Evaluation of the Harvest of the Month 4-6 Grade Curriculum, 2017

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Executive Summary

The California Department of Public Health contracted with the Alameda County Office of Education to develop a Harvest of the Month (HOTM) curriculum targeting students in grades four through six. This curriculum was to serve as the central component of a school-based nutrition education intervention for 4th-6th grade students and their parents. The curriculum, as well as the existing complementary family newsletters, were evaluated by the Nutrition Policy Institute, University of California, Division of Agriculture and Natural Resources during the 2016-17 school year.

For each grade, the HOTM curriculum consisted of six lessons and corresponding student workbooks. The curriculum was designed to be implemented over a six-month period. Due to time constraints, the curriculum was implemented over a six-week period, for purposes of the evaluation. Each lesson featured nutrition education focused on a different fruit or vegetable, with grade-appropriate math and/or English Language Arts (ELA) activities that addressed the California Common Core Standards. The lessons also provided information about local agriculture and promoted a healthy lifestyle, including eating more fruits and vegetables, choosing healthy beverages, and engaging in physical activity. In-class education was complemented by a home-connections HOTM family newsletter featuring nutrition information, recipes, and tips for selecting, storing, and preparing various fruits and vegetables.

The evaluation of the HOTM intervention had multiple aims:

1. To assess the impact of the HOTM curriculum on students' behaviors and attitudes towards fruits and vegetables, including consumption.
2. To gather student and teacher feedback and recommendations for improving the HOTM curriculum.
3. To assess parent/guardian familiarity with the HOTM family newsletter and impacts on knowledge and behaviors at home.

Evaluation methods included a 2-group pre-post test administered to intervention and comparison group students immediately prior to, and following curriculum implementation; focus group discussions with intervention group students; a survey of intervention group teachers; and a survey of parents/guardians of intervention group students.

There were two intervention schools and one control school. Both the intervention and control sites were public K-6 schools located in Hayward, CA. The intervention group consisted of 262 students in nine 4th-6th grade classrooms (three classrooms per grade) and the comparison group consisted of 236 students in nine 4th-6th grade classrooms (three classrooms per grade). All sites were demographically similar and met the SNAP-Ed qualifying threshold of at least 50 percent of students eligible for free or reduced price meals.

Student survey findings indicated:

- Statistically significant increases in combined fruit and vegetable consumption, fruit consumption, and 100% juice consumption among intervention group students. Holding grade, gender, and race/ethnicity constant and accounting for clustering by classroom, the

change in combined fruit and vegetable consumption frequency was 0.540 times/day (95% CI: 0.050, 1.031) higher in the intervention as compared to the comparison group. Fruit consumption was 0.419 times/day (95% CI: 0.171, 0.668) higher in the intervention group and 100% fruit juice consumption was 0.297 times/day (95% CI: 0.060, 0.535) higher in the intervention group.

- Preferences for 22 produce items were measured. Four of the five items for which a statistically significant preference was identified were fruits, with statistically significant increases in preference for apples (p=0.036), apricots (p=0.004), carrots (p=0.004), cherries (p=0.004) and nectarines (p=0.003) in the intervention group as compared to the comparison group.
- A small, but statistically significant difference between the intervention and comparison groups was found regarding perceived importance of eating fruits and vegetables that are grown nearby (p=0.024).
- Minimal impacts were found regarding self-efficacy and social norms. No significant differences were found with respect to self-efficacy, while the only social norms item for which a statistically significant difference was found was "*My teachers tell me it is important to eat vegetables*" (p<0.001).

Findings from student focus groups and student responses to open-ended survey questions indicated:

- Overall positive attitudes toward HOTM.
- Interest in learning about the health benefits of fruits and vegetables.
- Appreciation for fruit and vegetable tastings.
- Mixed perceptions of the math and writing activities, which appeared to be associated with general student attitudes toward math and writing, and not associated with the curriculum per se.
- Mixed perceptions of featured fruits and vegetables.

Teacher surveys indicated:

- Overall positive perceptions of the HOTM curriculum as a means of promoting healthier diets and physical activity.
- High levels of student engagement.
- Requests to reexamine aspects of the curriculum including time allocation, teacher instructions and appropriateness of the learning level for select activities.
- Concerns about the classroom application of the physical activity component.

Parent surveys indicated:

- Nearly two-thirds of parents reported familiarity with the HOTM newsletter.
- Over half of parents reported that their children requested more fruits and vegetables at home
- Parents reported learning new information from the newsletter and making changes, including eating and buying more fruits and vegetables.

The evaluation findings indicate that the HOTM curriculum has positive impacts on both student knowledge of fruits and vegetables and reported consumption of fruits in particular,

and vegetables to a lesser degree. Notably, the program is highly regarded by students, teachers and parents/guardians.

Given its positive reception by all key stakeholders, wider application of the program is warranted and recommended. The pilot program demonstrated the effectiveness of this school-based intervention while providing detailed information to guide changes to increase its positive impact. Areas for future consideration include identifying optimal student age/grade for program participation, techniques to enhance the selection and appeal of featured vegetables, and continued support and assistance of classroom teachers for modifying program elements such as integration with academic curriculum, improvement of self-efficacy, social support, and physical activity program components.

Introduction

The California Department of Public Health (CDPH) Nutrition Education and Obesity Prevention Branch (NEOPB) contracted with the Alameda County Office of Education (ACOE) in 2015 to develop a Harvest of the Month (HOTM) curriculum targeting 4th through 6th grade students. Materials were based on HOTM student workbooks developed by San Bernardino County and in use in several California county SNAP-Ed programs since 2010. When SNAP-Ed funds support offering any curriculum in school-based settings, the United States Department of Agriculture (USDA) requires that the curriculum be evidence-based. Therefore, the curriculum was evaluated by the Nutrition Policy Institute, University of California, Division of Agriculture and Natural Resources during the 2016-17 school year.

Harvest of the Month Background

HOTM is a multi-level social marketing intervention implemented in many community venues, but most often in schools. Initially developed by several California school districts as part of a broader nutrition education effort targeting low-income students, it features nutrition education tools and resources for educators, students, families and cafeteria managers to support the promotion and adoption of healthy lifestyle habits, specifically daily consumption of California-grown fruits and vegetables. Recognizing the value of this approach, CDPH adopted HOTM in 2005 as a statewide effort that was standardized, cost-effective, replicable, and available to all in English and Spanish. Additionally, locally developed materials are available in Chinese, Russian, Vietnamese, and Hmong. HOTM materials and additional program background are located at www.HarvestoftheMonth.com.

The primary goals of HOTM are to:

1. Increase availability of California grown fruits and vegetables in school meal programs, classrooms, grocery stores, worksites and other community-based locations, and through farm-to-school programs, school and community gardens, and farmers' markets.
2. Increase consumer preferences for California-grown fruits and vegetables.
3. Increase consumption of locally grown foods by connecting growers to their communities through farmers' markets, grocery stores, schools, food banks, and other locations.
4. Increase participation in daily physical activity and an understanding of its importance to good health.
5. Expand familiarity with California-grown fruits and vegetables, local farmers, the state's rich agricultural bounty, and how food travels from the farm to consumers' plates.[1]

Harvest of the Month Curriculum

ACOE developed an HOTM curriculum targeting 4th through 6th grade students. For each grade, the HOTM curriculum consisted of six lessons and corresponding student workbooks. The curriculum was designed to be implemented over a six-month period. Each lesson featured nutrition education focused on a different fruit or vegetable, with grade-appropriate math and/or English Language Arts (ELA) activities that addressed the California Common Core

Standards. The lessons also provided information about local agriculture and promoted a healthy lifestyle, including eating more fruits and vegetables, choosing healthy beverages, and engaging in physical activity. This in-class education was complemented by a home-connections HOTM family newsletter featuring nutrition information, recipes, and tips for selecting, storing, and preparing various fruits and vegetables.

