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Promoting Locally Grown Foods in Schools through Developed Classroom Curriculum and Foodservice Educational Tools

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Background

Many organizations, established internationally, nationally, regionally, and locally, and funded by for-profit, non-profit, and government groups, encourage the support of local agriculture. The purchase of locally grown and produced products has many benefits to producers, consumers, the economy, and the environment. In particular, the trend in purchasing locally grown foods has developed significantly in the United States over the past few years. Americans are purchasing more locally grown foods in order to support local farms and farmers, further strengthening local economies, and to consume fresh and healthy foods like fruits, vegetables, dairy products, and others. Consumers are also purchasing local foods to help protect the environment by reducing energy consumption related to transportation and food preparation and storage, maintaining open land, and preserving wildlife habitats.

Throughout the country, Farm to School programs have been created to bring local farms and schools together. By helping to create business partnerships, Farm to School programs have two primary objectives; these programs seek to support local agriculture and to increase healthy food consumption, and thus improve nutrition status, of students. The National Farm to School organization estimates that 1,986 Farm to School programs operate in the U.S., with thirty-eight states having operational programs and 8,354 schools being served by these programs (1).

In Massachusetts, the Department of Agricultural Resources (MDAR) assists in funding and operating the state's Farm to School Project. MDAR was first established in 1852. Its mission is "to support, promote and enhance the long-term viability of Massachusetts agriculture with the aim of helping this state's agricultural businesses become as economically and environmentally sound as possible (2)." To help achieve this mission, the department's Division

of Agricultural Development helps in overseeing the activities and functions of the Farm to School Project.

For years, the Massachusetts Farm to School Project has worked to bring local farms and school districts together. Focused on improving the markets and economic stability of Massachusetts farmers, while also improving the quality of foods available to students statewide, the project has had many great successes in matching farmers with schools. Approximately one hundred public schools, private schools, and colleges in the state serve locally grown food, with the majority of them receiving assistance from the Farm to School Project. About fifty Massachusetts farms sell their food products to participating schools (2). Last fall, the project implemented the first annual "Massachusetts Harvest for Students Week" during the week of September 24, 2007. The purpose of this week was to raise awareness regarding the benefits of purchasing and serving locally grown foods in schools statewide. While not only temporarily increasing the amount of local foods served in schools, Harvest Week also included classroom and public education regarding local agriculture, nutrition, and sustainability. With this education, the week potentially improved the health of Massachusetts' children, improved the well-being of the state's agricultural economy, and raised awareness of the numerous benefits accompanying the increased use of locally grown foods.

There are a multitude of foods grown and produced in Massachusetts. Many fruits and vegetables are grown, including, but not limited to, cranberries, apples, blueberries, squash, pumpkins, sweet corn, and broccoli. Other foods include maple syrup, wine, milk and cheese, and aquaculture products. There are 6,075 farms and 518,570 acres of farmland in the state. Annual cash receipts from these Massachusetts-grown products equal $433 million (2).

This study was created to test the value of Harvest Week, the receptiveness of students and school foodservice staff to purchasing and consuming locally grown foods, and the effectiveness of classroom education regarding local agriculture, nutrition, and sustainability. Two Massachusetts schools were studied during Harvest Week: Amvet Boulevard School in North Attleboro and Heath School in Brookline. Amvet Boulevard School is an elementary school within the North Attleboro School District offering education to students in kindergarten through fifth grade. It employs twenty-seven teachers and enrolls about four hundred students. Ninety-one percent of students are white, 14.5% are low-income, 17% require special education, and 5.5% do not have English as a first language (3). The school's three third-grade classrooms participated in this study, as did the school's foodservice department. Heath School, which belongs to the Public Schools of Brookline district, is located in the Chestnut Hill area of Brookline. It enrolls about 377 students in kindergarten through eighth grade and employs thirty-five teachers. Seventy percent of students are white, 14.4% are Asian, 7.4% are low-income, 15.4% require special education, and 17.4% do not have English as a first language (4). Heath School's three third-grade classrooms participated in this study, along with the school's foodservice department. This project later enrolled one third grade class from Narragansett Elementary School in Narragansett, Rhode Island. This school is part of the Narragansett School System.

