Identifying Impact Indicators for School Garden Programs: Using Delphi Methods to Inform Program Development and Evaluation

Introduction

School gardens programs and garden-based education appear to be positioned to become fixtures in educational institutions given recent trends and the national interest in gardens at school sites (Hayden-Smith, 2006; Williams & Dixon, 2013). The literature shows (Berenguer, 2007; Bowker & Tearle, 2007; Koch, Waliczek & Zajicek, 2006; Mayer-Smith, Bartosh & Peterat, 2009; Williams & Dixon, 2013) that while there are specific curriculum links being made with science, language arts, mathematics, social studies and writing; school gardens programs exhibit a multitude of purposes and benefits.

Although the aforementioned literature outlines an extensive set of impacts that may result from a school garden program, they are grounded in a specific case or intervention. Those that are planning for and evaluating school garden programs are left to make connections based on case study results or intervention trials, which leaves plenty of room for error (Slavin, 2008). Educators and other key stakeholders would benefit from a set of impact indicators that cover a variety of school garden functions organized in the logical sequence of impacts following program engagement. By providing such results, they can better understand when and how to collect data to understand programmatic impacts (Israel, 2016).

Conceptual Framework

Educators and other key stakeholders would benefit from a set of impact indicators that cover a variety of school garden functions organized in the logical sequence of impacts following program engagement. By providing such results, educators and support organizations can better plan their programs and understand when and how to collect data to understand their aggregate programmatic impacts (Israel, 2001). Logic models provide an effective framework for educators to develop program plans for the development and evaluation of school garden programs based on certain outcomes they intend to create (Israel, 2001). Table 1 outlines the type of outcomes included in the framework that may be short-term, intermediate or long-term in nature.

Table 1 . Outcome Types for Educational Programs

Short-term	Knowledge, attitudes, skills and aspirations
Intermediate	Behavior change or adoption of best practices
Long-term	Social, economic and environmental conditions

Principles of backward design (Wiggins & McTighe, 2005) allows those that develop the program to identify the desired results in order to determine acceptable evidence of impact from assessment prior to planning learning experiences and instruction. In the planning phases, the intended outcomes are integrated into a logic model in the form of impact indicators that theoretically would result in the programmer's vision of success (Israel, 2001). These impact indicators should be used to develop program objectives that would guide the overall evaluation framework and associated evaluation tools. When integrating the additional components of a logic model that include process components, the educator is effectively identifying a causal relationship between the program and its intended outcomes otherwise known as a program theory of change (Israel, 2001). By organizing the school gardens program in this manner, programs can measure, learn and improve based on intended outcomes and make proactive changes based on the deficiencies along the outcome chain.

Methodology

The purpose of this study is to use research methodology to bring together a large group of school garden experts with breadth of experience and expertise to help to effectively guide the development and evaluation of school garden programs. The objective of the study is to identify the most meaningful outcomes (short-term, intermediate and long-term) to include the evaluation of such programs as identified by key school garden program experts.

We used the Delphi technique to identify key outcomes that should be incorporated in evaluation frameworks across a variety of school garden programs. The Delphi technique is a research-based approach used to solicit, collate, and direct responses to achieve consensus among a group of experts and has been cited as an effective means from structuring a group communication process so that the process is effective in allowing a group of individuals to address a complex situation (Delp, Thesen, Motiwalla & Seshadri, 1977; Linston & Turoff, 2002; Warner, 2015). The Delphi technique is frequently used in the educational context to develop consensus for program priorities and objectives that can help guide planning and evaluation efforts of programs.

The population for this study consisted of key school garden experts that held various roles in school garden programs across the state of Florida. The group of experts was purposively selected in alignment with best practice for the Delphi technique (Stufflebeam, McCormick, Binkerhoff & Nelson, 2012). In selecting the expert panel members, an advisory committee was developed that included representatives from the state agencies, non-profits, institutions of higher education and various school systems for a total of 74 panel members. This study utilized three online surveys to move the panel towards consensus.

