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# Realizing a Holistic Approach to Food through School Gardens and Growing Activities

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## Abstract

*Garden-enhanced education in schools is increasingly recognized as a promising strategy for promoting healthier eating and environmental awareness for children. Analysis of the development of school garden initiatives can offer insights into how these benefits may be optimized. Using a mixed-methods approach, our study tracked the progress of 55 primary schools participating in the Food for Life Partnership: a multi-component school food program. The findings showed considerable expansion of food growing facilities, outputs and supporting infrastructure. Participating students, parents and community volunteers helped create new links to food-related activities in the dining hall, the classroom and the home environment. This provided a mandate for lead teaching staff, often working under conditions of social deprivation and poor green space, to create a more holistic approach to food in school life. The effectiveness of these changes connected to the strategic re-development of growing spaces and the conceptually integrated messages on food sustainability.*

**Keywords:** food, sustainability, school, garden, students, program implementation

## Introduction

Schools offer an important setting in which children can learn about the health, environmental and social aspects of food. Notably, garden-enhanced education in schools is increasingly recognized as a promising strategy for promoting healthier eating and environmental awareness for children, not least because it offers a wide range of experiential possibilities.

A range of research studies suggest beneficial outcomes of food-growing activities for children and youth. Children's consumption behaviors are directly related to their opportunities to experience different foods (Blanchette and Brug 2005), and gardens in school settings offer the chance for children to develop a personal connection with their food. Research suggests that education with primary school-aged children (4-11 years) about diet and nutrition should focus on concrete experiences with food (e.g., Parmer et al. 2009). Participation in growing edible plants is associated with an increased ability to identify fruits and vegetables (Somerset and Markwell 2009), a willingness to taste vegetables grown in the garden (Morris, Neustadter and Zidenberg-Cherr 2001), and a willingness to try vegetables in school meals (Morris and Zidenburg-Cherr 2002).

Children participating in structured educational courses on growing food express more positive preferences for fruit and vegetables (Libman 2007; McAleese and Rankin 2007; Birch 1999; P. Morgan 2010). The school setting may be important because it offers opportunities for positive peer influence and social support (Brug et al. 2008). School-based hands-on experiences with fruits and vegetables can enable children to prepare these foods at home with their families and influence the quality of the food their families buy and prepare (Heim et al. 2009; Demas 1998). Learning at an early age can have long term positive effects on health. Studies have found an association between gardening and fruit and vegetable consumption, even when the gardening activity occurred in the past (Alaimo et al. 2008; Devine et al. 1999).

School food-growing activities can provide a range of benefits in addition to the promotion of healthier eating. Through creative outdoor learning, children can develop practical life skills as well as generic social skills (Graham et al. 2005). Gardening activities are reported to provide hands-on study of science concepts as well as a range of other subjects such as literacy, mathematics, history and the arts (Passey, Morris and Reed 2010). School gardens are therefore a useful supplement to the resources of a school (Graham et al. 2005). Some evidence suggests that garden-based education may be an effective method to improve students' learning outcomes, for example in science (Klemmer, Waliczek and Zajicek 2005). Projects delivered through school gardens can be more attractive than their alternatives. Visits to external horticultural projects or farms may be less likely than an integrated garden to improve the school environment or to shape school norms through routine experience (Ozer 2007).

Hands-on experience of local food production can help build a mandate amongst both students and staff for local ecological improvements, thus contributing to a wider agenda on well-being and sustainability in the school setting (Story,

Nanney and Schwartz 2009). In addition to student-related outcomes, school food gardens may contribute towards an agenda on civic participation by offering opportunities for parent and the wider community involvement and the celebration of school life (Blair 2009; Ozer 2007). This in turn may produce benefits for schools in terms of, for example, higher levels of parental support for student learning.

While this research suggests considerable benefits for garden-enhanced education, it is not without limitations. Research studies often focus on heavily structured, specialized and externally delivered interventions (CDC 2010). Reports based upon these initiatives may not necessarily reflect their performance under "ordinary" learning conditions (Nutbeam 1998). Other reports, according to Scott, Reid and Jones (2003), suffer from a surfeit of assertion over empirical evidence for the benefits of school environmental education.

There has been little research on the conditions under which garden-enhanced education can become integrated into mainstream school practice. Clearly some pre-requisites include adequate space, facilities, equipment and partnerships to enable experiential lessons on fruit and vegetable production, preparation and storage. Other issues, such as the threat of vandalism, are likely to be important considerations. Equally, other factors may be critical for success. While gardening remains a popular hobby, the effective management of growing projects over the course of a school year requires horticultural skill, enthusiasm and commitment. Previous research indicates that staff need professional development in this area, especially given that it has little place in contemporary teacher training. While professionals from outside the school may play a part, in the longer term schools need to develop in-house skills (Scott, Reid and Jones 2003), drawing upon either staff or adult volunteers. This in turn requires buy-in from the school leadership team, administrators and others such as grounds maintenance staff.