The materials were initially pilot-tested during the 2015-16 school year in 18 classrooms in 3 schools located in Hayward, CA. An internal evaluation was conducted by ACOE and the curriculum was revised based on the evaluation findings, which primarily addressed: adding background and nutritional information about fruits and vegetables; increased support for English Language Learners; supplying additional instructions and diagrams for physical activities, and increasing the level of academic rigor. The revised materials were piloted during the 2016-17 school year through an external evaluation conducted by the University of California Nutrition Policy Institute.

The revised curriculum consisted of six lesson plans and corresponding student workbooks for grades 4-6. Lessons were designed to be taught once per month beginning in November and continuing in January through May. Due to time constraints, the pilot curriculum was implemented over a six-week period for purposes of the evaluation. Each lesson addressed: a different fruit or vegetable, grade-appropriate Common Core standards for math and English Language Arts (ELA), an HOTM Monthly Goal, and grade-level specific Nutrition Competencies (Common Core Standards Matrix for the Nutrition Competencies, Grades K-6). To select the produce for the lessons, CDPH surveyed local health departments throughout California to identify three fruits and three vegetables to be highlighted in the HOTM curriculum.[2] Responses to the health department survey as well as the statewide harvest cycle were considered when selecting the monthly featured fruits and vegetables. The final choices were: apples (November), winter squash (January); broccoli (February) and oranges (March); carrots (April) and berries (May). Each lesson concluded with a taste testing. With the exception of the lesson on winter squash, which featured roasted pumpkin seeds, featured items were tasted raw, with no accompanying condiments or dips.

Each student workbook contained five sections: Harvest It, Move It, Link It, Try It, and Digest It. The Harvest It section required students to read a variety of informational texts. The subsequent sections supported the chosen Common Core standard and used the fruit, vegetable, and nutrition competencies as content, with supportive teacher guidance (Move It, Link It), student practice (Try It), and informal assessment (Digest It).

The Harvest It section established student expectations, activated prior knowledge, provided English language development support, and engaged students. It included the lesson goals, a picture of – and nutrition facts label for – the highlighted fruit or vegetable, and a diagram of a serving size. In addition, this section included a reading passage containing information on nutrition content and health benefits, as well as facts about varieties and production. The information in the Harvest It section was derived in whole or in part from the HOTM Educator's Newsletter, a monthly newsletter that "links to curricular areas such as mathematics, science,

health, history, English/language arts and physical education" and "provides key information about the featured produce as well as resources to further explore each fruit and vegetable."[3]

The Move It section was designed to promote the importance of physical activity, to get students physically active, and to introduce content to be utilized in subsequent sections of the lesson. Each of the six lessons promoted some form of movement or physical activity.

The Link It section provided guided-practice opportunities for students in math and writing and included graphic organizers and other scaffolds to help students synthesize content from the Move It activity.

The Try It section reinforced math and writing skills by asking students to independently complete activities similar to those presented in the Link It section, or to further develop work from that section.

The Digest It section provided opportunities for students to taste the featured fruit or vegetable and reflect on what they had learned during the lesson.

To prepare teachers, all lesson plans included detailed instructions for each section of the workbook, a summary section addressing the learning objectives, standards, and materials; a procedure section describing each activity, goals for teachers and students; and a Nutrition Resources and Health Messages section that included information on MyPlate and how to understand and use the Nutrition Facts label.

To help facilitate home connections with the content taught in class, a one-page HOTM Family Newsletter, available in both English and Spanish, was sent home with students. Newsletter content provided general information on how nutrition affects a child's health and education; tips for providing more fruits and vegetables; ways to encourage healthy food choices; a recipe for the HOTM featured fruit or vegetable; tips for selecting, storing and serving the produce item, and ideas for engaging in physical activity.[4]

Evaluation

Schools and classrooms were sampled via convenience sampling and assigned to intervention or comparison group. All sites were demographically similar and met the SNAP-Ed qualifying threshold of at least 50 percent of students eligible for free or reduced price meals. All students in intervention and comparison classrooms were eligible to participate in the research pending parental consent and student assent. The intervention group consisted of 262 students in nine 4^{th}-6^{th} grade classrooms (three classrooms per grade) at two K-6 public elementary schools in Hayward, CA. The comparison group consisted of 236 students in nine 4^{th}-6^{th} grade classrooms (three classrooms per grade) at one public K-6 school in Hayward, CA.

The evaluation of the HOTM curriculum had three aims:

1. To assess the impact of the HOTM curriculum on students' behaviors and attitudes towards fruits and vegetables, and to measure change in consumption of fruits and vegetables.
2. To gather student and teacher feedback and recommendations for improvements for the HOTM curriculum.
3. To assess parent/guardian familiarity with the HOTM family newsletter and impacts on knowledge and healthy behaviors at home.

The impact of the HOTM curriculum on students' behaviors and attitudes, Aim 1, was assessed via a 2-group pre-post test. The surveys were self-administered during class time and were proctored by members of the research team. The pre-test survey was administered during a two-week period prior to curriculum implementation, and the post-test survey was administered during a two-week period following completion of the curriculum. Both surveys were administered to comparison group students within the same timeframe as the intervention students. The student surveys included questions adapted from surveys including the School Physical Activity and Nutrition Project (SPAN) survey[5] and the Food Preference Survey.[6] Following IRB recommendation, an alternate activity was provided to students who opted out of the surveys.

The items included on both pre and post surveys included frequency of consumption of fruits (times/day), of vegetables (times/day), and of 100% fruit juice (times/day); attitudes toward trying new fruits and vegetables (3-point scale: *Almost always or always; Sometimes, Almost never or never*); preferences (3-point scale: *I like this a lot, I like this a little, I do not like this, Don't know or never tasted it*) for 22 produce items; self-efficacy regarding ability to eat fruits, vegetables, and 100% fruit juice for breakfast, lunch, snack and dinner at home/school (5-point scale: *I disagree very much; I disagree a little; I am not sure; I agree a little; I agree very much*); social norms regarding attitudes and behaviors of peers and adults at school and home (5-point scale: *I disagree very much; I disagree a little; I am not sure; I agree a little; I agree very much*); and interest in local agriculture (4-point scale: *Very important; Somewhat important; Not very important; Not at all important*). The post-test included five additional open- and closed-ended questions assessing students' perceptions of the curriculum.

An "opt out" letter was sent home to parents/guardians of intervention and comparison group students providing information about the research and requesting that parents/guardians return a signed letter to the school if they preferred their student not participate in the survey. Of 498 letters sent home, 13 parents/guardians (eight intervention, five comparison) returned signed letters opting their students out of the survey. Students were informed they could decline to participate in the survey with no negative consequences, an option that was chosen by one comparison group student.

Students were included in the analysis if they completed both a pre-test and a post-test survey and did not have prior exposure to HOTM, which some teachers taught during the prior school year. A total of 464 students completed the pre-test survey (240 intervention, 224 comparison), while 449 students completed the post-test survey (235 intervention, 214 comparison) and 430

students completed both pre- and post-test surveys (220 intervention, 210 comparison). Seventy-nine fifth grade (n=43) and sixth grade (n=36) intervention group students were excluded from the analysis due to prior exposure to the HOTM intervention. None of the control students had prior HOTM exposure. The final sample consisted of 351 completed pre- and post-test surveys (210 comparison, 141 intervention) (Table 1).

Table 1. Number of intervention and comparison group students included in analysis, Harvest of the Month Evaluation, Hayward, CA, 2016-17

	Intervention Students	Comparison Students	Total Students
Completed pre-test	240	224	464
Completed post-test	235	214	449
Completed both pre, post	220	210	430
Excluded from analysis	79	0	348
Final sample of completed pre, post	**141**	**210**	**348**

In the analysis, ordinal categorical outcomes were treated as continuous outcomes and analysis of covariance was conducted on their change scores, controlling for pre-test scores. For binary outcomes, generalized estimating equations models were fit using proc genmod. All analyses adjusted for grade, gender, and race/ethnicity and accounted for clustering by classroom, and were conducted using SAS 9.4.