Results

The results of this study identified 14 immediate outcomes (knowledge, attitudes, skills and aspirations) 13 intermediate outcomes (behavior change or adoption of best practice) and 11 conditional outcomes that the expert panel felt were most important to include in developing and evaluating a successful school garden program.

Table 2. Summary of Delphi Results

Outcome	Strongly Agree / Agree % (SD)
Immediate Outcomes (14)	
Increased knowledge and awareness of where food comes from (foods systems)	94.9
Students exhibit an increase in knowledge of healthy eating habits	86.4
Fosters love of gardening among students that increases their enthusiasm for learning	86.4
Students exhibit increased knowledge about nutrition and understand the importance of eating healthy to promote wellness	84.7
Increased life skills including leadership, accountability, teamwork/cooperation, social skills, responsibility, focus and patience.	84.7
Students exhibit an increased willingness to eat more nutritious foods (i.e. fresh fruits and vegetables)	83.1
Increased knowledge and skills among teachers for cross-curricular integration at the gardens	83.1
Students, parents and teachers demonstrate increased knowledge, skills, interest and confidence for growing their own food.	81.4
Students demonstrate increased ability to identify various plants and produce (i.e. fruits and vegetables)	81.4
Students demonstrate an increase in knowledge and appreciation for the natural environment	81.4
Increasing knowledge, skills and confidence for planning and carrying out gardening best practices	81.4
Students demonstrate increased knowledge of the value of a garden	81.4
Increased knowledge and skills through cross curricular integration in topics associated with gardening (i.e. science, technology, engineering math, social sciences, history, language arts, etc.)	79.7
Students exhibit an increase in knowledge and appreciation for the value of local food systems (i.e. local foods, local agriculture, local farmers, etc.)	69.5
Medium-term Outcomes (13)	
Students engage in nature through outdoor activities	86.4
Students are more engaged (participate, listen and pay attention to lesson)	78.0
Students share knowledge about gardening	76.3
Adults positively engage with students in garden	76.3
Students, parents and teachers make healthier food choices (i.e. expanding palate, eating more fruits and vegetables, trying new healthy foods/drinks)	76.3
Teachers incorporate nutrition education into garden instruction	74.6
Create a plan and structure to collaboratively manage the gardens	74.6
Students will protect their environment by using sustainable gardening practices (water conservation, composting, re-use of materials, etc.)	74.6
Teachers develop and implement garden-based curriculum that leverages real-world application of multiple disciplines (i.e. math, science, history, etc.) that connects to state standards.	72.9
Students increase their physical activity	72.9
Increased parent and community engagement in the garden	72.4
Students take home produce for cooking/consumption at home	71.2
Administrators designate the garden as an outdoor classroom to be incorporated in the regular school	69.5
Long-term Outcomes (11)	
Improved quality of outdoor school environment	83.1
Increased access to fresh fruits and vegetables	79.3
Sustainable school gardens (sustained for multiple years)	78.0
Students are connected to nature and their food	78.0
Healthier garden participants (physical and mental health)	76.3
Increase in the number of school, community and home gardens	74.6
Students and teachers become environmental stewards	74.6
Increase in the number of partnerships for school gardens	74.6
A productive edible garden that provides produce for students to bring home	69.5
Future generations participate in sustainable agricultural practices	69.5

Conclusion

This Delphi Study utilized the input of a panel of key experts across the state of Florida to develop a set of the perceived most important outcomes for the inclusion into associated planning efforts for school garden programs to ensure successful development and evaluation. Through this exercise, educators and other key stakeholder can streamline the planning process to ensure that more time can be spent on instruction. Agricultural education professionals and other stakeholders connected to school gardens can use the results of this study to provide a solid foundation for an outcome-driven school garden program. The short-, medium-, and long-term outcomes can be used to design the structure of a school garden, formal and informal curriculum for students, and can serve as a guide for school garden evaluation. These outcomes may also be used as framework for grant-seeking activities and to assist with demonstrating accountability to funders. We recommend those associated with school garden programs consult this list and select the most important and relevant outcomes for their local context and students' needs.