Evidence from research on school nutrition programs (van Cauwenberghe et al. 2010) indicates that school gardens are also likely to have greater impact as part of a combined effort across a number of dimensions of school life. Program links to school food policy, educational cooking, food preparation and tasting activities, lunchtime food provision, as well as reinforcement through visits to farms or community gardens, can all contribute towards a more holistic approach to food. Regardless of the type of initiative—whether it focuses on cooking, nutrition or the promotion of school meals—often there is a failure to integrate messages consistently across the whole school. This leads to inconsistent and compromised implementation. With reference to effective outdoor learning in schools, Rickinson and colleagues' (2004) review of the literature identified a similar need for integration and summarized key barriers in terms of: health and safety issues; teacher confidence and expertise; the constraints of the school curriculum; shortages of time, resources and support; and political/institutional constraints, such as an emphasis on "back to basics" in education. To this list Dyment (2005) adds competition within and between other educational programs in sports and the performing arts. Other potential issues for understanding how schools implement and embed garden-enhanced education remain under-explored. While there are

many attractions to school gardens, some of these obstacles may account for gardens' patchy and uneven adoption in schools.

This paper focuses on the role of the school garden and growing activities in the realization of a holistic approach to food as part of the Food for Life Partnership program. As Springett (2001) points out, some of the most valuable learning from program evaluation can arise from an analysis of the implementation and the role played by leading stakeholders. According to this perspective, programs of health promotion in complex community settings are best understood as social reforms or processes of change—as opposed to interventions that deliver a "dose" or "treatment." Springett argues that "one could characterize health promotion as a decision-making process involving a number of key agents whose combined actions contribute in varying degrees to the final outcome" (2001, 140). Our present study, therefore, sought insight into participants' interpretation of the program and their perceptions of the character and context of the changes that occurred. This focus on how, why and for whom the program had effects also draws upon elements of Pawson and Tilley's (1997) framework for creating a realistic evaluation.

## Aim and Objectives

The overall aim of this paper is to explore the role of the Food for Life Partnership (FFLP) program of garden design, development and associated growing activities in creating a holistic approach to food in school. The objectives are to:

1. Determine the impact of the FFLP initiative on the gardens and food growing activities of participating primary schools (students aged 4-11 years).
2. Assess the role of students and other stakeholders in making school gardens and food growing activities.
3. Explore the perspectives of students and other stakeholders on the opportunities to make links between growing activities and other food-related activities in schools.
4. Theorize the role of school gardens in promoting a holistic approach to food and to draw research, practice and policy implications.

## The Program

The Food for Life Partnership is a program that works with 3,600 schools in England seeking to transform children's food environment. Started in 2007, the initiative evolved out of a concern that obesity and the climate change impact of food cannot be addressed unless "individuals and communities are reconnected to how their food is produced, and regain the skills and knowledge needed to take active control over what they eat" (Food for Life Partnership 2010). FFLP has four areas of focus in its work with schools:

1. Food leadership: promoting food reform through an action group with student, teacher, catering staff and parent representatives.

2. Food quality and provenance: working with school meal caterers to procure more local, seasonal, organic, marine stewardship council[1] and foods produced to high animal welfare standards.
3. Food education: reforming practical food education, particularly with regard to raising issues of environmental and social sustainability through gardening, cooking, visits to farms and local food producers, and classroom projects.
4. Food culture and community involvement: engaging with parents and the wider community on the use of healthier and more sustainably sourced food in school and at home.

This paper concentrates on the program's impact on the role of growing fruit and vegetables in schools. These activities cut across all four areas listed above. FFLP's garden-based work intends to develop both a social and an ecological space for influencing educational practices, food consumption in school, the social life of the school community and, more widely, provide an opening to the food environment beyond the school gates. There is an emphasis on organic and bio-diversity principles in the development of the school fruit and vegetable garden. According to the initiative, students should take an active role in the set up and use of growing spaces to change food culture across the school. Schools that applied to the FFLP "flagship" program are eligible for an enhanced level of support because they have high proportions of students from poorer socio-economic backgrounds, lack a garden or green space inside the school, are located in areas of high urban density, or have little track record of school food policy development. Over a period of 18 months, each flagship school receives up to £500 (approximately US$800) in funding for resources, such as garden tools and written materials to support garden development and education. Over the course of ten visits from an FFLP garden education officer, all flagship schools are likely to participate in a process with the following common elements of training and support:

- assessment and consultation to establish the school's priorities, interests and capacity for change;
- facilitation of an action group to develop a garden plan and calendar of activities;
- training of staff and volunteers in organic horticultural skills (such as crop rotation, composting and pest control), project development, and safety and risk management;
- teaching plans to connect garden activities with curricular studies, experiential learning from farms, and use of produce in food in classroom activities, school meals, and wider learning;
- networking with like-minded schools, advice on further funding opportunities, community engagement, voluntary support and the active participation of students.

FFLP staff do some work directly with students, but largely in the role of modeling best practices with school staff or as part of a consultation and celebration event.

[1] A scheme for promoting sustainable fishing practices

While a standard package of support is available, in practice each school works within the framework established by FFLP to develop its own, bottom-up solutions for the design of the garden areas and the role the garden plays in changing the food culture of the school. Qualitative research on FFLP, conducted separately from the present study, found that schools adopted the program flexibly by building on and complementing pre-existing activity and their school ethos (Teeman et al. 2011).

## Method

### Methodology

The study used mixed methods research to collect and analyze data, integrate findings and draw inferences using both qualitative and quantitative methods (Tashakkori and Creswell 2007; Onwuegbuzie and Leech 2005). We selected mixed methods as a pragmatic approach for exploring a range of program-related changes from a number of different perspectives, including those of lead participants (Springett 2001). We collected multiple sources of data to capture changes at the student group level and at the school organizational level at the point of enrolment with the program ("baseline") and again after approximately 18-24 months ("follow up").