Aim 2, student feedback and recommendations for improving the curriculum, was addressed via focus group discussions which were conducted with 4th, 5th, and 6th grade intervention group students. One focus group was conducted per grade. The discussions elicited the following qualitative data:

- Student perceptions of the curriculum, materials, and activities.
- Impacts of the HOTM curriculum on student knowledge.
- Impacts of the curriculum on attitudes and behaviors related to fruits and vegetables, local agriculture, shopping patterns, and food-related behaviors at home.
- Student recommendations for improving the curriculum.

Participation in the focus groups was on an “opt-in” basis requiring signed parental consent and student assent. Letters were sent home to parents/guardians explaining the purpose of the focus groups and requesting signed consent for students to participate. A total of 21 parents provided consent for the students to participate in the focus groups. The research protocol limited each focus group to a maximum of 10 students. Since consent was obtained for fewer than 10 participants per class, all students with consents were invited to participate in the focus groups. Students were informed that they could decline participation in the groups with no negative consequences; however, all chose to participate. The focus groups were conducted during school hours in private classrooms at each school site. Each group was co-facilitated by two members of the research team. A third member of the research team took notes.

School protocol was followed for on-site visitation during all research activities. All research team members underwent a fingerprint scan (LiveScan) and a credentialed K-12 teacher was present in the room at all times. School sign-in/sign-out procedures were followed.

Teacher feedback, Aim 2, was solicited via an online survey administered to intervention group teachers following each lesson. This 24-item survey elicited:

- Teachers' perceptions of the curriculum, including how well each lesson component worked.
- Perceived strengths and weaknesses of the lessons.
- Likelihood of teaching the lessons again.
- Any deviations from the lesson.
- Recommendations for improving the curriculum.
- Any other feedback teachers wished to provide in an open, unguided comments section.

To assess parent/guardian awareness of the HOTM as well as any impact on home behaviors, Aim 3 of the evaluation, an anonymous 10-item paper survey was sent home to parents/guardians of intervention group students toward the end of the program. Respondents were asked to complete the survey (available in English and Spanish) and return it within one week. It assessed:

- Parent/guardian awareness of the HOTM curriculum.
- Parent/guardian familiarity with the HOTM family newsletter.
- The newsletter's impact on knowledge and behaviors regarding diet and physical activity.
- The extent to which children asked parents/guardians to make changes regarding diet and physical activity.
- Any additional feedback parents/guardians wished to provide in an open, unguided comments section.

Intervention group teachers received a $1,300 incentive for teaching the six-lesson curriculum. The three teachers who allowed the research team to conduct student focus groups received an additional $300 incentive. Comparison group teachers received a $300 incentive. No monetary incentive was provided to parents or students in either the control or intervention groups.

Results

Students

No significant differences between intervention and comparison group students were found with respect to key demographic characteristics (Table 2).

Table 2. Demographic characteristics of students in intervention and comparison groups, Harvest of the Month Evaluation, Hayward, CA, 2016-17 ($n_{intervention}$ = 141, $n_{comparison}$ = 210)

	Intervention Group		Comparison Group		p-value[3]
	n	%[1] (SE)[2]	n	%[1] (SE)[2]	
Gender					
Male	72	51.06 (3.38)	96	45.71 (4.06)	0.580
Female	68	48.23 (3.22)	112	53.33 (3.61)	
Other	1	0.71 (0.79)	1	0.48 (0.48)	
Missing	0	0.00 (0.00)	1	0.48 (0.47)	
Grade					
4th	67	47.52 (19.85)	68	32.38 (16.57)	0.780
5th	33	23.40 (16.84)	80	38.10 (17.84)	
6th	41	29.08 (16.50)	62	29.52 (15.99)	
Race/Ethnicity					
Multiple	40	28.37 (5.24)	51	24.29 (4.20)	0.928
American Indian/Alaska Native	1	0.71 (0.68)	3	1.43 (0.96)	
Asian	9	6.38 (3.23)	17	8.10 (2.81)	
Black/African American	7	4.96 (1.57)	13	6.19 (2.24)	
Latino	76	53.90 (9.50)	117	55.71 (7.27)	
Native Hawaiian/Pacific Islander	5	3.55 (2.18)	3	1.43 (0.68)	
White	1	0.71 (0.78)	3	1.43 (0.73)	
Other	2	1.42 (0.92)	3	1.43 (0.76)	

[1] Percents adjusted for clustering by classroom.
[2] SE refers to standard error, a measure of the reliability of the statistic as estimated from the study sample as an estimate of the population's parameter.
[3] Differences in categorical variables between intervention and comparison group students by Chi-square test. Boldface indicates statistical significance at P<0.05.

Of the behavioral outcomes measured, statistically significant differences between the intervention and comparison groups were found for changes in the frequency of combined consumption of fruits and vegetables (calculated as the sum of fruit and vegetable consumption, not including fruit juice); fruit, and 100% fruit juice. Holding grade, gender, and race/ethnicity constant and accounting for clustering by classroom, the change in combined fruit and vegetable consumption frequency was 0.540 times/day (95% CI: 0.050, 1.031) higher in the intervention as compared to the comparison group. Fruit consumption was 0.419 times/day (95% CI: 0.171, 0.668) higher in the intervention group, which is in part due to the negative direction of intake in the comparison group. Consumption of 100% fruit juice was 0.297 times/day (95% CI: 0.060, 0.535) higher in the intervention group. There were no significant differences regarding vegetable consumption. These findings are consistent with other evaluations of school-based interventions promoting increased fruit and vegetable consumption, which have identified greater increases in fruit than vegetable intake.[7,8,9,10]

Of the 22 produce item preferences measured, there were statistically significant increases in preference in the intervention group, as compared to the comparison group, for apples (p=0.036), apricots (p=0.004), carrots (p=0.004), cherries (p=0.004) and nectarines (p=0.003). Of those, apples and carrots were featured HOTM items. There were no statistically significant differences between the intervention and comparison groups regarding preference for oranges and strawberries, the other HOTM featured items included in the survey. The findings reveal increased preference for 18 of 22 (81.8%) fruit and vegetable items among intervention group students, indicating a positive association between the curriculum and student preference. As is further explained in the Discussion and Conclusions section, a limitation is that three of the HOTM items (broccoli, berries and winter squash) did not appear on the list of items assessing food preferences, resulting in an inability to measure changes in student preference for three of the HOTM items, and potentially underreporting the impact of this curriculum regarding fruit and vegetable preferences. The only self-efficacy measure for which a close to statistically significant difference between the intervention and comparison groups was found was perceived ability to "*get vegetables from the fridge, pantry or shelf by myself*" for lunch at home (p=0.051). The only social norms item for which a statistically significant difference was found was "*My teachers tell me it is important to eat vegetables*" (p=0.001). A small, but statistically significant difference between the intervention and comparison groups was also found regarding perceived importance of eating fruits and vegetables that are grown nearby (p=0.029) (Table 3).

Table 3: Impact of Harvest of the Month intervention on ordinal, categorical dietary behaviors, preferences, beliefs about local agriculture, self-efficacy, and social norms, Harvest of the Month Evaluation, Hayward, CA, 2016-17.

