

Cultivating a Healthy School Environment: Evaluation of a Virginia School Nutrition
Training Program

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Abstract

The Reach, Effectiveness, Adoption, Implementation, Maintenance (RE-AIM) framework was used to evaluate the impact of the Virginia Department of Education's (VDOE) implementation of the USDA's Team Nutrition training program on Virginia elementary schools from 2017-2020. The VDOE provided training for school nutrition directors (SNDs) at workshops in June 2018 and September 2019 and continued technical assistance to help SNDs improve the school food environment within their divisions. SNDs' perceived support, self-efficacy, and intention to implement changes to the school food environment was measured through pre- and post-training surveys and quarterly check-ins. Implementation was measured using lunchroom environment observations and strategic plans created at the workshops. SNDs representing 83.9% of Virginia elementary students (512,953 students) in 111 divisions attended at least one of the workshops. Within effectiveness, perceived support from cafeteria staff was highest among all stakeholders for both the 2018 and 2019 trainings, though it significantly decreased from before to after the training for both workshops. Average perceived support did not significantly change over time. Self-efficacy was significantly higher following the 2018 training workshop only. The intervention was adopted by 84% of divisions and both intention to implement and actual implementation were highest for strategies related to Farm to School, a VDOE priority. Effectiveness and implementation are expected to improve as it takes up to years for changes to occur in schools. Despite RE-AIM not being part of the initial evaluation plan, 62% of indicators were assessed.

With some adaptations to improve effectiveness, the intervention should continue and be expanded.

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General Audience Abstract

Interventions to improve the dietary habits of children are often conducted in schools, as most children attend school and children consume up to two meals while at school. USDA's Team Nutrition initiative trains school nutrition staff to serve healthy school meals and provides materials to implement nutrition education for students. The Virginia Department of Education implemented the Team Nutrition program statewide through two training workshops for school nutrition directors (SNDs), June 2018 and September 2019, and technical assistance between the trainings. This study examined the process of implementing the intervention, as well as the outcomes. Overall, 84% of Virginia elementary students were represented by SNDs at the training workshops. SNDs were most likely to intend to implement and implement changes in their divisions related to Farm to School programs and least likely change their culinary skills trainings for staff. It can take up to two years after a training for changes to be implemented in schools, therefore it may be too early to know the full effect of the training. The results showed that the intervention was widely adopted, with 84.1% of divisions in Virginia attending at least one of the training workshops. Although participation was high in-person, less SNDs participated in the intervention activities outside of the trainings. Overall, the intervention was successful in reaching many students and had a small positive effect. With some adaptations to improve the effectiveness, the intervention should continue to be implemented and expanded to the rest of the state.

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CH 1. Introduction

The National School Lunch Program was created in 1946. Few revisions were made for the first forty-eight years of the program until the School Meals Initiative for Healthy Children was announced by the United States Department of Agriculture (USDA) in 1994.¹ This initiative, which took effect in 1998, was designed to have school meals meet the current Dietary Guidelines for Americans.¹⁻⁵ To aid schools in implementing these changes and promote research-based nutrition education, the USDA's Team Nutrition program was created in 1995.^{3,6} Since then, it has been implemented in thousands of schools across the country.⁶

The goals of Team Nutrition are to support schools to offer healthier school lunches and to have students eat a variety of foods containing less fat and more fruits, vegetables, and grains.⁷ The Team Nutrition program works by having families, communities, teachers, administrators, media, and school nutrition staff work together to reach students at home and at school. There are two main components to Team Nutrition, training and age appropriate nutrition education for students.⁷ Team Nutrition provides initial training materials to provide school nutrition staff with the skills, knowledge, and motivation to implement healthier options. They also provide technical assistance through grants and online resources. The second component of Team Nutrition is comprehensive nutrition education through age appropriate curricula available online to be disseminated to teachers and media campaigns.^{2,6} The Team Nutrition approach uses constructs from social learning theory and social marketing to influence the eating behavior of children both at school and home.² Children receive the healthy messaging through multiple sources, such as during lunch through healthy meals and posters, during class through nutrition education, and at home through parents and a marketing campaign.^{2,3,8}

Implementation of the Team Nutrition program requires school nutrition director (SND) and cafeteria staff participation. There is limited evidence in current literature about specific factors that influence implementation of interventions. While lack of time or adequate staff to implement interventions in the cafeteria setting can be barriers to successful implementation, there are specific characteristics of the intervention agents that can influence the degree to which implementation occurs. Food service managers with a college degree and those that were required to attend trainings reported more healthy preparation practices and healthy offerings.⁹ Perceived support from parents by cafeteria staff is another factor that can influence implementation as nearly two thirds of parents are perceived as unsupportive of helping students eat healthy because they do not enforce healthy eating behaviors at home.¹⁰ SNDs who perceive that parents in their division are unsupportive are less likely to make changes to the school food environment. Additionally, SNDs are hesitant to remove a la carte items because these items help offset the greater costs associated with fresh fruits, vegetables, and whole grains.¹⁰ However, receiving input from students on new items can help the SNDs to alter the program to offer more healthy items while also keeping participation in the program high.¹⁰ Not surprisingly, high perceived support from cafeteria staff and school administration were correlated with improvements to the school nutrition program, as was a strong relationship with school administration and comfort in current role.¹⁰⁻¹³ Years of experience in the current job, personality and leadership skills, and self-efficacy can also affect implementation.¹⁴ Finally, having an enforced school wellness plan created using Team Nutrition principles also helps motivate SNDs improve their school nutrition programs.^{9,13}