### School Sample

The first 55 primary schools enrolled in the FFLP flagship program in 2007/8 were sampled to take part in the study. These were located across all nine regions of England. The average number of students enrolled in these schools was 287. This is somewhat higher than the England average of 228 although the sample figure masks a considerable range (min. 48, max. 671; SD 137.5). The schools were more likely than average England schools to have a track record in health promotion and environmental activity. Eighty-two percent of the schools had National Healthy Schools[2] status, and 53 percent of schools had Eco-Schools[3] flag status.

### Quantitative Data Collection

In each school at baseline and follow up the lead teacher contact, usually a member of the senior management team, was asked to complete a structured questionnaire on school food growing-related activities. This consisted of questions on the school's resources and capacity to deliver food-growing education, and the engagement of stakeholders in the design and function in the school garden areas. The majority (48 out of 55) of the baseline and review forms were completed by the same member of staff.

At baseline and follow up, at least half of the Year 5 and 6 classes (ages 9 to 11) in each school were randomly selected to take part in a questionnaire survey. The baseline questionnaire was completed by 1,435 students, and 1,423 students

[2] A national program intended to improve health and encourage closer working between health and education providers.

[3] An international program of environmental and sustainable developmental education for schools.

completed the follow up questionnaire. For both occasions this amounted to a sample of 61 percent (S.D. 6.33) of the total population of the Year 5 and 6 students in the schools sampled. Using Likert scale questions, students were asked to report on their involvement in food growing and health education related activities. The questionnaires were administered by the research team or, on occasions, program officers using standardized guidance.

**Qualitative Data Collection: Staff**

At the point of review, lead staff were asked to give written responses to open questions on their perceptions of successful and challenging aspects of developing garden-enhanced education, and its role in promoting a holistic approach to food. Of the 55 respondents, a random selection of 24 participants supplemented their responses through an audio-recorded semi-structured interview with a member of the research team.

**Qualitative Data Collection: Students**

In six of the 55 schools we conducted group interviews with students 12 months following enrolment with the program. These schools were selected on a list basis to include a geographical spread of two in the north, two in the midlands and two in the south of England. For each school, there were five group interviews ranging in size from three to six individuals. The students were drawn from mixed-ability classes in Years 3 to 6 (ages 7-11). A total of 77 students took part in interviews. The topic guides explored perceptions of food growing activities and students' roles in developing the garden areas.

**Data Analysis**

All quantitative data were entered into SPSS Version 17, a statistical software package. Quantitative data were used to generate the frequencies and cross-tabulations in this report. Qualitative data were transcribed and analyzed thematically (Francosi 2004). In order to validate the research, written summary points from the preliminary analysis were checked with lead staff in participating schools and lead program officers (Silverman 2011). Following Morgan (2007) we adopted a pragmatic approach to integrating qualitative and quantitative findings. This took the form of comparing, contrasting, building on, or embedding findings to establish a plausible set of conclusions.

**Ethical Issues**

The research protocol was approved by the University of the West of England Research Ethics Committee. School head teachers were asked to give written consent based upon written and verbal information provided by the researchers. Schools provided parents with standard written information on the study, data protection and right of withdrawal. Students were informed of the purpose of the study. We adhered to each school's policy on the right of students to opt out.

## Quantitative Findings: School Garden-Related Activities

### Impact on School Garden Design and Infrastructure

In the year prior to enrolling with the FFLP initiative, the majority of schools reported some, albeit often very limited, engagement with garden-enhanced education. For example, of the 55 schools, 42 already had a small area demarcated for growing fruit and vegetables. After 18 months of participation in the program, most schools had considerably expanded the plot areas of their school gardens. For the 55 schools as a whole, this equated to the creation of 20 full-size allotments overall. This may be an underestimate given that orchard and supporting wildlife areas were excluded from the calculation.

At baseline, schools generally had good access to basic facilities such as changing rooms, hand washing, toilets and accessible paths. However the majority of schools lacked a full array of specific facilities to deliver a whole-school program of garden-based education. The majority of schools had strategies for conserving or attracting wildlife. A significant fraction, almost a third, lacked green space features on site such as hedges, trees, shrubs and wildflower or rough grass areas.

At follow up, the majority (at least 36/55 across a range of measures) of schools reported improvements in their gardening facilities; the growing site, equipment and composting facilities stood out as areas with the greatest levels of improvement. The majority of schools had no pre-designated space to develop growing areas and therefore had to create areas directly outside classrooms, make use of planters on asphalt playgrounds, outside the school kitchen or convert other play and ornamental areas. Six schools took up plots on nearby allotment sites.

### Staff Professional Development and Educational Delivery

At the outset, the 55 school leads were asked to rate the significance of a list of issues that might affect the sustainable delivery of the growing skills program in their school. Areas that were rated as most problematic (a “major” or “significant issue”) were: freeing up staff time to dedicate to growing projects (n=33), lack of equipment (n=21), parent and community support (n=21), and running costs (n=18). The majority (n=31) of school leads reported that the staff had had no specific skills in garden design, growing, or the use of produce in educational cooking, nor had they undertaken any training in a formal course of horticultural education. Only six schools closely followed guidelines for organic gardening practice. Schools were not likely (nine or fewer) to have policies in place to support more growing-specific aspects of work such as use of garden tools, risk assessments for use of garden produce in school meals or making compost. The following indicators illustrate how, at follow up, this picture had changed quite significantly:

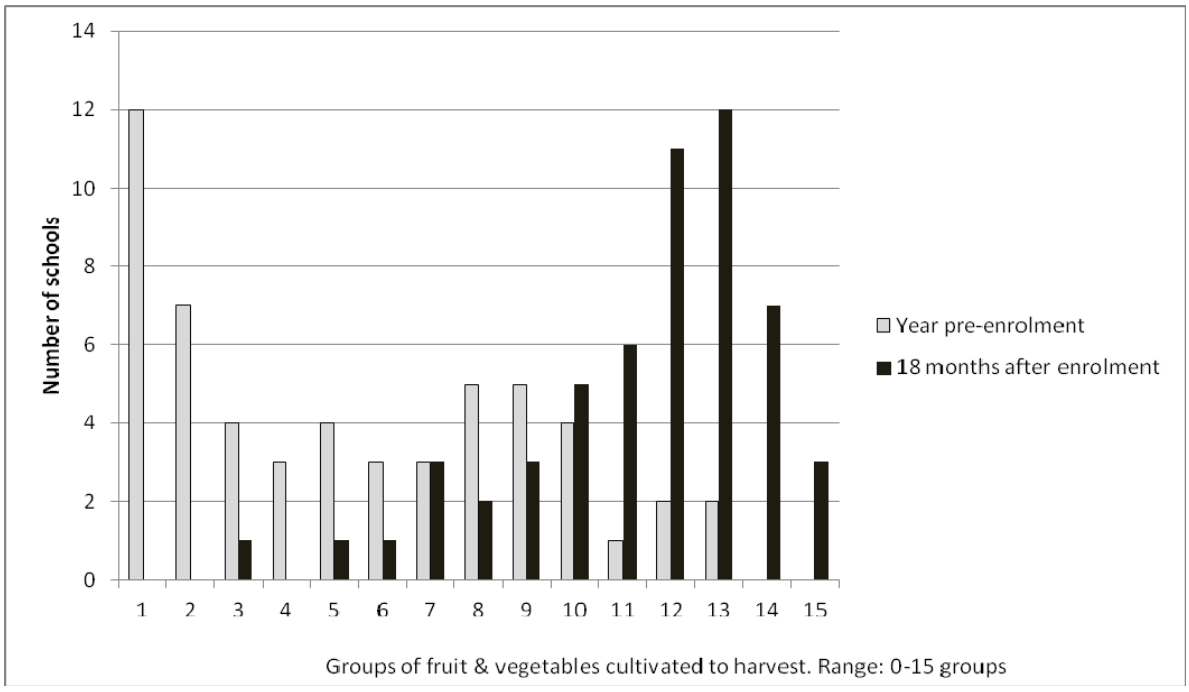
- 42 of 55 schools had arranged for staff to undertake new training in horticultural education.
- 46 of 55 schools had adopted new systems for organic gardening.

- 30 of 55 schools had adopted new policies and risk assessment.

**Fruit and Vegetable Production**

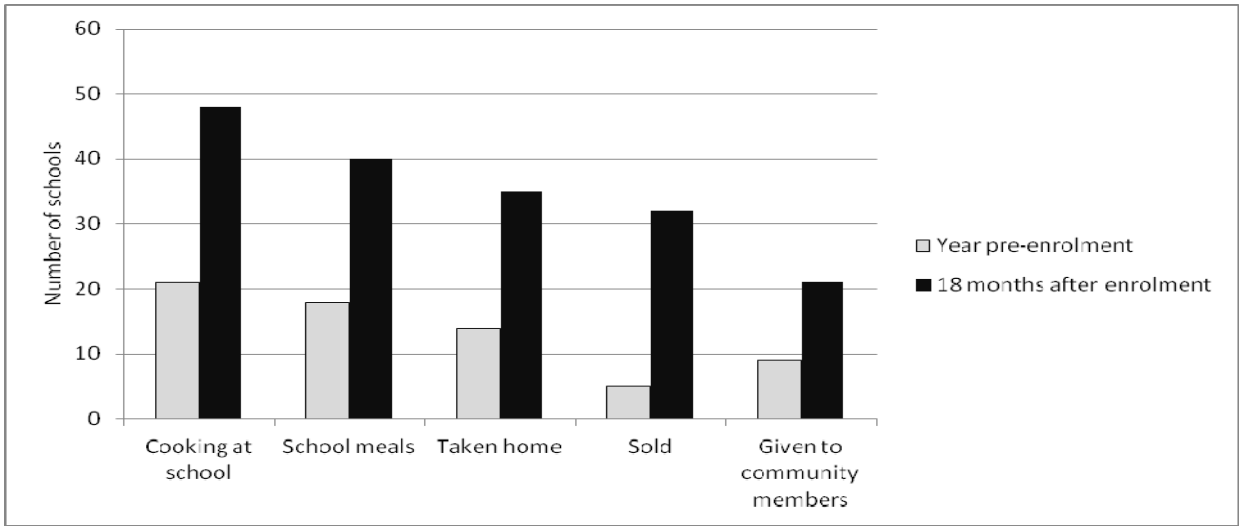
At the points of baseline and follow up, lead staff were asked to list fruit and vegetables their school had grown in the last 12 months. We categorized these into groups such as roots (e.g. carrots, parsnips); brassicas (e.g. cabbage, broccoli); salads (e.g. lettuce, cress); and soft fruit (e.g. strawberries, raspberries). Before enrolling with the program, the majority (30/55) of schools had only grown five vegetables or fruit from five of these groups. This very restricted range included plants commonly employed in curricular study, for example broad beans or cress. The position had changed considerably at the point of review (see Figure 1). Three-quarters of schools were growing fruit and vegetables from over ten groups. This diversity included many unusual types of garden crops such as mushrooms, callaloo, chilli, squash, traditional English apple varieties and other "heritage" plants.