Research Questions

The aim of this study was to assess Massachusetts Harvest for Students Week and its corresponding activities. For this project, the activities of concern were the use of a classroom curriculum developed specifically for this study and the provision, education, and marketing of local foods in cafeterias.

The developed classroom curriculum taught students about local agriculture and locally grown foods, the national and international food supply, the identification of locally grown foods, the benefits to buying foods locally, and the locations where locally grown foods can be purchased. Students' knowledge and attitudes regarding these topics, along with their appreciation for foods served in school cafeterias, were evaluated with the use of pre and post-intervention assessments. It was expected that their knowledge and attitudes would improve following Harvest Week and the corresponding education.

The provision, education, and marketing of local foods in cafeterias during Harvest Week were evaluated using several assessment tools. Pre and post-intervention surveys, interviews, and data sheets, completed by foodservice directors and staff, were used to assess the attitudes of foodservice staff regarding local agriculture and the use of local foods in cafeterias. Attitudes regarding taste, visual appeal, preparation, marketing, and cost of local foods were of particular interest in this study. The actual cost, quality, and consumption of local foods in cafeterias during Harvest Week were also concerns. It was expected that staff perceptions of local foods would improve after Harvest Week as they would work with the new products and find quality and cost improvements in the local foods over the usual foods. It was also expected that the staff would notice an increase in student consumption of the foods over the course of Harvest Week.

Ultimately, this study was developed to analyze the overall effectiveness of Massachusetts Harvest for Students Week. By collecting and evaluating several sources of data, it would be determined if classroom education significantly increases student knowledge and improves student attitudes regarding local agriculture. At the same time, the evaluated data would determine if the use of locally grown foods in cafeterias is well received by both foodservice staff and students.

Methods

In May 2007, the idea to conduct a research project testing the efficacy of classroom curriculum and foodservice educational tools used in conjunction with Massachusetts Harvest for Students Week was proposed to the Massachusetts Department of Agricultural Resources and the Massachusetts Farm to School Project. With approval for the project from both groups, two public schools were selected to participate in the study. The foodservice departments of Amvet Boulevard School, North Attleboro and Heath School, Brookline had already expressed interest in participating in Harvest Week, making them ideal candidates for the investigation. Furthermore, the two schools differed demographically, allowing for differences in study results to be further analyzed. Connections at these schools were made directly with foodservice directors and principals, with both people's approval needed for progression of the investigation. Principals selected third-grade classroom teachers with whom to work with during the classroom curriculum portion of the study.

A student survey was developed to be used both as a pre-test and a post-test for administration before and after Harvest Week and its corresponding local foods-focused education. The survey focused on student knowledge, attitudes, and behaviors regarding local foods. A second survey for foodservice staff was also developed to be used both before and after Harvest Week. This survey focused on attitudes and behaviors of the staff regarding local food use in school cafeterias. Interview questions were developed to be asked of foodservice staff before and after Harvest Week. The purpose of these questions was to acquire further information, both fact and opinion, from the staff. Finally, a data sheet to be completed by foodservice directors was created. This data sheet gathered information regarding cost of foods, quantities of food sold, and other quantitative data.

Along with the development of the surveys, the classroom curriculum was created. This curriculum involved two 45-minute lessons to be taught by researchers. The first lesson focused on where food comes from and what types of foods are produced and available locally. The second lesson focused on the benefits of buying local foods. Both lessons included a slideshow of photos to be shown during a brief lecture and open discussion period. The first lesson also included a supporting worksheet; the second lesson included an interactive activity in which students measured the distance, time, and money needed to transport foods from varying locations throughout the United States. Both activities were developed specifically for the study. Finally, both lessons began and ended with open discussions of the topic and what was previously learned. These introductory and wrap-up times gave students opportunities to ask questions and make comments on the subject matter.

