Youth in Horticulture

Improving Research on Youth Gardening

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SUMMARY. Results of research on youth gardening programs indicate a variety of benefits; however, most studies to date have encountered difficulties in separating treatment effect from confounding variables. A survey of those recently involved in this type of research was conducted to identify common problems and generate suggestions for improving future research efforts. Problems reported as most frequently encountered include difficulty with timing and logistics, lack of funding, and finding and keeping sufficient numbers of participants. Suggestions for obtaining stronger results include: allowing plenty of time for planning, establishing good communication with collaborators, choosing topics relevant to funding agencies and policy makers, and creating interdisciplinary studies that are longitudinal or large-scale collaborative efforts.

An increasing amount of research is exploring the effects of horticulture programs on youth participants (Bradley et al., 1998; DeMarco et al., 1999). Studies have examined effects of school gardens on academic achievement (Alexander et al., 1995; Canaris, 1995; Sheffield, 1992), nutrition (Canaris, 1995; Lineberger and Zajicek, 2000), environmental awareness (Endoh and Morinaga, 1996; Milton et al., 1995; Skelley and Zajicek, 1998; Waliczek and Zajicek, 1998), self-esteem (Dawson and Zajicek, 1998; Sheffield, 1992; Waliczek and Zajicek, 1998), life skills (Bunn, 1986; Waliczek et al., 2001; Wotowiec, 1974), and other benefits. While this body of research indicates that youth gardening programs offer numerous benefits, many studies to date have been inconclusive, and some are essentially anecdotal, thus lacking

the scientific rigor to substantiate the suggested benefits. Large-scale, scientifically valid studies are needed to secure administrative support and funding for such programs, but research in this field has proven to have many complications not present in research with plant subjects.

Predny and Relf (1998) describe some factors negatively impacting their research on intergenerational horticulture programming and suggest several planning methods to make research more successful. First, they suggest that thorough communication with the staff at collaborating facilities helps generate the support needed to make programs a success. This includes building the horticulture program around the philosophy and goals of the facility and agreeing on a schedule that is convenient for the staff. They also encountered problems with good-intentioned but inexperienced volunteers. Researchers should treat volunteers with respect, provide them

with training on how to work with the study population, and give them a clear list of expectations (Predny and Relf, 1998). Shoemaker et al. (2000) identify horticulturists' lack of experience in the necessary social science research methodologies as a limiting factor in the widespread development of research documenting human issues in horticulture, and recommend the use of interdisciplinary teams to improve the outcomes of research. They also describe numerous methodologies that have been used successfully in exploring people-plant interactions, such as experiments, quasi-experiments, surveys, personal interviews, focus groups, and observation.

To help improve future research in youth gardening, a survey was conducted to pool the knowledge and experience of those who have completed research in this field.

Materials and methods

A survey was designed to investigate the common problems experienced by those involved in school and youth gardening research to seek techniques for overcoming the problems and to determine future directions for research. The survey was written to include a combination of closed- and open-ended questions. A pilot test was completed by one published researcher in this field. The survey was sent to faculty and graduate students across the country who had recently participated in related research. Names were obtained through a general literature search online and in horticultural journals such as *HortTechnology* and the *Journal of Therapeutic Horticulture*, focusing on keywords associated with youth gardening, such as gardening AND youth, school gardens, children AND horticulture rather than including environmental education in general. A total of 21 researchers in 10 states were identified, all of whom had participated in research related specifically to youth gardening. University departments represented included horticulture, agricultural science, plant science, cooperative extension, design and environmental analysis, and health and nutrition. A few of the researchers were employed by other agencies (e.g., botanic gardens). Surveys were mailed to 17 researchers; current contact information could not be obtained for the remaining four people. It is recognized that the limitations of literature

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searching may have failed to identify all eligible researchers, potentially making the sample population small and increasing potential bias. However, measures were taken to enlist participants from all parts of the country.

Results and discussion

A total of 13 surveys out of 17 were returned, providing a 76% response rate. All respondents reported having planned and implemented research between 1996 and the present. Several reported participation in multiple research projects.

CHARACTERISTICS OF PAST RESEARCH. Survey recipients were asked to list the specific topics investigated in their research. Five topics were reported by 20% or more of respondents (Table 1). Other topics reported by at least one respondent were fitness, garden design, risk management, special needs, teacher needs, and impact of nature on well-being, behavior, and therapy.

Another question asked what age groups have been included in research. The majority of respondents, 85% (11), report conducting research with

elementary aged children. More than one-third, 38% (5), reported working with middle school students; 23% (3) studied high school students; and 15% (2) conducted research with preschool children.