**Figure 1. Groups of fruit and vegetables grown by schools. N=55. Missing data=0**



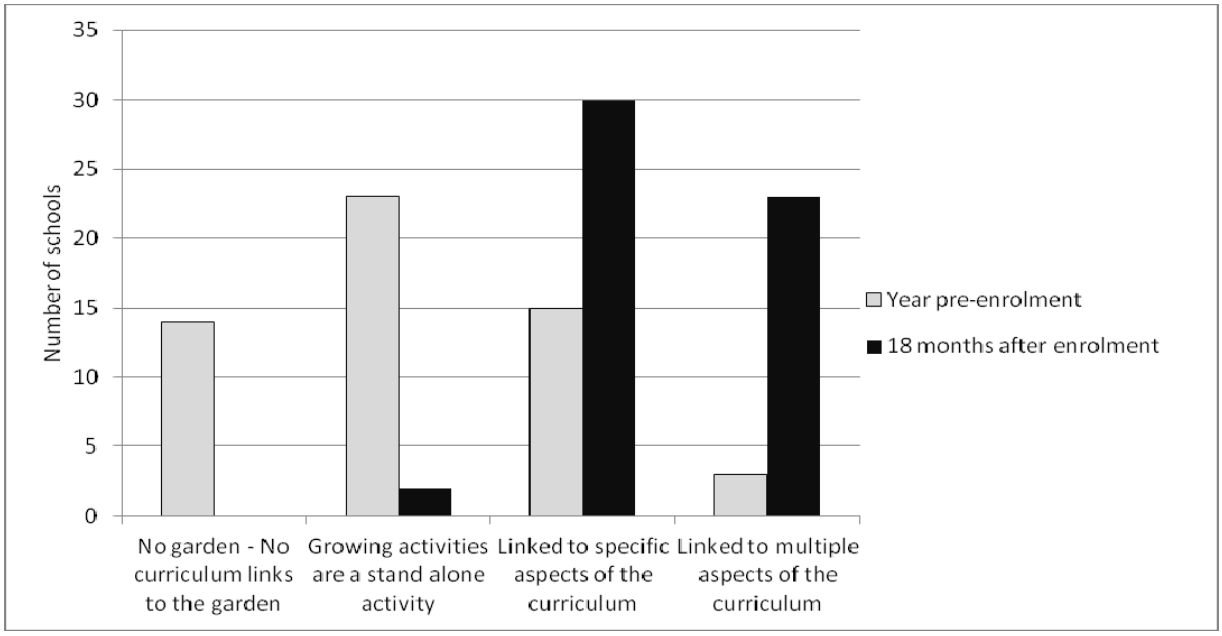

Staff also reported an increase in the cultivation of crops to harvest and an increase in crop yields. Although no quantifiable data was recorded in this respect, Figure 2 shows a shift towards actively making use of crops in school meals, the classroom and community activities.

**Figure 2. How produce from the school garden area was used (N=55. Missing data=2)**




School leads were asked to categorize the status of their curriculum links at baseline and follow up. They were also asked to provide supplementary evidence in terms of a summary statement and schemes of work. At follow up a majority of schools had improved their links at either specific or multiple levels within the curriculum (Figure 3).

**Figure 3. How growing activities were linked to the curriculum (N=55. No missing data)**



For many schools at follow up the emphasis had shifted to integrated links between the garden area and many aspects of school life. Some schools adopted a themed approach to the curriculum in which, for example, a garden-based project combined literacy, history and science learning.

**Role of Parents and the Wider Community**

School leads were asked to estimate the involvement of parents and other adult members of the local community. Over the research period the percentage of schools with two or more such adults involved rose from 13 to 33 out of 55. These individuals assisted with the development, planning and maintenance of the areas.

**Staff Reports and School Records on the Role of Students**

School leads were asked to report the number of students taking part in a growing activity in the past 12 months. Here growing activities were defined as the school-based cultivation of fruit and/or vegetables with the aim of producing a harvestable crop. School leads were encouraged not to include in their report science-based projects that did not have this aim. An average of 28.6 percent of students took part in some form of growing activity in the 12 months before enrolment. In the 12-month period before follow up this figure rose to 74.4 percent. These overall averages disguised wide variations: students in smaller schools or in schools with higher social deprivation scores were significantly more likely to be involved in growing activities.

In terms of the level and character of student involvement, at baseline only nine of 55 school leads reported that at least one year group of children were actively involved in most aspects of food growing. At follow up 38 of 55 school leads reported that students had taken on more active forms of engagement. These roles included helping to decide the layout of gardens, planning the types of crops to grow, maintaining the garden areas and cultivating crops through to harvest.

At baseline seven of 55 school lead staff reported that children in their school were able to actively make use of garden produce in school or extra-curricular activities, for example, cooking activities. At follow up 29 of 55 school leads reported that children had this opportunity.

**Student Questionnaire Reports on Engagement with the School Gardens**

Student data largely mirrored the staff reports. The percentage of 9 to 11-year old children reporting growing fruit and vegetables at school in the last year rose from 54.4 percent to 82.5 percent. These growing activities included preparing the soil, sowing seeds, watering, weeding, planting out, staking and harvesting.