The final piece of the project to be developed was the foodservice educational tools. Displays were created to be used in cafeterias during Harvest Week. These displays, which were hung on cafeteria walls, focused on Massachusetts food and agriculture facts. Created to be interactive, the purpose of these displays was to involve and educate all students on local agriculture. Pre-made posters and other marketing tools from the Department of Agricultural Resources and the Farm-to-School Project were also collected to be used in participating school cafeterias.

In early September, approval for the project by the University of Rhode Island Institutional Review Board (IRB) was sought. Parent consent forms and student assent forms were written and approved for use. A written statement of support from each participating school principal was required for the approval from the IRB. Immediately after approval, the consent and assent forms were sent to the third-grade classrooms at Amvet Boulevard School and Heath

School. The forms were signed and collected the week before Harvest Week to allow time for the administration of the pre-test survey.

The week before Harvest Week, materials were delivered to both participating Massachusetts schools. These materials included the displays, posters, stickers, menu cards, and other materials for cafeteria use, the student surveys, and the foodservice staff surveys and interview question forms. A dietetic intern from Framingham State College, working with the foodservice director of the Brookline School District, was recruited to teach the two classroom lessons at Heath School. As a result, the needed materials for the classroom lesson were also delivered to Brookline before Harvest Week. At this time, the lesson plan was discussed with the dietetic intern to ensure that similar teaching methods were used and identical material was covered at both participating schools.

Once all materials were delivered to the schools, the administration of the project was initiated. Immediately before Harvest Week, all third-grade students at both schools were surveyed using the pre-test. A total of six classes were surveyed as both schools had three third-grade classrooms. Surveys were numbered by classroom teachers in order to maintain anonymity while also allowing for the matching of individuals' pre- and post-test surveys following the investigation. Foodservice staff were also interviewed by foodservice directors and surveyed before Harvest Week. Again, the surveys were numbered by foodservice directors for confidentiality purposes.

During Harvest Week, the week of September 24th-28th, one selected third-grade classroom at each participating school received the developed curriculum. The curriculum was taught on two separate days. Students at Amvet Boulevard School were taught by Meredith Carter and students at Heath School were taught by Kendra Whitney, the dietetic intern from

Framingham State College. At this time, local foods were served each day in the cafeteria. These foods included apples, watermelon, green beans, cucumbers, tomatoes, and others. In the cafeteria, the educational materials were put on display along with the marketing materials, including the posters, menu cards, etc.

Following Harvest Week, third-grade students at both schools, including those who received the curriculum, completed the post-week survey. Foodservice staff at both participating schools completed post-Harvest Week surveys and answered post-Harvest Week interview questions. Foodservice directors completed the data sheets, providing both quantitative and qualitative data regarding the use of locally grown foods during Harvest Week and the positive and negative aspects related to the local foods' purchase, preparation, and sales. All data was collected by researchers for analysis.

After reviewing the gathered data, it was decided that the classroom curriculum needed to be tested in a third school in order to produce more accurate and reliable results. Narragansett Elementary School in Narragansett, Rhode Island was recruited to participate in the study in March 2008. With the support of both the school's principal and health curriculum director, the IRB approved the study's extension. Parent consent forms and student assent forms were distributed among the one third-grade classroom selected to participate in the study. Signed forms were collected. Students completed the pre-test survey, modified to fit agriculture in Rhode Island. Again, these surveys were numbered by the teacher in order to maintain confidentiality among participants but to allow the comparison of individuals' responses. Students then received the two 45-minute classroom lessons, both slightly adjusted to educate on Rhode Island agriculture. These lessons were taught in consecutive weeks as their timing was not limited by Massachusetts' Harvest Week. These lessons were taught by Meredith Carter. After

receiving and participating in both lessons, the students completed the post-test survey, also identical to the pre-test survey. Surveys were collected for analysis and comparison with results gathered from Massachusetts schools.

All collected data was analyzed by researchers. Data collected from the foodservice departments of the Massachusetts schools was combined for analysis. Student survey data from Massachusetts schools was combined for all survey questions except for one, which asked about the acceptability of fruits and vegetables in school cafeterias. The data from Massachusetts classrooms was then compared to data collected from the participating Rhode Island classroom.