COMMON PROBLEMS. Respondents were asked to list all problems encountered in conducting their research and identify the problem they felt was most inhibiting to their research (Table 2).

The survey requested suggestions for overcoming these difficulties. A wide range of comments was received (data not presented), but three themes became evident. The first is *planning in advance* to avoid problems and remaining flexible in order to deal with any that do arise. This requires having knowledge as to what problems may be encountered and how research design can help reduce the effects. For example, because most respondents noted problems in obtaining and keeping sufficient numbers of participants, researchers should recruit enough subjects to compensate for large losses as an early priority. Another early priority should be the identification and pilot testing of appropriate research instruments.

The second theme focuses on how to avoid problems by finding *effective communication techniques* with all participants. The best method of communication for everyone, such as phone, e-mail, or fax, should be established early. All discussions should be followed by written confirmation of what was decided. Collaborators should understand from the beginning what their benefits for participation are, what their obligations are, and why it is crucial to complete their tasks in the given time frame. Researchers

should also understand the workload and schedule of their collaborators in order to set realistic expectations for their level of participation.

The third theme focuses on increasing the *amount and quality of collaboration* between researchers and participating schools or childcare organizations by understanding organizations' motivations for participating and offering incentives such as a prewritten garden curriculum or other supplies.

COLLABORATORS. Respondents were asked to list organizations with which they have collaborated. Three organizations consistently offered support to a majority of youth gardening research projects (Table 3). Additional organizations that have collaborated with or provided resources for researchers include: other universities, departments of parks and recreation, social services, housing authorities, botanical gardens and arboreta, various grant organizations, graduate students, and the horticulture industry.

When asked to specifically name the collaborators who had shared the most resources or assistance for research, 30% (4) named schools or teachers; 23% (3) identified other university departments; and 15% (2) named both the extension service and extension Master Gardeners.

FUNDING. Responses on the survey indicated that funding is a common problem for the majority of respondents (Table 2). Answers to questions related to funding indicated that there are organizations such as the National Gardening Association willing to assist financially with this type of research. Researchers should know what will be

Table 1. Proportion of respondents (N = 13) to a survey of individuals recently conducting youth gardening research who report researching five relevant topics.

Topic	Researchers studying topic (%) ^z
Health or nutrition	69
Environmental education	46
Self-esteem or self-concept	30
Academic achievement	23
Life skills	23

^zNot cumulative; several respondents listed more than one research topic.

Table 2. Problems reported by respondents (N = 13) to a survey of individuals recently conducting youth gardening research as frequently encountered and as most inhibiting for conducting research.

Problem	Researchers who encountered the problem (%) ^z	Researchers listing it as their most inhibiting problem (%)
Timing/logistics	69	13
Funding	54	23
Sufficient number of participants	46	23
Appropriate testing tools	38	8
Support of school/other organization	38	0
Obtaining parental permission	31	23
Test subjects dropping out/absent	31	23
Promised help not following through	31	8

^zNot cumulative; several respondents listed more than one most inhibiting problem.

Table 3. Organizations that have frequently collaborated in youth gardening research as reported by respondents (N = 13) to a survey of individuals recently conducting youth gardening research.

Organizations	Respondents reporting collaboration (%) ^z
School system	85
Cooperative extension service	
Extension agents	77
Master Gardeners	46
4-H clubs	30
Other departments at universities	54

^zNot cumulative; several respondents listed more than one collaborator.

needed and seek help from many different sources, varying their targeted sources with the goals and specific populations of each project.

TIME NEEDED TO COMPLETE RESEARCH. The survey asked respondents to report the actual time used to complete their research (Table 4).

The survey then asked how much time they would suggest in order to design and plan, execute, and evaluate research. Reflecting the wide variation of research in this field, many researchers noted that the time needed would vary greatly with the content and design of a study. However, estimated time ranges were provided on most of the surveys.

Time suggested for planning research ranged from 2 months to over 1 year (Table 5). It was noted by two respondents that extra time should be planned to allow for a pilot run of any test instrument or survey that will be used in the research.

Time suggested to execute research varied even more widely (Table 5). Several respondents commented that follow-up data would better explore any long-term benefits youth may gain from horticulture programs. However, working with youth populations makes time-series

research difficult for several reasons; children are considered a vulnerable population and research with youth must always be approved by a university internal review board, any collaborating organizations, and the parents of participants. The high mobility of children who change teachers and schools frequently makes it difficult to complete long-term studies with large numbers of participants.