There was some evidence that the school garden activities could have had wider impact. The number of students reporting having helped to grow fruit and vegetables at home in the last year rose 26 percent to 35.2 percent. Children who had taken part in FFLP-related education on food growing and environmental sustainability were more than twice as likely to hold positive attitudes towards

organic, local, free range and fair trade foods, compared to those who had had no such education in the last year (21.8 percent compared to 10.7 percent).

**Perceived Effectiveness of Program on Food-Growing Activities**

The final form of quantitative data concerned lead school staff perceptions of the overall role of the FFLP program in their school. At the follow up stage, staff were given a list of activities that were associated with the program and asked to rate the influence of the program (from "ineffective" to "very effective") and the level of priority for the school (from "unimportant" to "very important"). Table 1 shows positive or very strongly positive ratings and lends support to the empirical evidence of change set out above. The ratings also highlight some areas that were more challenging, such as parental and community engagement.

**Table 1. With regard to the following areas (1) how effective has FFLP been in assisting your school? (2) how important has this area been as a priority for your school? Frequencies represent number of respondents. Data available for 51 of the 55 study schools.**

| | Perceived effectiveness of FFLP in assisting the school | | | | | Level of priority for the school | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Very effective | Effective | Neutral | Ineffective | | Very Important | Important | Neutral | Unimportant |
| Design and development of suitable sites for growing activities | 31 | 10 | 5 | 5 | | 26 | 13 | 8 | 4 |
| Organic horticulture training and advice | 35 | 15 | - | 1 | | 35 | 10 | 3 | 3 |
| Health, safety and practical advice on management of growing areas | 19 | 18 | 10 | 4 | | 18 | 23 | 5 | 5 |
| Linking growing projects to the curriculum and wider educational goals | 17 | 18 | 15 | 1 | | 27 | 15 | 5 | 4 |
| Actively involving students in decisions | 26 | 13 | 7 | 5 | | 33 | 10 | 5 | 3 |
| Actively involving parents or wider community | 15 | 18 | 13 | 4 | | 26 | 16 | 5 | 4 |

## Qualitative Findings: Teacher and Student Perspectives

This section reports on the staff and student interviews and written feedback on the role of school gardens and associated growing activities in developing a holistic approach to food in school life.

**A Generative Space**

Most participants held very positive views about their school garden. This was often expressed as a strong appreciation and enjoyment of the plants and the outdoor space. Students were interested, enthusiastic—and sometimes surprised—about the growing fruit and vegetables. These 8-year-old interviewees illustrate this engagement:

> *Student LH53: When you plant them and water them and you go away for quite a long time you come back and they've got a little leaf coming out. And when you go away and come back they've just started getting bigger. It's wicked! I've learnt at school that not all vegetables grow on top of the ground: some grow underground.*

> *Student LH32: We grow mushrooms in the shed and I look at them every day. I've learnt that carrots are roots.*

According to the majority of teachers interviewed, this experiential learning helped bring to life abstract learning about healthier eating. It also helped class-based education about local, seasonal, organic, fair trade food issues:

> *Teacher CB01: The whole school has got excited about watching plants grow and then tasting them. Spinach, beans and peas being taken into the kitchen and made into meals helped to show kids that veg can be fun!*

Those who had grown food in school felt more engaged and informed when they went on visits to farms and food producers on school field trips. Teachers reported how the food growing activities linked to other aspects of food related work in schools. Teachers reported that the garden formed a basis for making connections:

> *Teacher TV01: The general approach of the whole school food approach: growing is embraced and celebrated; this then feeds in to the school dinners where a positive approach to food and eating is developed. It's had a huge educational impact on children's food choices.*

Teachers from one school explained how growing activities had become more integrated in the life of the school as they started to make more use of their allotment (a community garden plot):

> *Teacher OV2: In the past we had an allotment: it was nice but it was very much just enrichment to the school experience. There was no greater thought beyond that.*

> *Teacher OV1: It would be a bit of a treat: you'd go off to the allotment and make perhaps a thing out of it.*

> *Teacher OV2: Now we are more focused on how we can use the allotment for education. Each year group has got a plot, children are involved in the actual selection of produce to grow, the growing process and the use of the*

> *produce… So eventually we'll be using the produce in cooking and healthy meals education and things like that and not even shout about it.*

While there were examples of students with knowledge of sustainable food issues, the majority of students interviewed during the intervention had a limited understanding of, for example, the term "organic food." It was also not always clear how much school growing activities were contributing to this understanding—as opposed to knowledge already held by these children.

**Connected Curriculum**

A theme arising from the interviews was the connections between food growing activities and the formal curriculum. These links evolved—sometimes spontaneously—out of the garden development process:

> *Teacher ART3: I started off being rather dubious about the relevance of the [FFLP gardening] project to the curriculum if I am honest. I couldn't see how it fitted in with what we have to deliver in class. But it seems to work... largely through the kids because they make the links across science, mathematics and food technology rather than us. They talk about food and growing all the time. It has helped them to learn about the relevance of food in so many different areas that I have become more and more convinced… it has made these issues very real for them.*

Growing activities, in some cases, became highly integrated into the school's curriculum. As one member of staff commented:

> *Teacher GB02: We have dedicated curriculum time every week and part of our planning. Each class has a plot and classes do research for the garden in terms of conditions needed for growth, plant families and so on. This feeds into theme weeks around the topic of food. Gardening has given us a license to do what we wanted to do.*

Some teachers found it difficult to incorporate the routine gardening activities into the constraints of the standard class-based educational format:

> *Teacher PE01: Growing is bitty: it's a case of a little here and little there—you don't go from sowing, to harvest, to eating in one go! With a weekly rotation, if you're the first pupil you may not be the one to try the produce—and you don't always get to see the whole process. Then there's the issue of whether you've got enough activities for everyone to do on a session. It's difficult educationally.*

**Equity and Meaningful Engagement**

This type of difficulty raised issues of equity for some teachers who were conscious that that full participation could be hard to achieve:

> *Teacher MDT1: The challenge for us at the moment is embedding [food growing] in classroom culture and practice. So the teacher makes sure all*

> *kids are going out, seeing to their plants in their beds regularly through the whole cycle, you know, not just planting up and then forgetting about it!*

Other schools faced this challenge by directing garden activities at specific classes or groups of children, or created rotational sessions to maximize participation:

> *Teacher PH02: It's a Year 5 thing at the moment: the idea being rather than everyone just getting a little taste they get more in-depth experience of cookery and growing—and they build up their skills on a week-on-week basis...*

One large school's rotational approach had helped promote maximum class involvement in the garden and to develop projects with larger groups over the course of the gardening calendar.

> *Teacher SJ01: I just found that there were so many children in the school it has presented a real challenge. We have allocated dedicated slots in which we will take groups of children into the garden during the week. At the moment we have a potato competition going on. Every class has sacks, potato seeds and compost and we are going to see who can grow the heaviest yield of potatoes. The winners are going to have a day cooking potato-based products. Over the summer holidays every child in the school is going to take a plant home, whether it is a sunflower, a courgette [zucchini], a cucumber and… hopefully children can bring their produce to a fête in September. So we've tried to include every child in the school.*

By contrast other teachers highlighted the role of the garden area in targeting their work with children with specific needs:

> *Teacher SE02: Gardening is the sort of thing that engages them: taking them out, weeding the plots... I mean it's completely inclusive if we need resources or anything for someone with special needs then there's no issue and no problem: behavior-wise it's the ideal curriculum isn't it?*

**Students as Active Participants**

As part of the program, all schools set up action groups with student representation to assist in the development of a whole-school approach to food. Such active participation was reported to help create closer engagement and dialogue:

> *Teacher PE01: The children have loads of ideas. The [action group] feels like its part of the school as a whole rather than just me or another member of staff.*

> *Teacher PE03: I think it's good that everyone comes together and shares ideas: children have very different ideas compared to the adults. It gives the children part ownership in what's going on.*

Two 10-year-olds involved in the garden planning group explained how the system worked in their school:

> *Student MD01: We've got little planters for each class and we're growing carrots, lettuce, cauliflower, tomatoes and last year we were planting peas. We've the three allotments on the back of the school and we're going to keep chickens.*
>
> *Student MD11: We thought it was fair if every class has planters and does it. Most of the people in [the fruit and vegetable] growing club get to do a lot more growing than that.*

In contrast to some of the more rigidly defined areas of the school, garden areas offered the chance to draw up and implement plans over the course of a season. The tasks involved in gardening also offered many opportunities for decision making, leadership and team work. Sometimes this involved a reversal of roles, for example where students took food into the school kitchen and asked the cook to prepare it for their lunch.

**Developing Staff Interest**

A theme amongst teachers was the importance of engaging a wide range of staff in order to make food growing a whole-school activity. Some interviewees felt that garden-based activities had helped make this possible:

> *Teacher FD01: Growing produce has brought together different aspects of the school around a common theme. It's given us [staff] a focus to pull together all the expertise we have actually got within the staff and wider community.*

Such activities not only engaged teachers but also ancillary staff such as cooks, teaching assistants, groundskeepers and caretakers. Where this support was lacking—due to other commitments, lack of confidence, or low expertise—interviewees reported that they had difficulties developing the project:

> *Teacher SB01: [One challenge is] getting all staff on board with the gardens. There's a coordinator developing gardening, but it needs support from all staff in school to work. It can't fall on one person.*

This was felt to be particularly important given the range of project skills, trouble-shooting expertise and mutual support needed to keep food growing projects running over the course of time.

**Connecting with the Home Environment**

Support from parents, other community members and external organizations also emerged as a theme. In some cases, gardens were reported to attract parental interest:

> *Teacher DS01: We never used to able to attract parents into the school: I don't know why. But with the events like the Growing Day the response from parents has been absolutely amazing—on that day about 60 parents came. We seem to have attracted a lot more parents in just lately with Food for Life.*

However such support was also reported to present difficulties:

> *Teacher MP01: Getting the parents engaged in the gardening project was also very difficult at first as they would have lots of ideas but be reluctant to come and do anything in school!*

Where such support was achieved, teachers felt that it helped influence families in their home environment.

Discussion among students at one school illustrates how general interest was perceived to stimulate change at home:

> *Student SA46: [after talking about growing in school] My mum's now thinking she could dig up a bit more of the garden so that we could grow more carrots and potatoes and maybe lettuces too.*

> *Student SA21: I planted a squash plant [on a farm visit]. I've never seen a squash plant. I told them and my parents said would we like to try it at home.*

Such home-school interactions created a virtuous circle, for example:

> *Teacher SM01: Class plots are developing well with teachers becoming more confident to have a go at a wide variety of fruits and vegetables. The confidence of the children has grown also and they are learning from one another, seeking support from their parents and grandparents.*

However a significant minority of students said that they had few opportunities at home. Students at one urban school illustrated some of the restrictions despite, on occasions, the efforts of households.