Results

Fifteen students from Amvet Boulevard School in North Attleboro, MA and fifteen students from Heath School in Brookline, MA participated in the study; all of these participants received the classroom education. Nine students from Narragansett Elementary School in Narragansett, RI participated in the study. The students from Narragansett only received the classroom education; they were not exposed to the foodservice education and marketing and the availability of local foods as provided to Massachusetts students during Harvest Week. All students completed both pre and post-test surveys. In analyzing the data, differences between school-affiliated responses as well as differences between state-affiliated responses were evaluated.

Five participants from the foodservice department at Amvet Boulevard School and three participants from the foodservice department at Heath School were also involved in the study. Foodservice staff from North Attleboro completed interview questions and both pre and post-Harvest Week surveys. Foodservice staff from Brookline completed the interview questions; however, they only completed the pre-Harvest Week surveys. Foodservice directors from both school districts completed the data sheets.

Table 1: % Like to Go to Farm or Farmers' Mkt. to Buy Food

	Pre	Post
A	46.7	73.3
B	73.3	66.7
N	33.3	66.7

A=N. Attleboro, B=Brookline, N=Narragansett

According to Table 1, students at Amvet Boulevard School improved their attitudes regarding visiting and purchasing foods at farms and farmers' markets. Originally, 46.7% of students liked visiting these places to buy local food, while 73.3% liked visiting them after

Harvest Week. Students at Narragansett Elementary School also improved their attitudes with only one-third of students liking to visit farms and farmers' markets to buy food before exposure to the classroom education and two-thirds of students liking to visit these locations after the classroom education. Students at Heath School, however, did not improve their attitudes as 73.3% liked visiting farms and farmers' markets before Harvest Week and only 66.7% reported the same attitude following Harvest Week.

Table 2: ID of Where Food is Produced

	MA (n=30) (% correct)		RI (n=9) (% correct)	
Location	**Pre**	**Post**	**Pre**	**Post**
My Town	36.7	53.3	22.2	33.3
My State	53.3	76.7	55.6	100.0
N.E.	20.0	53.3	44.4	66.7
U.S.	40.0	70.0	66.7	88.9
World	46.7	66.7	77.8	77.8

On the student surveys, students were asked to identify places where food is produced. The correct response was to identify all five locations: my town, my state, New England, the U.S., and the world. According to data in Table 2, students' knowledge on food-producing locations increased as responses improved among both student groups and for all categories, except for Rhode Island students identifying 'the world', which remained static. Before Harvest Week and/or the classroom education, Massachusetts students were more aware of food being produced in their town (36.7%) than Rhode Island students (22.2%). However, Rhode Island students were more aware than Massachusetts students that foods are produced in their state (55.6% vs. 53.3%), New England (44.4% vs. 20.0%), the U.S. (66.7% vs. 40.0%) and the world (77.8% vs. 46.7%). After Harvest Week, Massachusetts students increased their responses, and thus their knowledge, in recognizing their town (53.3%), their state (76.7%), New England

(53.5%), the U.S. (70.0%), and the world (66.7%) as food producing locations. Rhode Island also increased their knowledge of all food producing locations except the world, most notably identifying their state as a food producer (100.0%).

Table 3: ID of Foods Grown in State

	MA (n=30) (% correct)		RI (n=9) (% correct)	
Foods	**Pre**	**Post**	**Pre**	**Post**
Strawberries	93.3	93.3	66.7	77.8
Corn	90.0	90.0	100.0	100.0
Oranges	50.0	70.0	44.4	77.8
Lobster	3.3	20.0	44.4	44.4
Cheese	13.3	13.3	22.2	44.4

Table 3 identifies student knowledge pertaining to foods grown in their respective states. Before Harvest Week, the majority of Massachusetts students were able to identify strawberries (93.3%) and corn (90.0%) to be locally grown foods, while also identifying oranges (50.0%) as a non-locally grown food. After Harvest Week, the same percentages of students identified strawberries and corn as locally grown foods, while the percentage of students recognizing lobster (20.0%) as a locally grown food increased. Students did not increase knowledge regarding cheese as a local product, but more Massachusetts students did recognize oranges as a non-local food (70.0%). In Rhode Island, most students understood strawberries (66.7%) and corn (100.0%) were locally grown foods before exposure to the classroom curriculum. After the classroom education, these students increased their knowledge as more students identified strawberries (77.8%) and cheese (44.4%) as locally grown and produced foods. More students also identified oranges as a non-locally grown food (77.8%), while the percentage of students recognizing lobster as a locally produced food remained the same (44.4%). After the classroom education, all Rhode Island students were still able identify corn as a locally produced food.