Outcome	Intervention Group		Comparison Group		Adjusted* Mean Difference in Change Between Intervention and Comparison (95% Confidence Interval)	Pr > |Z|
	n	Adjusted* Mean Change (post-pre)	n	Adjusted* Mean Change (post-pre)		
Behaviors (times/day)						
FV Consumption Frequency (times yesterday)	138	1.069	207	0.528	0.540 (0.050, 1.031)	**0.031**
Vegetable Consumption Frequency (times yesterday)	138	0.896	208	0.751	0.146 (-0.182, 0.473)	0.383
Fruit Consumption Frequency (times yesterday)	139	0.114	207	-0.306	0.419 (0.171, 0.668)	**0.001**

Juice Consumption Frequency (times yesterday)	139	0.819	206	0.522	0.297 (0.060, 0.535)	**0.014**
Preferences (3 point scale: like-don't like)						
Apples (+)[a]	139	0.020	205	-0.057	0.077 (-0.149, -0.005)	**0.036**
Apricots (+)	46	0.265	81	0.020	0.245 (0.080, 0.410)	**0.004**
Beets (-)	38	-0.000	74	0.022	-0.022 (-0.162, 0.117)	0.752
Cabbage (+)	105	-0.123	136	-0.184	0.061 (-0.101, 0.224)	0.459
Carrots (+)	137	0.140	201	0.011	0.129 (0.042, 0.216)	**0.004**
Cherries (+)	135	0.196	180	0.111	0.085 (0.027, 0.142)	**0.004**
Cooked Greens (+)	87	-0.045	139	-0.092	0.047 (-0.112, 0.206)	0.562
Cucumbers (+)	113	-0.256	173	-0.298	0.042 (-0.079, 0.162)	0.497
Grapes (+)	135	0.024	199	0.019	0.006 (-0.067, 0.079)	0.878
Jicama (+)	66	-0.223	114	-0.239	0.016 (-0.065, 0.098)	0.698
Lettuce (+)	118	-0.059	178	-0.125	0.066 (-0.069, 0.201)	0.338
Mandarins (+)	76	-0.070	129	-0.193	0.123 (-0.004, 0.250)	0.058
Nectarines (+)	61	0.318	101	0.158	0.160 (0.056, 0.263)	**0.003**
Oranges (+)	136	-0.006	199	-0.050	0.045 (-0.014, 0.103)	0.132
Peaches (+)	130	0.052	193	-0.013	0.065 (-0.015, 0.145)	0.113
Peppers (+)	113	0.087	161	-0.003	0.089 (-0.047, 0.225)	0.197
Plums (-)	88	-0.027	130	0.026	-0.053 (-0.154, 0.048)	0.301
Potatoes (-)	129	-0.662	187	-0.650	-0.012 (-0.119, 0.095)	0.822
Radishes (+)	58	0.056	99	-0.037	0.094 (-0.068, 0.256)	0.256
Spinach (raw) (+)	89	0.311	143	0.223	0.088 (-0.038, 0.214)	0.169

Strawberries (+)	137	-0.092	198	-0.109	0.017 (-0.005, 0.038)	0.125
Sweet Potatoes (-)	101	0.247	164	0.262	-0.016 (-0.147, 0.116)	0.817
Local Agriculture (4 point scale: very important-not at all important)						
Important to eat local fruits and vegetables	124	0.329	199	0.186	0.143 (0.015, 0.272)	**0.029**
Self-Efficacy (5 point scale: strongly agree-strongly disagree)						
Eat fruit for breakfast	137	-0.042	204	-0.152	0.110 (-0.068, 0.288)	0.226
Drink juice for breakfast	139	0.030	206	0.125	-0.095 (-0.293, 0.103)	0.348
Eat vegetable for lunch at school	136	-0.724	203	-0.730	0.006 (-0.221, 0.233)	0.960
Eat fruit for lunch at school	138	-0.281	206	-0.387	0.106 (-0.095, 0.306)	0.301
Get vegetable for lunch at home	135	-0.769	200	-0.931	0.162 (-0.000, 0.325)	0.051
Get fruit for lunch at home	134	-0.321	206	-0.306	-0.015 (-0.159, 0.129)	0.837
Eat fruit for snack	137	-0.289	206	-0.309	0.021 (-0.106, 0.147)	0.750
Eat vegetables for snack	135	-0.295	199	-0.436	0.142 (-0.183, 0.466)	0.393
Eat vegetables for dinner	133	-0.036	206	-0.158	0.121 (-0.114, 0.357)	0.314
Eat fruit for dessert	131	-0.247	204	-0.341	0.094 (-0.084, 0.272)	0.299
Social Norms (5 point scale: strongly agree-strongly disagree)						
Best friends eat vegetables daily	139	-0.078	207	-0.223	0.145 (-0.015, 0.305)	0.076
Classmates eat vegetables daily	137	-0.194	208	-0.150	-0.044 (-0.223, 0.135)	0.629
Classmates think it's cool to eat vegetables	136	-0.125	205	-0.140	0.015 (-0.191, 0.221)	0.885
Adults at home eat vegetables daily	139	-0.461	205	-0.354	-0.107 (-0.231, 0.018)	0.092
Cafeteria staff ask students to eat vegetables	138	-0.053	204	-0.122	0.069 (-0.127, 0.265)	0.490
Teachers say important to eat vegetables	134	0.290	205	-0.060	0.350 (0.147, 0.552)	**0.001**
Want to eat vegetables every day	134	-0.691	201	-0.798	0.107 (-0.130, 0.344)	0.377

Like taste of many vegetables	137	-0.624	208	-0.609	-0.016 (-0.230, 0.198	0.887

*Adjusted for baseline, grade, gender, and race/ethnicity.

[a] (+) and (-) signs indicate direction of change for fruit and vegetable preferences.

No statistically significant differences between students in the intervention and comparison groups were found regarding openness to trying new fruits and vegetables (Table 4).

Table 4. Percent of intervention and comparison students reporting "always, almost always or sometimes" liking to try new fruits and vegetables, Harvest of the Month Evaluation, Hayward, CA, 2016-17.

Outcome	Group	Baseline (%)	Follow-up (%)	Percent Change (%)	Adjusted* p-value
I like to try new fruits	Intervention (n = 138)	48.55	49.28	1.50	0.2394
	Comparison (n = 202)	41.58	34.65	-16.67	
I like to try new vegetables	Intervention (n = 138)	24.64	22.46	-8.85	0.4678
	Comparison (n = 204)	19.61	15.20	-22.49	

*Adjusted for grade, gender, and race/ethnicity.

Intervention group students felt positively about all aspects of the curriculum, particularly the fruit tastings. Fourth and fifth grade students reported higher satisfaction with most aspects of the curriculum than sixth graders (Table 5).

Table 5: Intervention group perceptions of the HOTM curriculum, by grade, Harvest of the Month Evaluation, Hayward, CA, 2016-17

Outcome	4th grade students		5th grade students		6th grade students		All Students	
	n	Percent Adjusted for Clustering (SE)[1]	n	Percent Adjusted for Clustering (SE)	n	Percent Adjusted for Clustering (SE)	n	Percent Adjusted for Clustering (SE)
Liked lessons								
A lot	44	65.67 (5.30)	21	65.63 (12.26)	17	41.46 (12.21)	82	58.57 (6.00)
A little	20	29.85 (5.13)	8	25.00 (4.06)	20	48.78 (4.21)	48	34.29 (4.14)
Not so much	2	2.99 (1.47)	3	9.38 (10.77)	2	4.88 (3.23)	7	5.00 (2.10)
Not at all	1	1.49 (1.50)	0	0.00 (0.00)	2	4.88 (5.56)	3	2.14 (1.60)
Liked workbooks								
A lot	33	50.00 (2.62)	16	53.33 (8.70)	9	23.68 (5.91)	58	43.28 (5.12)
A little	27	40.91 (2.42)	11	36.67 (5.93)	18	47.37 (14.29)	56	41.79 (4.10)
Not so much	4	6.06 (2.76)	2	6.67 (9.10)	7	18.42 (12.05)	13	9.70 (4.02)

Not at all	2	3.03 (1.52)	1	3.33 (4.79)	4	10.53 (8.34)	7	5.22 (2.56)
Liked trying fruits								
A lot	54	80.60 (8.66)	27	81.82 (2.66)	30	73.17 (3.06)	111	78.72 (3.85)
A little	10	14.93 (7.07)	5	15.15 (5.57)	9	21.95 (0.74)	24	17.02 (3.29)
Not so much	2	2.99 (1.60)	1	3.03 (4.24)	1	2.44 (2.53)	4	2.84 (1.25)
Not at all	1	1.49 (1.50)	0	0.00 (0.00)	1	2.44 (2.78)	2	1.42 (0.97)
Liked trying vegetables								
A lot	35	52.24 (10.54)	15	45.45 (2.90)	16	40.00 (7.79)	66	47.14 (5.17)
A little	28	41.79 (8.53)	12	36.36 (0.83)	15	37.50 (4.72)	55	39.29 (3.83)
Not so much	1	1.49 (1.54)	6	18.18 (2.66)	8	20.00 (9.84)	15	10.71 (4.24)
Not at all	3	4.48 (2.70)	0	0.00 (0.00)	1	2.50 (2.66)	4	2.86 (1.48)

[1] SE refers to standard error, a measure of the reliability of the statistic as estimated from the study sample as an estimate of the population's parameter.