> *Student LH06: I've got this little small pot of strawberries and I tasted some they were very sour. My garden's covered in concrete and dead leaves and my cats poo in the garden. It's covered in it.*

> *Student LH08: We have a very small garden at home so we don't grow anything. So we get most of things from [a large supermarket].*

## Discussion and Conclusions

This article aimed to explore the role of the Food for Life Partnership (FFLP) program of garden design, development and associated growing activities in creating a holistic approach to food in school. Prior to enrolment, the majority of

schools lacked the basic facilities needed to deliver an effective garden-enhanced education, staff with applied horticultural skills, specific safety guidelines, or multiple links between growing activities and the curriculum. Drawing upon both qualitative and quantitative data sources, our research found that the FFLP program made considerable changes to the capacity of schools to undertake food-growing activities. These activities connected to a wider set of changes involving the way in which food issues were conceptualized in the educational sphere of participating schools. School garden-based activities succeeded in connecting different areas of action together. For some, but not all schools, students were actively involved in this process. This process of change also promoted opportunities for a diverse range of learners and created an impact on how the school engaged with parents and the wider community on school food issues. Overall the process helped re-position the role of food in school, change the nature of the bio-physical environment and affect the educational ethos.

The FFLP program provided a mandate for lead staff to develop the growing area as an outdoor classroom, to formalize the role of the food growing as part of curricular study and to create more personalized learning. In this way, the FFLP program reinforced staff capacity to apply health promotion and environmental education roles. However this work was not without difficulty. As other studies have found (e.g. Van Cauwenburghe et al. 2010; Bell and Dyment 2008), factors that inhibited progress included the complex and multi-component nature of the program; forging the links between school kitchens and educational cooking activities was a challenge for schools. As institutional gatekeepers, lead school staff were pivotal in this process, although the concerted efforts of the whole staff team helped ensure that student involvement extended beyond a limited circle.

Quantitative evidence of an increase in student participation in growing activities over the evaluation period provided a backdrop to the qualitative accounts of students. These data lent support to other research on types of learning outcomes of food-growing activities for students (e.g. Graham et al. 2005; Ozer 2007). Those students who were actively involved in planning, development and maintenance are likely to have obtained greater benefits (Bell and Dyment 2008). However, students' regular and structured participation can be difficult to achieve particularly where there are practical obstacles to running group-based outdoor learning and integration into schemes of work. Meanwhile, schools that successfully promoted parental support appear to have gained from practical expertise, enhanced social interactions across the school community and greater exchange with students' home environments. Teachers reported that these dividends were hard to achieve, but that the school garden was a space in which parents could engage with the school on more informal terms.

It is important to recognize that there are some limitations to our analysis presented in this article. School lead reports may not reflect the perspectives of other staff in their schools, particularly with regard to the subjective ratings and qualitative feedback. They are, however, likely to reflect the strategic perspectives of the school leadership team. Furthermore, while the study has a pre- and post-design, there is no external comparison with schools outside the FFLP program. This

limits understanding of how schools can make growing skills reforms in the absence of enhanced support from an external team of experts. Further research on the adoption and development of food growing activities in schools that lack specialist support could help inform our understanding of best practices in the mainstreaming of garden-enhanced health and environmental education.

It should be noted that the overall findings conceal important variations and patterns. There are distinct issues in some schools to do with organizational scale, project coordination, curriculum integration and stakeholder commitment. These issues help account for the slow progress for some of the schools, particularly those with a larger student roll. Nevertheless, the trajectory of schools in contexts of higher social deprivation and low access to green space suggests that food gardens can be implemented under challenging circumstances. This is significant given that students in such schools face restricted access to food growing in their home environment and are likely to experience higher levels of health and social needs.

There are a number of implications for policy, practice and research. Although some elements of the reforms ran counter to policy trends in education, feedback from staff suggests that the initiative was congruent to the core educational mission of schools (cf. Teeman et al. 2011). Practical experience with cultivating fruit and vegetables in primary schools appears to help children grasp social and environmental perspectives on food, in addition to the health aspects of food that have been reported elsewhere in a growing body of research (Robinson-O'Brien, Ramona and Heim 2009). Thus school gardens can act as a locus for exploring issues such as local sourcing, ecological sustainability and socially just methods of food production.

The development of school gardens is feasible even in adverse circumstances. However, as Ozer (2007) makes clear, school garden programs require long-term commitment and effort on the part of the principal and the school community to be adequately sustained. In the case of the FFLP program, expert personal training and advice enabled participating schools to realize their vision to link educational work, stakeholder involvement and sustainable food provision. It was these "human" elements that figured strongly as a theme in our research over and above the importance of funds for equipment and other resources. This provides a case for focused teacher training (cf. Copeland et al. 2011) and the continued use of outside professionals, qualified in horticultural education and a participatory approach to garden design, to assist schools that are new to this area.

Research on the longer-term sustainability remains an open question, however the majority of schools were able to show evidence of how they had succeeded in actively training and engaging a wide range of stakeholders in the initiative. As Bell and Dyment (2008) suggest, gardening activities can provide ongoing opportunities to build positive relationships among students, staff and parents. Such interaction is a good predictor of sustainable project delivery. Where they were utilized well, school gardens acted as a central locale through which schools could engage with a holistic approach to food. Not only did they yield produce to be used in educational cooking, and school and home meals but they also formed a site for engaging with

health and sustainability issues, and the social dimensions of production and consumption of food. Overall the effectiveness of the changes reported in this article appear to be connected to the strategic re-development of growing spaces and conceptually integrated messages on food sustainability.

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