Table 4:% Recognized Label Designating Freshest Apple		
	Pre	Post
A	93.3	100.0
B	93.3	100.0
N	88.9	100.0

A=N. Attleboro, B=Brookline, N=Narragansett

Students were asked to identify apples with labels designating location of origin. Knowing that foods produced locally are fresh, correct responses to this survey question were the identification of either Massachusetts or Rhode Island-grown food labels. Table 4 shows that the vast majority of students were able to identify the freshest apples according to labels before Harvest Week and/or the classroom education. Following Harvest Week and/or the classroom education, 100.0% of all student participants were able to identify locally-grown labels designating fresh products.

Table 5: % Believe It Is Important to Have Farms in State		
	Pre	Post
A	93.3	100.0
B	93.3	100.0
N	100.0	100.0

A=N. Attleboro, B=Brookline, N=Narragansett

Before Harvest Week, the majority of students at both Amvet Boulevard School (93.3%) and Heath School (93.3%) believed it is important to have farms in Massachusetts. After Harvest Week, 100.0% of students believed it is important to have farms in the state. Both before and after exposure to the classroom education, 100.0% of students at Narragansett Elementary School believed it is important to have farms in Rhode Island.

Table 6: ID of Reasons Why Local Farms Are Important				
	MA (n=30) (% correct)		RI (n=9) (% correct)	
Reasons	**Pre**	**Post**	**Pre**	**Post**
Jobs	40.0	80.0	0.0	62.5
Open Land	40.0	76.7	55.6	62.5
Gas	70.0	93.3	44.4	62.5
Healthy/Delicious	93.3	93.3	88.9	75.0

Students were asked to identify reasons why it is important to support local farms. The possible responses were: (1) local farms provide jobs; (2) local farms preserve open land; (3) local farms save gas by decreasing distances required for transportation; and, (4) local farms produce healthy and delicious foods. The correct response to this question was to circle all four selections. As seen in Table 6, students improved their knowledge of the first three concepts after receiving the classroom education. Massachusetts students did not increase their knowledge of the concept that local farms produce healthy and delicious foods, although the vast majority (93.3%) of students understood this concept both before and after the education. Narragansett students, however, decreased their knowledge regarding the production of healthy and delicious foods, with 88.9% of students understanding this concept before the education and 75.0% of the students understanding this concept after the education.

Table 7:Students Avg. Degree of Likeness of School's F&V (1=strongly dislike, 5=strongly like)		
	Pre	**Post**
ABS	3.9	4.1
HS	3.9	3.5

Table 7 exhibits results gathered from students at the two Massachusetts schools. Asked before and after Harvest Week and the correlating use of local foods in school cafeterias, the students reported their likeness of fruits and vegetables served in cafeterias. Little change was

found in student perceptions of the foods. However, overall responses show that students like fruits and vegetables served in cafeterias, with all data showing results over 3.0, which designated ‘neither like nor dislike’.

According to foodservice interview questions, the majority of staff members were supportive of Harvest Week and the use of locally grown foods in cafeterias. Most of the staff looked forward to Harvest Week, not having many concerns or worries about the event or serving the new foods. Many staff members thought students would notice differences in their lunch meals, while they also thought the cafeteria would serve more fruits and vegetables and the students would consume more fruits and vegetables. Foodservice staff expected that students would also notice the marketing materials in the cafeterias. In terms of cost, some staff members did not think there would be cost differences while others did think there would be cost differences. However, many staff members anticipated that the local foods would be fresher, brighter in color, healthier, and of a higher quality than the usual foods served. All staff members said they would promote the new foods to students during lunchtime.