In response to open-ended survey questions eliciting student perceptions of the curriculum, students reacted positively to several aspects of HOTM, including learning about the health benefits of fruits and vegetables, how to read nutrition facts labels, the movement activities, and the fruit and vegetable tastings. There were no notable differences by grade. Below are representative comments regarding what students liked about HOTM:

- *I liked the fun activities and learning how to read nutrition fact labels.*
- *It taught us about how fruits and vegetables are good for you and what we can do to eat more.*
- *I liked trying new things because it helped me be more open*
- *Learning more about fruits and vegetables and where they came from.*
- *I really liked the lessons because they explained which nutrients the fruit had and how those nutrients help reduce the risk of getting certain diseases.*
- *I liked that it tells you about the different colors and where you can find them. They also tell you why they are important.*

Aspects of HOTM students did not like included having to wait until the end of the lesson for the taste test, and dislike of some fruits and vegetables featured during the tastings. Some students expressed a desire for the curriculum to include less common fruits and vegetables. Some students expressed dislike for the writing, physical activity and math components of the curriculum. Those perceptions appeared to be associated with general dislike of those activities, and not related to the curriculum per se. Representative comments are below:

- *The fact that we have to do a lot of work in the workbook before eating the fruits or vegetables.*
- *The writing, there is too much writing.*
- *I liked everything about Harvest of the Month. But the only thing I didn't like was you had to do math.*
- *I did not like how there was not a lot of different types of foods that we haven't seen before.*
- *Some of the things we tried I didn't like and an example would be broccoli.*

Students reported learning a range of new things from the HOTM lessons, including the health benefits of fruits and vegetables, the importance of reading nutrition facts labels, how to calculate serving sizes, the importance of physical activity, the benefits of local agriculture, the importance of healthy beverages, and increased openness to new fruits and vegetables. Representative comments are below:

- *What I learned from harvest of the month is the food label. Now every time I go to the store I look at the food label.*
- *How to not get tricked by the calories and serving size.*
- *I learned that half a cup of apples is the same as half of your fist.*
- *That it's better that your fruits and vegetables get grown closer to you so they don't have to get sprayed with pesticides to last the trip and aren't overripe.*
- *We learned that exercise is good for you.*
- *That energy drinks are not good for you and water is.*
- *That even with fruits and veggies you can still make very fun snacks.*
- *I learned that some fruits and vegetables have good taste.*
- *One thing that I learned is that you should eat fruits and vegetables. And Harvest of the Month inspired me to eat fruits and vegetables.*

Student Focus Group Findings

Over half of the students participating in the focus groups reported enjoying the HOTM curriculum and expressed that they would like it to continue. While the remaining participants were less enthusiastic about the curriculum, none expressed strong negative feelings. Positive perceptions of the curriculum declined with age. All 4th graders reported liking the curriculum, which was the case for four of six 5th grade students and five of nine 6th grade students. Students expressing concerns with the curriculum cited dislike of writing and math activities, as well as dislike for some featured items, such as broccoli. Concerns regarding writing and math activities may be associated with the fact that the curriculum was implemented over a six-week period, rather than six-months as per the curriculum design, and limited student exposure to certain concepts.

Aspects of the curriculum that students liked included learning about the health benefits of fruits and vegetables, the taste tests, and the movement activities. Students were divided regarding perceptions of the math component of the curriculum, with roughly half enjoying that and half expressing dislike. Few students reported enthusiasm for the writing component of the curriculum.

Students reported learning a number of things they had not previously known about fruits and vegetables, including that fruits and vegetables are relatively low in sugar and calories, that a diet high in fruits and vegetables can help prevent certain diseases, and that different fruits and vegetables have different vitamins. They also discussed learning about the negative health impacts of sugar-sweetened beverages. Some students also reported learning about local agriculture and "that it's better to eat food from nearby," noting that "fruits and vegetables

that come from local farms are better, because fruits and vegetables from faraway farms get handled a lot and lose nutrition."

Approximately half the students reported asking their parents to serve more fruits and vegetables at home. As a student explained, "Once every three days I ask my parents to buy more fruits and vegetables, because you can't stop eating them." Similarly, another noted that he asks his mother to get more fruits and vegetables, noting that "it's almost like chips. You get addicted to them." Students explained that they ask their parents to buy more fruits and vegetables because they "taste good and are healthy and good for you." Other students noted that "the nutrition label showed me that they don't have that many calories" and that "fruits and vegetables help keep away cancer and diabetes." Increased student interest in fruits and vegetables was supported by findings from the parent survey, where 43% of respondents reported that their children had asked them to buy more fruits and vegetables.

Student recommendations for improving the HOTM curriculum included introducing more unfamiliar fruits and vegetables and accompanying the taste tests with different spices and condiments. Fourth grade students also felt the timing of the lessons was important, explaining that the lessons should not be taught after lunch, "because then kids aren't hungry for the taste test." Some fourth grade students also wanted assurances that the HOTM lessons would not interfere with recess, lunch, or assemblies.

Teacher Feedback

Intervention classrooms teachers completed a brief survey following each lesson. Respondents were asked to provide open-ended feedback regarding aspects of the curriculum with which they were not satisfied. Below are key findings from the teacher feedback survey.

Lesson Duration

The allotted time to implement each HOTM lesson is 60 minutes. Teacher responses indicate a mean lesson duration of 63.8 minutes, with a median of 60 minutes, a minimum of 35 minutes and a maximum of 119 minutes, which was reported on two occasions.

Perceptions of Curriculum

Teachers were asked to comment on lesson alignment with the learning objectives outlined in each lesson plan. All teachers felt the lessons were strongly aligned or aligned with the learning objectives. With the exception of Lesson 5, all or most respondents felt each lesson was "strongly aligned" with the curriculum's learning objectives (Table 6).