Just over 60% of survey respondents provided an estimate of time needed to evaluate research findings (Table 5). One respondent noted that this time length was subject to change depending upon the other responsibilities of the researcher.

The time required to complete a study, in general, is longer than the times allowed for past research. Future researchers should allow sufficient time for planning. This may be particularly difficult with studies conducted primarily by graduate students. Faculty should consider the short time span allowed for design, implementation, and evaluation, particularly with Master of Science (M.S.) students, and they should guide research appropriately. Integrating M.S. students into one phase of a long-term research project conducted by faculty collaborators from different departments in one or more universities would provide opportunities for students to gain research expertise and contribute substantial findings.

SUGGESTIONS FOR RESEARCH DESIGN. When asked if future research should be primarily quantitative or qualitative, 69% (9) said that future research should include both of these methods. One researcher commented that quantitative measures better articulate results while qualitative measures help us understand the real meaning

of these numbers.

Gardening programs have been suggested to provide many different kinds of benefits to youth participants. An open-ended question inquired as to which of these benefits future research should investigate to best stimulate growth in the use of school and youth gardens. A wide variety of answers was obtained and most respondents offered more than one subject (Table 6). Additional topics suggested were career readiness, environmental stewardship, respect for the Earth, social skills, the value of green space, and exploring the impact of success with plants on how children feel about themselves. One researcher explained that we must be able to show the "cause and effect on achievement gains to justify the time, money, and energy required by gardening programs."

COMMENTS ON IMPROVING FUTURE RESEARCH. Suggestions for improving future research were solicited through a final open-ended question. It was suggested that in choosing a dependent variable, one should consider how that variable would influence policy and policy makers. For example, school gardening research should focus on issues that are currently important to school administration, such as compliance with state standards of learning, time and cost efficient stimulation of academic achievement, and improving the health and nutrition of students. Research with juvenile offenders could focus on issues related to behavior management and change.

One respondent recommended that research should be based on an existing theory, such as an educational, sociological, or psychological theory, in order to enhance the credibility and application of the research. Other comments suggested planning far in

Table 4. Amount of time actually used to complete research reported by respondents (N = 13) to a survey of individuals recently conducting youth gardening research.

Actual time used to complete research	Proportion of survey responses (%)
<1 year	40
1–1.5 years	20
1.5–2 years	7
>2 years	33

Table 5. Amount of time cited by survey respondents (N = 13) to a survey of individuals recently conducting youth gardening research as necessary for planning, executing, and evaluating the results of a research project, given as a percent of total responses in each category.

Time needed	Proportion of total responses (%)		
	Planning	Executing	Evaluating
<6 months	23	8	40
6–12 months	31	15	15
1–2 years	23	31	8
≥2 years	0	31	0
No response	23	15	37

Table 6. Topics suggested by survey respondents (N = 13) to a survey of individuals recently conducting youth gardening research for future research in order to best promote support for youth gardening programs.

Topics for focus of future research	Respondents suggesting topics (%) ^a
Academic and curricular benefits (e.g., meeting standards of learning, reading, achievement and accountability, comparing learning value to money invested)	62
Health, nutrition, or fitness	24
Life skills and resiliency	24

^aNot cumulative; several respondents listed more than one topic.

advance, conducting more studies with a pre- and posttest design, and working with individual teachers and schools to generate interest before going to the school board for permission to conduct research. Prewritten educational kits were proposed to help encourage and support cooperating teachers.

Conclusions

The initial planning stage is crucial to the final success of youth gardening research. The goals of this stage should be identifying a topic that will advance youth gardening in the eyes of policy-makers and funders, finding and testing appropriate research measurements, and obtaining sufficient numbers of participants. Also, effective communications must be established among all involved parties to ensure the greatest amount of understanding of research techniques and compliance with the demands of research. Researchers should be well organized and thorough in describing both the obligations and benefits of participating in the project to all collaborators.

Two types of research design offer the potential to generate the science-based and testable results needed to advance the support of horticulture programs for youth. Longitudinal studies evaluate the long-term effects of youth gardening programs, while large-scale collaborative research projects provide the best replication of experimental units, thereby allowing for easier testing of treatment effects. Finding committed collaborators to help plan and implement long-term research projects will add depth to the existing body of research. Collaboration with researchers in related disciplines such as sociology and environmental psychology can further strengthen research. Faculty from universities and other organizations across the country, working together to design and implement studies in order to complete research, will significantly improve the applicability and reliability of the findings.

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