The foodservice director at Amvet Boulevard School reported that the school serves 942 meals each week, with 140 servings of fruit and 100 servings of vegetables served at each meal. Staff members portion the fruits and vegetables but the students select the foods for their trays. During Harvest Week, this school served blueberries, mixed field greens, watermelon, and yellow squash in the cafeteria. These foods were purchased through Costa Fruit and Produce, a distributor served by local farms. Since foods were purchased through a distributor, the N. Attleboro school did not see much of a cost difference between the local foods and the usual foods. There were no obvious quality differences found between the local foods and the usual foods either. In terms of consumption, rates were the same or greater during Harvest Week.

At the Heath School in Brookline, approximately 850 meals are served each week. Typically, one serving of fruit and one serving of vegetables are served to each student at lunch. Foodservice staff serve the fruit and vegetable servings to students. During Harvest Week, the school served apples, pears, watermelon, cucumbers, carrots, tomatoes, peppers, summer and zucchini squashes, butternut squash, green beans, and a winter medley. Food products were purchased from Lanni Orchards in Lunenberg, Massachusetts. Food costs were found to be cheaper for all products except peppers, which were the same in price, and peeled butternut squash, which was $0.25 more per pound. Although no differences were found between the local foods and the usual foods in terms of preparation time and waste, the foodservice department did have a few issues with availability and delivery of the local foods. The cucumbers, watermelons, and green beans were not available in the requested quantities, while the tomatoes were delivered at peak ripeness, thus having a shorter shelf life. Deliveries were not reliable as they did not always arrive on the delivery day or within the delivery time frame. Although exact consumption rates were not available, it was reported that the apples, pears, and peaches were well received by the students. In general, the local vegetables were hardly distinguishable from the usual foods once they were prepared and served.

Table 8: Foodservice Survey Results (1=strongly disagree, 5=strongly agree)

	Pre	Post
Look of Local Foods	4.3	4.6
Taste of Local Foods	4.4	4.5
Preparation of Local Foods	1.3	2.4
Marketing of Local Foods	4.5	4.3
Difference in Local Foods	3.1	2.5
Cost of Local Foods Not Issue	4.9	4.8
Cost of Local Foods Issue	4.1	4.2
Support of Local Farms	5.0	5.0

Table 8 shows the results from foodservice staff surveys completed before and after Harvest Week by staff members at both the N. Attleboro school and the Brookline school. For the most part, little change was seen among responses before and after Harvest Week. When asked if local fruits and vegetables would look better than non-local fruits and vegetables, staff members rated their opinion at 4.3 before Harvest Week and at 4.6 after the week. Staff rated their opinion at 4.4 before and 4.5 after Harvest Week when asked if local fruits and vegetables taste better than non-local fruits and vegetables. As a result, staff members found that local foods look and taste better after Harvest Week, even when they anticipated this better look and taste before Harvest Week. Staff members reported a before and after response average of 1.3 and 2.4, respectively, when asked if local fruits and vegetables would be more difficult to prepare than non-local fruits and vegetables. This moderate change in results shows that staff members may have found that local foods require different or more difficult preparation methods than non-local foods. Staff members were asked if students pay attention to marketing tools used in the cafeteria; they reported pre-Harvest Week responses of 4.5 and post-Harvest Week responses of 4.3. When asked if students notice a difference between local foods and non-local foods, staff members reported ratings of 3.1 before Harvest Week and 2.5 after Harvest Week. Although staff members expected and found that students notice marketing tools, their responses slightly changed in terms of students noticing a difference between the food products. This change signifies that the students may not have noticed a change as the staff members expected prior to Harvest Week. Staff members were asked if they would encourage the purchasing of local foods in schools if cost were not an issue. They reported scores of 4.9 before Harvest Week and 4.8 after Harvest Week. Staff members were then asked if they would encourage the purchasing of local foods in schools if cost were an issue. They reported scores of 4.1 before Harvest Week and

4.2 after Harvest Week. These results barely changed, showing that staff members would support the purchasing and use of local foods in school regardless of cost. Finally, staff members were asked if Massachusetts farmers, and agriculture in general, need to be supported by the public. Both before and after Harvest Week, they reported ratings of 5.0; these results show that the staff members are very supportive of local agriculture, regardless of the use of local foods in school cafeterias.