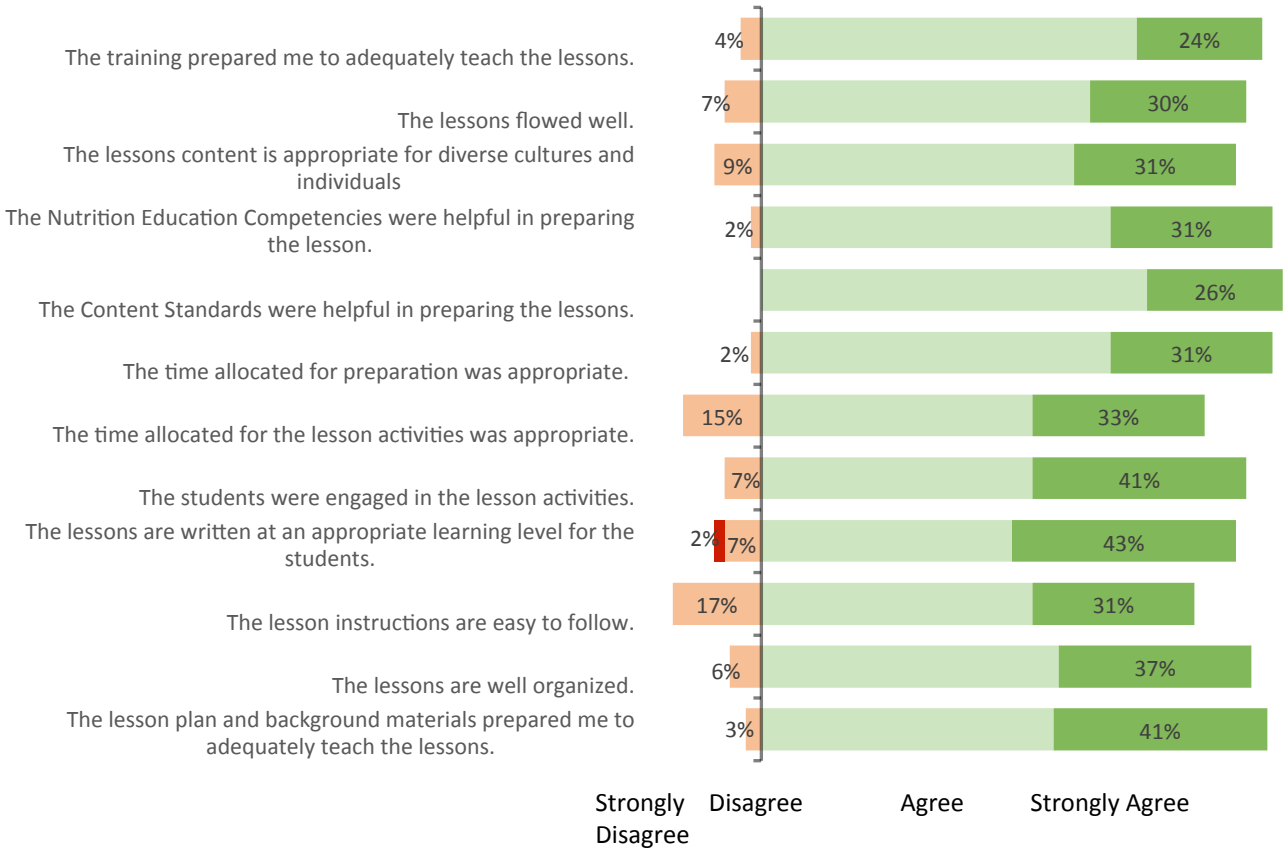
Table 6: Intervention group teachers reporting that Harvest of the Month lesson is "strongly aligned" with learning objectives by lesson and grade, Harvest of the Month Evaluation, Hayward, CA, 2016-17 (n=9 teachers)

	Lesson "strongly aligned" with learning objectives		
	Grade 4	Grade 5	Grade 6
Lesson 1	2/3[a]	2/3	3/3
Lesson 2	2/3	3/3	2/3
Lesson 3	2/3	2/3	3/3
Lesson 4	2/3	2/3	3/3
Lesson 5	2/3	1/3	1/3
Lesson 6	2/3	3/3	2/3

[a] Figures indicate number of teachers reporting the lesson was "strongly aligned" with learning objectives as a proportion of total responses.

Teachers rated all aspects of the curriculum highly (Figure 1). Aspects meriting attention included the clarity of the instructions for teachers, the appropriateness of time allotted to teach the lessons, and the appropriateness of the lessons for student learning levels, which some teachers noted was at too low a level.

Figure 1: Teacher Perceptions of the HOTM Curriculum, Harvest of the Month Evaluation, Hayward, CA, 2016-17 (n=54 responses)



Teachers reported high levels of student engagement, noting, for example, that the apple lesson "really attracted students to apples. We had a great discussion regarding nutrition facts and their importance." Teachers also commented that the lessons fostered student creativity and a desire to cook. "Students enjoyed being creative with their recipes. They wanted to follow up with actually making some of their recipes to see what it would taste like." Teachers also noted that the lessons were helpful in teaching common core concepts. "I liked the use of line plots, as I have not had time to teach that this school year and it allowed me to teach them in a short amount of time." Teachers also reported that students learned new things. "I believe this was a great lesson in that all students were able to make a connection by monitoring their heart rates. Some students seem to have never known that they could actually check their heart rate. The ability for them to actually see the cause and effect (before/after) due to movement related to the heart rate was powerful." Similarly, another teacher explained that "tracking their heart rate was fun for the students. This lesson ties in excellent with unit rates and provides real world examples." Yet another teacher commented that "classifying items to fruits and vegetables was awesome. The discussion about what makes a vegetable and what

makes a fruit was eye-opening, as many students thought tomatoes and cucumbers were vegetables."

Teachers also reported that students learned about healthy beverages and the amount of effort required to burn calories. One noted that students were surprised to learn that energy drinks and sports drinks are unhealthy, while another indicated that "it was an eye opener for students to realize how much they needed to move to burn calories."

Teachers also noted that the curriculum was a useful tool for learning about food security and local food in a non-stigmatizing way. As one explained, "It was a great way to learn about different local places to get food. We have a mobile food pantry that comes to our school twice a month, and for some students this activity really helped them to understand what this was. It was a nice way to discuss food insecurity, food stamps, etc. without having to single out certain students."

Areas for improvement include improved time allocation; easier instructions for teachers; appropriateness of the lessons for different learning levels; and appropriateness of the lessons for diverse cultures and individuals. Several teachers felt that the time allocated for the lessons was too low. As one explained, "this took longer than I anticipated. The hardest part for students was finishing all of the Try It in a timely manner. They needed lots of guidance and support to get through that part. We had to rush the tasting part because of that." Similarly, another expressed that it was "very difficult to complete this lesson in 1 hour, especially if you want to have a discussion for Link It section."

Several instructors also noted that the instructions were not always clear or easy to follow. One explained that, "I had to read it through several times before I clearly grasped what students were supposed to do." Another reported that the math instructions were "somewhat difficult to follow. Thank God I have taught fractions!" Similarly, another explained that "the Move It section was confusing. I had to read it over several times to make it work."

Several teachers felt that learning levels were low. As one reported, "writing one paragraph at the end of the year in fifth grade is very remedial. I usually assign much more, which my students are very capable of doing." Also with respect to math, another explained that the "ratio relationship was too easy."

Several teachers reported student resistance to the math and writing activities. As one noted, "students did not like having to write, so it was a struggle to get them to do it." Another explained that, "as always, the eating and moving parts were fine. The reading and writing parts, not as engaging."

A number of teachers discussed challenges conducting movement activities in their classrooms, which some felt was "too chaotic." As a 4th grade teacher reported regarding Lesson 4, "I do not enjoy this lesson - too chaotic and confusing for students to follow/role play, did not execute this lesson well." Another reported challenges implementing movement activities in a

classroom setting. “I have 34 students. This required moving furniture and not all students could play at once. It was not fun for students to sit out watching.” Others reported student resistance to the performance aspects of the movement activities. “They weren't into the Move It part at all. They like the exercise type Move It activities but the performance part of this was a miss.”

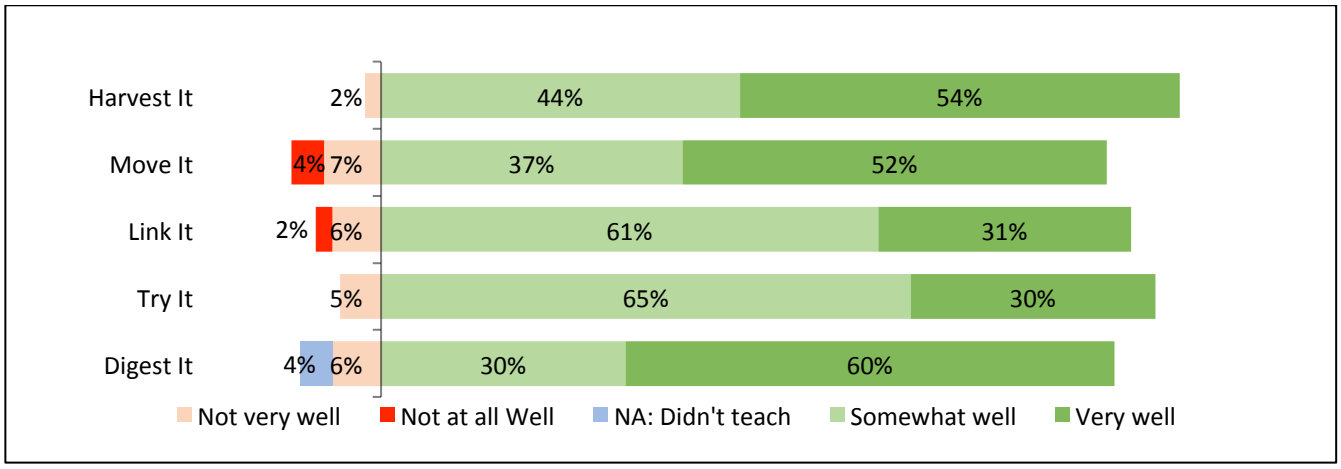
A few teachers expressed concerns regarding the choice of featured produce items. As one explained, “Though I understand the health benefits of broccoli, would prefer a less common vegetable which is more enjoyable plain. As the goal is to encourage healthier eating, I don't feel that broccoli is the best of vegetables.” Several teachers also expressed concern regarding the salt content of the pumpkin seeds provided for the lesson on winter squash. Future versions of the curriculum may wish to highlight the fact that all featured items, including prepared seeds, meet CDPH standards and are low in sodium.

