefits of gardening such as the enjoyment of eating fresh produce. However, many of the benefits respondents mentioned were not necessarily inherent to working outside with fruits, vegetables, and plants, including learning values such as patience, work ethics, and goal systems. Not surprisingly, these are the types of values that children's gardens were meant to instill in children throughout history. In the late 19th century, children's gardens were initiated by a factory owner who believed that a garden would be "a place to foster the physical, mental and moral development of the boys of his employees" (Bassett, 1979). This factory garden was the model for future school gardens that were built to help children learn about nature, work habits

and social attitudes (Bailey, 1909).

Comparisons were made between the adult groups responding to the survey and the answers they submitted for each question. No statistically significant differences were found in survey responses in most questions, indicating that in most cases, adults view children's gardening similarly. One exception was found with question 7, "Gardening can provide human benefits to the body, mind, and spirit. Please indicate which of the following are important to you and the children with whom you garden." An analysis of variance (ANOVA) test compared respondents answers and found statistically significant differences ($P = 0.062$) (Table 6). Post-hoc analyses (Least Significant Difference) indicated that differences occurred between the perceptions of parents and teachers. More parents viewed food production as important (74.7%), than did teachers (54.1%). However, more teachers viewed "socializing with gardening friends" (16.4%) and "learning about plants" (24.6%), as more important when compared to parents (4.5% and 8.7%, respectively). Exercising and improving the home or community were not important to either group.

In response to question 10, "Indicate any children's gardening information or topics you would be interested in having us post on this homepage," most respondents were interested in acquiring information on the physical (38.8%) and psychological benefits (35.2%) of children's gardening (Table 8). In addition, some respondents were interested in nutritional benefits of children's gardening (9.6%) (Table 8). Again, an "other" category collected individual responses to this question. Information on theme garden ideas, organic gardening techniques, activities and ideas for homeschooling, curriculum integration ideas, and edible flower recipes was requested most frequently.

Discussion

Results from this study suggest that children are spending time outdoors exploring the garden with adults. Involvement with adults provides children not only contact with the natural world, but a role model to teach them an understanding of the natural world (Hart, 1994). In addition, information from the survey provides horticulture researchers an overview of the type of children that are involved in

Table 7. Parent and teacher responses to survey question 7.

Please indicate which of the following are important to you and the children with whom you work	Percentage	
	Parents	Teacher
Growing fruit and vegetables for food	74.7	54.1
Socializing with gardening friends	4.5	16.4
Feeling relaxed and safe in a plant environment	10.6	4.9
Learning about plants	9.7	24.6
Improving home or community with plants and flowers	0	0
Exercising for physical benefits	0	0
Not applicable	0	0
Other	0.5	0

Table 8. Responses in categories answering survey question 10.

Indicate any children's gardening information or topic(s) you would be interested in having us post on this homepage	Frequency	Proportion (%)
Physical benefits	109	38.8
Psychological benefits	99	35.2
Nutritional benefits	27	9.6
Not applicable	16	5.7
Other	30	10.7

gardening, the programs in which they are involved, and the benefits they may be obtaining from their participation in gardening activities.

The results of this study may also be beneficial to the horticulture industry in directing marketing efforts toward an important group. Knowing that parents are a large consumer group and that they are interested in teaching children about gardening at home allows the industry to direct efforts towards selling products to this market. Moreover, teachers are working with large groups of children and could be considered a major new market for horticultural goods.

Perhaps the most exciting finding from this research, however, was the demonstration that Web-based surveys could be a viable research technique to obtain a population for the study of people-plant interactions. The Internet offers researchers three key things: a readily accessible study sample of interested gardeners, a method for participants to respond, and a potential source of large amounts of information. This information can guide research in a direction that is of interest not only to universities and industry professionals, but to the general public as well.

Literature cited

- Texas A&M University. 1 Sept. 1994. Aggie Hort. <<http://aggie-horticulture.tamu.edu>>.
- Alesandrini, K. 1996. Sitting in the poll position. *Comp. Shopper* 16(11):469.
- Bailey, L.H. 1909. *The nature study idea*. MacMillan, New York.
- Bassett, T.J. 1979. Vacant lot cultivation: Community gardening in America, 1893-1978. *Landscape* 25(2):1-8.
- Dressner, M. and M. Gill. 1994. Environmental education at summer nature camp. *J. Environ. Educ.* 25(3):35-41.
- Gordon, B. and J.C. Dotter. 1996. City community gardens in partnership with the San Jose State University interdisciplinary student garden project for education, outreach, and sustainable agriculture research: A model for replication. People-Plant interactions in urban areas: A research and education symposium, 23-26 May 1996, San Antonio, Texas.
- Hart, R. 1994. Fostering earth stewardship. *Amer. Hort.* 73(7):5-6.
- Harvey, M.R. 1989. Children's experiences with vegetation. *Children's Environ. Quart.* 8(1):36-43.
- Henneberry, J. and P. Robertson. 1983. Fun in the sun: An outdoor program in a health care setting. *Children's Health Care* 12(1):37-41.
- Kaiser, M. 1976. Alternative to therapy: Garden program. *J. Clinical Child Psychol.* 5(2):21-24.
- Kaplan, R. 1973. Some psychological benefits of gardening. *Environ. Behavior* 5(2):145-162.
- Kaplan, R. and S. Kaplan. 1987. *The experience of nature*. Cambridge Univ. Press, New York.
- Texas A&M University. 1 Sept. 1996. KinderGARDEN. <<http://aggie-horticulture.tamu.edu/kindergarden/kinder.htm>>.
- Maddox, K. 1997. Online market research helps web advertisers; surveys provide valuable data, but may reach warped sample. *Adv. Age* 68(41):36.
- McCullough, R. 1998. Web-based market research: Dawning of a new age. *Direct Mktg.* 61(8):36-38.
- Montessori, M. 1912. *The Montessori method*. Schocken, New York.
- Patel, I.C. 1991. Gardening's socioeconomic impacts: Community gardening in an urban setting. *J. Ext.* 29:7-8.
- Poroshina, G.P. 1985. Organization and contents of labor training in boarding school for mentally retarded in summer time. *Defektologiya* 6:47-49.
- Sarver, M. 1985. Agritherapy: Plants as learning partners. *Acad. Therapy* 20(4):389-396.
- Schonland, A.M. and P.W. Williams. 1996. Using the internet for travel and tourism survey research: Experiences from the net traveler. *J. Travel Res.* 35(2):81-88.
- Shoemaker, J. 1982. Horticultural skill ratings, demographic characteristics, economic aspects, and social behaviors of community gardeners. MS thesis. Kansas State Univ., Manhattan.
- Soleri, D. 1986. Food gardens and some characteristics distinguishing gardening and non-gardening home-owning households in a low-income census tract of Tucson, Arizona. MS thesis. Univ. Ariz., Tucson.
- Statistical Package for Social Science (SPSS). 1997. SPSS 7.5 for Windows. Prentice Hall, Upper Saddle River, N.J.
- Waliczek, T.M., R.H. Mattson, and J.M. Zajicek. 1996. Psychological benefits of community gardening. *J. Environ. Hort.* 14:204-209.