Discussion

In looking at the study results, it can be determined that student attitudes regarding local agriculture improved after Massachusetts Harvest for Students Week and exposure to local foods in cafeterias, foodservice marketing and education tools in cafeterias, and/or the developed classroom curriculum. The results from Table 1 provide researchers with a better understanding of school populations. These results report that only students in Brookline were well aware and supportive of local farms and farmers' markets before the education, while all students were aware and supportive of local farms and farmers' markets after the education. A portion of the students who did not express that they like to go to farms or farmers' markets had never been to a farm or farmers' market so they could not provide a response.

Improvement of student attitudes can also be seen through results shown in Tables 5 and 7. Results in Table 5 show that the vast majority of students believed local farms are important before receiving the classroom education. This implies that the students were receptive to the education and Harvest Week as they already knew and supported local farms and agriculture. Differences in results were not seen between city (Brookline) and suburban (N. Attleboro and Narragansett) schools. Results in Table 7 only depicted the attitudes of Massachusetts students. As the results changed only slightly before and after Harvest Week, it cannot be determined that local food use in cafeterias changed student perceptions and consumption rates of fruits and vegetables at school when compared to usual food use. Several students were unable to respond to the corresponding survey question as they typically bring lunch from home. These results may have differed if students were to rate fruits and vegetables immediately after lunchtime consumption. However, foods were rated days before and after Harvest Week, likely causing students to forget the qualities of the foods of interest.

Study results further show that student knowledge increased with the classroom curriculum, Harvest Week, and its corresponding activities. As seen in Table 2, students learned about locations where food is grown through exposure to the classroom education. Massachusetts students gained a better understanding that food is grown in their respective towns (Brookline and N. Attleboro), the state, New England, the United States, and the world after learning about this concept, as seen by the increasing statistical percentages. Rhode Island students also learned the concept of locations of food production as their responses increased regarding each location with the exception of the world; the number of correct responses to this answer remained static before and after the classroom education. Table 3 shows students' understanding of locally grown foods. In both Massachusetts and Rhode Island, students increased or maintained their level of knowledge regarding the types of food grown within their respective states. Most students knew that strawberries and corn were produced locally before receiving the classroom education. These results show that marketing of strawberries and corn is not necessary, especially for third grade students, as their local production is widely known. Before Harvest Week and the education, students did not have a clear understanding that lobster and cheese are locally produced foods. In looking at the post-test results, it can be found that the education was not effective as the majority of students remained unclear with this concept. Therefore, more education and marketing needs to be provided regarding locally produced lobster and cheese. Finally, half or fewer of students knew that oranges were not locally grown prior to the education. Following Harvest Week and the education, the majority of students recognized that oranges are not produced locally. Although students responded well to this concept, the concept was difficult for students to grasp and may require further education.

In terms of recognizing locally grown food labels, students were knowledgeable prior to Harvest Week and the classroom education, as seen in Table 4. When determining the freshest apple, among apples produced in Massachusetts or Rhode Island, Wisconsin, or Mexico, the vast majority of students recognized apples from Massachusetts or Rhode Island being the freshest. After the education, all students were able to identify the freshest apple. These results signify that students clearly understand the concept of local and fresh. In the future, this concept does not need to be emphasized. Furthermore, the results are valuable for the Massachusetts Department of Agricultural Resources as they imply that the marketing materials produced by the department are effective. As seen in Table 6, students further increased their knowledge over Harvest Week and through the classroom curriculum by learning about the benefits of local farms. Students in Massachusetts increased or maintained their knowledge regarding all four emphasized benefits, while Rhode Island students increased or maintained their knowledge regarding three emphasized benefits, excluding the benefit that local farms produce healthy and delicious foods. The understanding of this benefit only decreased slightly following the classroom curriculum. Specifically, the ideas that local farms provide jobs and save on gas use were clearly understood concepts among students. The idea that local farms preserve open land was a big concept for this age group, although students in both states learned this concept.