Teachers noted several concerns regarding healthy beverages. As one explained, “not knowing what the recommended grams of sugar for the students age group is a downfall. Once I looked it up and shared it with the students, they had a better understanding of how much of the daily sugar is exceeded by having the energy drink.” Another reported that “students were confused about the drink choices being healthy or not,” while another felt that “additional drinks that are healthy and unhealthy for the Move It activity would be helpful.”

Some teachers expressed concerns regarding diversity. As one explained, “while United States and South America was represented, many of the African-American students asked ‘What about Africa?’.” Another reported challenges with differently-abled students, noting that “the format of the Try It was hard for some of my students who have visual processing issues.”

Overall, teachers rated the distinct components of the lessons highly, particularly the “Digest It” and “Harvest It” sections (Figure 2).

Figure 2: Teacher feedback on lesson components, Harvest of the Month Evaluation, Hayward, CA, 2016-17 (n=54 responses)



The survey assessed teacher interest in teaching specific lessons again. All teachers reported interest in teaching Lessons 1 and 4 again, at least ¾ would teach lessons 2 and 5 again, while slightly less than half reported interest in teaching Lessons 6 in the future (Table 7).

Table 7: Teacher interest in teaching HOTM lessons again, Harvest of the Month Evaluation, Hayward, CA, 2016-17

Would teach HOTM lesson again	Yes (%)	Maybe (%)	No (%)
Lesson 1 (n=9)	100.0	0.0	0.0
Lesson 2 (n=9)	77.8	11.1	11.1
Lesson 3 (n=9)	66.7	33.3	0.0
Lesson 4 (n=9)	100.0	0.0	0.0
Lesson 5 (n=8)	75.0	12.5	12.5
Lesson 6 (n=9)	44.4	44.4	11.1

Teachers cited strengths and weaknesses for all lessons. Survey comments indicate that Lessons 1, 2, 4 and 5 were engaging for students and provided them with new information. As a teacher commented regarding Lesson 4, "I really liked this lesson, because it went into depth about nutrition facts, juice, and sugar content. This really affects my students. They were very surprised. It is very helpful information for them to have. Thank you!" Concerns regarding Lesson 3 cited organization and length, while concerns with Lesson 6 addressed space issues, organization and length.

Parent Feedback

A brief survey was sent home to parents/guardians of 262 intervention group students. A total of 135 completed parent/guardian surveys were returned, representing a response rate of 51.5%. The surveys were fairly evenly distributed by grade, with 43 surveys (31.9%) completed by parents/guardians of 4th grade students, 37 surveys (27.4%) completed by parents/guardians of 5th grade students and 55 surveys (40.7%) completed by parents/guardians of 6th grade students. Of the returned surveys, 79 (58.5%) were completed in English, while 56 (41.5%) were completed in Spanish.

Nearly three-fourths (71.1%, n=96) of parents/guardians reported that their child had mentioned the HOTM curriculum to them, while 19.3% (n=26) reported no mention of the HOTM curriculum and 9.6% (n=13) were unsure. Of respondents whose children had mentioned the HOTM curriculum, 92.7% (n=89) reported that their child liked the HOTM curriculum, while 2.1% (n=2) reported that their child did not like the curriculum and 5.2% (n=5) were unsure.

Table 8 shows that nearly two-thirds (60.0%, n=81) of parents/guardians reported having seen the HOTM family newsletter that is sent home with students, while 28.1% (n=38) had not seen

it and 8.9% (n=12) were unsure (four respondents did not answer this question). Of those familiar with the HOTM newsletter, 77.8% (n=63) reported reading newsletter articles, 11.1% (n=9) had not and 9.9% (n=8) were unsure (one respondent did not answer this question). Of parents/guardians familiar with the HOTM newsletter, 66.7% (n=54) reported liking it "a lot" while 24.4% (n=24) liked it "a little" (three respondents did not answer this question). One fourth (25.4%, n=21) of parents/guardians that were familiar with the newsletter reported trying recipes included in the newsletter, while most (66.7%, n=54) had not, and four (4.9%) were unsure (two respondents did not answer this question). Parents/guardians completing the survey in Spanish were significantly more likely to report that their child had mentioned the HOTM curriculum to them, that they had seen the HOTM newsletter and that they liked the HOTM newsletter "a lot."

Table 8. Intervention student parent/guardian familiarity with, perceptions of, and actions taken based on the Harvest of the Month newsletter and curriculum, Harvest of the Month Evaluation, Hayward, CA, 2016-17

Familiarity with and perceptions of HOTM components	English N (%)	Spanish N (%)	All Respondents N (%)	p-value[1]
Child mentioned HOTM (n=135)	49 (62%)	47 (84%)	96 (71%)	**0.003**
Child liked HOTM curriculum (n=96)	44 (90%)	45 (96%)	89 (93%)	0.413
Saw HOTM newsletter (n=131)	40 (51%)	41 (79%)	81 (62%)	**0.001**
Read newsletter (n=80)	29 (74%)	34 (83%)	63 (79%)	0.292
Liked newsletter "a lot" (n=78)	22 (55%)	32 (84%)	54 (69%)	**0.005**
Tried newsletter recipes (n=79)	7 (18%)	14 (40%)	21 (27%)	0.173

[1] Differences in categorical variables between respondents completing the survey in English and Spanish by Chi-square test. Boldface indicates statistical significance at P<0.05.

Parents/guardians who had seen the newsletter reported a range of impacts (Table 9), including learning about nutrition information, serving ideas, recommended amounts of fruits and vegetables, and recommended serving sizes. No significant differences were found between respondents completing the survey in English and Spanish, however, over twice as many Spanish-speaking respondents reported learning about growing fruits and vegetables at home, a finding that would likely be significant with a larger sample.

Table 9. Topics learned from reading the Harvest of the Month newsletter by language in which survey was completed, Harvest of the Month Evaluation, Hayward, CA, 2016-17 (n=81 parents/guardians reporting familiarity with newsletter)

Topics learned	English N (%)	Spanish N (%)	All Respondents N (%)	p-value[1]
Nutrition information	30 (75%)	34 (83%)	64 (79%)	0.381
Serving ideas	18 (45%)	18 (44%)	36 (44%)	0.921
Recommended serving sizes	17 (43%)	16 (39%)	33 (41%)	0.750

Recommended amounts of fruits and vegetables	13 (33%)	19 (46%)	32 (40%)	0.203
How to store fruits and vegetables better	16 (40%)	16 (39%)	32 (40%)	0.928
How to grow fruits and vegetables at home	4 (10%)	11 (27%)	15 (19%)	0.051

[1] Differences in categorical variables between respondents completing the survey in English and Spanish by Chi-square test. Boldface indicates statistical significance at P<0.05.

As shown in Table 10, some respondents reported making changes based on the newsletter, including eating more fruits and vegetables, buying more fruits and vegetables, and eating new or different fruits and vegetables. While there were no significant differences between respondents completing the survey in English and Spanish, Spanish-speaking respondents were more likely to report buying more fruits and vegetables based on the HOTM newsletter, a finding that would likely be significant with a larger sample size.

Table 10. Changes made based on the HOTM newsletter, Harvest of the Month Evaluation, Hayward, CA, 2016-17 (n = 81 parents/guardians reporting familiarity with the newsletter)

Changes made	English N (%)	Spanish N (%)	All Respondents N (%)	p-value[1]
Eat more fruits and vegetables	27 (68%)	26 (63%)	53 (65%)	0.699
Buy more fruits and vegetables	17 (43%)	26 (63%)	43 (53%)	0.059
Get more exercise	13 (33%)	16 (39%)	29 (36%)	0.540
Drink healthier beverages	14 (35%)	14 (34%)	28 (35%)	0.936
Eat new or different fruits and vegetables	12 (30%)	15 (37%)	27 (33%)	0.530
Encourage child(ren) to get more exercise	12 (30%)	15 (37%)	27 (33%)	0.530
Buy local produce or shop at farmers' markets	14 (35%)	12 (29%)	26 (32%)	0.581
Store fruits and vegetables differently	10 (25%)	8 (20%)	18 (22%)	0.553

[1] Differences in categorical variables between respondents completing the survey in English and Spanish by Chi-square test. Boldface indicates statistical significance at P<0.05.

A number of respondents reported (Table 11) that their children asked them to make several changes since starting the HOTM curriculum, including having more fruits and vegetables at home, buying more fruits and vegetables, trying new recipes and encouraging physical activity. Respondents completing the survey in Spanish were significantly more likely to report that their children asked them to serve new fruits and vegetables, offer healthier beverages and try new beverages.

Table 11. Changes requested by child(ren) in past month, responses by language in which survey was completed, Harvest of the Month Evaluation, Hayward, CA, 2016-17 (n=135 parents/guardians responding to the survey)

Changes requested	English N (%)	Spanish N (%)	All Respondents N (%)	p-value[1]
Have more fruits and vegetables at home	38 (41%)	33 (59%)	71 (53%)	0.214
Buy more fruits and vegetables	34 (43%)	24 (43%)	58 (43%)	0.983
Try new recipes	21 (27%)	26 (46%)	47 (35%)	**0.017**
Help children get more exercise	24 (30%)	18 (32%)	42 (31%)	0.827
Serve new fruits and vegetables at home	18 (23%)	22 (39%)	40 (30%)	**0.039**
Buy local fruits and vegetables at stores or farmers' markets	18 (23%)	19 (34%)	37 (27%)	0.153
Have healthier beverages available	15 (19%)	19 (35%)	34 (25%)	**0.049**

[1] Differences in categorical variables between respondents completing the survey in English and Spanish by Chi-square test. Boldface indicates statistical significance at P<0.05.

Parent/guardian comments indicated appreciation for HOTM, as seen below.

- *My daughter tells me a lot of good news about Harvest of the Month. I think it is great for children.*
- *It was very informative. Helps get [my child] on the right track to eating healthy.*
- *Eating healthy is a struggle sometimes due to convenience. However, this awareness will help implement some changes.*
- *That the harvest of the month is cool.*
- *Me gustó las porciones de comida que recomiendan para los niños. (I liked the recommended portion sizes for children.)*
- *Espero que sigan haciendo esto para los niños. Muchas gracias. (I hope you keep doing this for the children. Thank you very much.)*
- *Mi hija aprendió de comer más frutas y verduras de cosecha del mes. (My daughter learned to eat more fruits and vegetables from Harvest of the Month.)*
- *Está muy contento porque quiere cuidarse comiendo saludable. Me ha pedido que le compre más frutas y verduras. (My son is very happy because he wants to take care of himself by eating healthy. He has asked me to buy more fruits and vegetables.)*
- *Toda la información que ponen en estos foletines está muy bien, especialmente para nuestros hijos. Ellos saben que deben comer frutas y verduras y con esa información que les dan es mas fácil para ellos. (All the information in these newsletters is very good, especially for our children. They know they should eat fruits and vegetables and it's easier with the information that you give them.)*

Discussion and Conclusions

This study has several limitations. The sample consisted of a convenience, rather than a random, sample and was conducted at intervention sites with prior exposure to HOTM. Because intervention group students with prior exposure to HOTM were excluded from the analysis, the intervention sample had a higher proportion of fourth graders than the comparison group. Although the analysis was adjusted for grade, the ability to detect differences in the smaller samples of 5th and 6th grade students was therefore limited. Additionally, the HOTM curriculum was designed to be taught once per month over a six-month period, but due to time constraints, the pilot curriculum was taught once per week over a six-week period. This may have implications regarding the generalizability of the findings to a longer, but less intensive intervention, as well as implications for student readiness for math and ELA core competency elements. It may also have had implications for findings regarding food preferences, as produce was taste tested out of peak season. An additional limitation is that three of the HOTM items (broccoli, berries and winter squash) did not appear on the list of items assessing food preferences, resulting in an inability to measure changes in student preference for those items. A further limitation is that intervention and comparison group teachers received a significant stipend for participation in the research. The stipend may have influenced how the intervention group teachers implemented the curriculum and may have led to social desirability bias, with more positive survey responses. That may have affected the generalizability of the findings, particularly since future adoption of the curriculum is unlikely to be associated with the provision of stipends. An additional limitation is that intervention group teachers received in-person training to implement the curriculum, which may affect the generalizability of the findings if in-person training is not offered in future larger scale implementation. Finally, findings from the parent/guardian survey are based on a self-selected sample. Parents/guardians happy with HOTM and/or witnessing changes at home may have been more likely to respond to the survey than other parents/guardians, potentially limiting the generalizability of the findings.

However, the benefits provided by this study are significant and provide important guidance to future program refinement and application. First, the evaluation was designed to gather qualitative information to inform the quantitative results and guide the design of larger scale implementation. While it may not be generalizable to the entire population to be served, this pilot program provided evaluation results that detail the pros and cons of each element of the curriculum and its implementation. Further, this evaluation gathered similar types of information from students, teachers and parents/guardians, information which can inform final refinements and modifications of the HOTM curriculum.

Second, the evaluation findings indicate that the HOTM curriculum is effective at changing the frequency of combined fruit and vegetable consumption, fruit consumption, 100% fruit juice consumption and preferences for five of 22 measured fruits and vegetables. Preference increased for two of the three featured HOTM items included in the survey. Four of the five

items for which students indicated increased preference were fruit, while the fifth was carrots, indicating that HOTM may be more effective at increasing student preference for sweet items.

Program implementation assessments were positive. Intervention group teachers rated the HOTM curriculum highly overall and expressed interest in teaching most lessons again. Additionally, almost all parents/guardians who had seen the HOTM family newsletter felt positive about it, and reported a range of increased knowledge and changed behaviors as a result of reading the newsletter, including buying and eating more fruits and vegetables and trying new or different fruits and vegetables. More than half of parents also reported that since starting the HOTM curriculum their children had asked them to offer more fruits and vegetables at home.

Most important, this evaluation provides clear suggestions from its qualitative data collection for further improvements. For example, the curriculum did not have a positive impact on vegetable consumption, thus a recommendation to feature vegetables that are appealing with minimal preparation was suggested, given limited food preparation facilities in most classrooms. Another potential modification of the curriculum would apply to improving the physical activity component. Teachers suggested addressing the limitations of providing physical education in a confined classroom setting.

In addition, curriculum modifications can be crafted to address its limited impact on student self-efficacy social norms and attitudes regarding local agriculture. But importantly, the report details ways in which to address these concerns and provides actual quotes from students, teachers and parents.

Overall, this evaluation demonstrated that the current HOTM curriculum has positive impacts on student knowledge and behaviors regarding fruits and, to a lesser degree, vegetables; is well-liked and accepted by students; and is regarded positively by teachers and parents/guardians.

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