The quantitative data provided by the foodservice staff and director at N. Attleboro show that fruit and vegetable consumption rates were the same or greater during Harvest Week than during other weeks throughout the year. At the Brookline school, consumption data was unavailable for analysis. In terms of local food costs, N. Attleboro did not find a cost difference between local foods and non-local foods; this is mostly likely related to their business

partnership with Costa, a food distributor. In general, local foods were the same price or cheaper than non-local foods for the Brookline school.

In looking at the results of Table 8, many attitudes of the Massachusetts foodservice staff members did not change after Harvest Week. The biggest change seen was in the preparation of foods, as staff members did not disagree as strongly following Harvest Week that preparing local foods would be more difficult than preparing non-local foods. The next largest change was in regards to children noticing a difference between local and non-local foods, as staff members did not agree nor disagree that students would notice a difference before Harvest Week but they slightly disagreed that the students noticed a difference after Harvest Week. The results also show that the foodservice staff are very supportive of local agriculture and using local foods in schools as they strongly believed the Massachusetts public should support local farms and school cafeterias should purchase and serve locally grown foods. In general, staff members believed locally grown foods are fresh, healthy, bright in color, and contain fewer preservatives, when compared to non-local foods.

Qualitative results from the Massachusetts foodservice staff show that they were excited and supportive of Harvest Week and the use of local foods in schools. The staff members were also optimistic that students would consume more fruits and vegetables during Harvest Week. Again, the foodservice staff thought locally grown foods would be fresh, healthy, bright in color, and contain fewer preservatives when compared to non-local foods. The staff members also expected students to notice the education and marketing tools on display in cafeterias during Harvest Week. After Harvest Week, the food service staff did not see large differences in quality between the locally grown foods and the non-local foods. Brookline school did encounter a few issues regarding product delivery and shelf life. This is mostly likely due to the differences in

business operations between farms and distributors as farms have several responsibilities outside of delivering food, causing their business to be pressed for time, employees, and other resources. Altogether, both foodservice departments responded positively overall to Harvest Week.

Conclusion

Third grade students at Amvet Boulevard School in N. Attleboro and Heath School in Brookline were receptive to Massachusetts Harvest for Students Week. These students knew about and believed in local agriculture prior to the state-wide event. The developed classroom curriculum was further effective as student knowledge increased and student attitudes improved in conjunction with its use. In the future, the curriculum needs to be reevaluated as some of the topics covered were already well-understood by the third grade students. In particular, these concepts included the use of labels to distinguish local and fresh foods and the local production of both strawberries and corn. In terms of local food use in cafeterias, student perceptions of the fruits and vegetables served did not change when comparing the local foods to the usual foods. However, this issue requires further investigation as the methods used to collect data regarding student perceptions were not accurate and reliable.

In terms of the participating school foodservice departments in N. Attleboro and Brookline, the staff showed strong support for local farms. The staff positively received Harvest Week as they looked forward to the event prior to Harvest Week and they provided positive feedback following the event. No apparent differences in cost, quality, and consumption were seen in either foodservice department. Local foods may require special preparation techniques compared to usual foods. However, this issue needs further investigation as the methods used to analyze this concern were not reliable and accurate.

Overall, it can be determined that locally grown foods are popular and that they continue to gain popularity throughout the United States. Massachusetts Harvest for Students Week appears to be an effective program, especially within the participating schools in N. Attleboro and Brookline. The classroom education seemed to be effective for the participating third grade

students, although it should be modified to fit the knowledge levels of other age groups, preschool through high school. The marketing materials provided by the Massachusetts Department of Agricultural Resources and the Massachusetts Farm to School Project may also be effective for future use in school cafeterias. Finally, foodservice departments were found to be very willing to participate in both a research study and the statewide initiative, Massachusetts Harvest for Students Week. Although these departments are sometimes considered to be the barriers when introducing new foods, concepts, and activities within schools, the participating departments proved to be interested, supportive, and enthusiastic about the opportunities provided through Harvest Week. Their successes pertaining to local food use in cafeterias may encourage other school cafeterias to introduce local foods as well.

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