Team Nutrition is an evidence-based program that has been shown through multiple studies to improve student nutrition knowledge and influence dietary behavior. The Team Nutrition program was originally piloted in seven locations throughout the country, where it showed a

statistically significant but not practically significant increase equivalent to less than one additional question correct on a questionnaire, in nutrition knowledge and healthy eating behavior.² Despite the modest effect of the intervention, the feedback from most stakeholders was overwhelmingly positive. Most teachers, cafeteria staff, and parents were satisfied with the amount of time required to implement the program.^{2,3} A program with a small effect that is easy to implement on a large scale can still have a large impact.¹⁵ Since the completion of the pilot study with the limited results, the Team Nutrition program has been studied considerably in demographically varied school settings.^{9,10,16-22}

A study that examined nearly 4,000 elementary schools of varying backgrounds determined that schools which participated in the Team Nutrition program were significantly more likely to have a salad bar than schools that did not participate in the program.¹⁹ Similarly, other studies showed schools participating in Team Nutrition offered significantly more healthy foods than schools not participating in the program.^{9,19,20} Students at schools participating in the Team Nutrition program were significantly more likely to self-report consumption of fruits, vegetables, and grains during the previous day.²² Finally, schools that participate in the Team Nutrition program are more likely to also participate in the Fresh Fruit and Vegetable Program. Participation in this program results in a statistically significant increase in the amount of fresh fruit served.²³

More research on the dissemination and implementation of the intervention is needed to understand what factors motivate SNDs to fully engage with the program and enact change in the school lunchroom environment. Virginia is an ideal location to study dissemination and implementation of this intervention because of the state's diversity. It is one of the ten states with the highest per capita income, yet 14.8% of children live in poverty.²⁴ The size and geographical area of each division varies from few schools in a rural area to some of the largest divisions in the

country in urban and suburban areas. The SNDs within the state are also diverse, varying by education level and years of experience.²⁴ An advisory council comprised of SNDs from each region in the state also indicated a need for more training and technical assistance in 2017.²⁴ Virginia's varied divisional features and the SNDs' desire for more training suggest a potential benefit from implementation of the Team Nutrition intervention. Evaluation of the implementation will elucidate factors that can be used to enhance future dissemination and implementation.

Purpose of the Present Study

The purpose of this study is to help fill a gap in the current, school-based obesity prevention literature by using the RE-AIM framework to understand the impact of Team Nutrition on elementary school children within the state of Virginia in order to inform its sustained and expanded implementation in Virginia elementary schools.

Objectives

1. **Reach:** Understand the reach of the intervention, including the percentage of all eligible students that participate and the representativeness of that sample.
2. **Effectiveness:** Determine the effect of the intervention on SNDs' perceived support from stakeholders, self-efficacy, and implementation, or likelihood of implementation, over time
3. **Effectiveness:** Elucidate characteristics of SNDs who are more engaged with the intervention
4. **Adoption:** Evaluate the adoption of the intervention, including the percentage of all school divisions and SNDs that participate and the representativeness of that sample.
5. **Implementation:** Assess the amount of the intervention that was delivered as intended and determine factors influencing participation

CH 2. Literature Review

Childhood Overweight and Obesity as a Public Health Problem

Childhood overweight and obesity is a serious public health concern within the United States that is most basically caused by an imbalance between energy intake and energy expenditure.^{25,26} In children, the classification of overweight and obesity can vary, but is commonly considered as being in the 85th to 94th percentile and 95th or greater percentile of weight for age, respectively.²⁷ In 2012, 31.8% of children were overweight or obese.²⁸ For children between the ages of two and nineteen, 18.5% were considered obese in 2010.²⁹ This is approximately 13.7 million children in the United States.²⁷ That percentage decreased slightly to 17% between 2011 and 2014.³⁰ Rates of overall childhood obesity increased from the 1990s but began to level off. Within the age group from six to eleven, the rate leveled off in 2007 and has been relatively constant through 2014.^{28,30} Among children, ages twelve through nineteen, rates of childhood obesity have continued to increase through 2014, although the rate of increase has slowed since the 1990s.³⁰

Chronic energy imbalance is related to several genetic, socioeconomic, environmental, and behavioral factors, including poverty, race, and location.^{25,26,31} Childhood overweight and obesity is also related to parental education level and income level of the family.^{26,27} Obesity rates of the children decrease as parental education level increases. These rates are lower in the highest income groups, though the rate of obesity in the middle income group, 19.9%, is higher than in the lowest income group, 18.9%.^{26,27} Hispanics and non-Hispanic black children have obesity rates of 25.8% and 22% respectively, significantly above the national average 17%.²⁷ It is least common among Asian children, with only 11% being obese. One environmental factor that can influence a child's

risk for obesity is where they live. Even after adjusting for demographic and behavioral factors, children from rural areas were 30% more likely to be overweight or obese than children from urban areas.³² Additionally, having one or both parents be obese increases the risk of the child being obese.³³ For this reason, many interventions to reduce childhood obesity target the families of the children.²⁶

Behavioral factors such as sleep, watching television, and physical activity can have great impacts on obesity risk. Children in the United States are sedentary for on average six to eight hours a day.³⁴ Children who are more physically active are at a lower risk for obesity because the activity results in an increase in energy expenditure, which can mitigate or eliminate the imbalance between intake and expenditure.^{26,34} Dietary factors such as high sugar sweetened beverage consumption and low fruit and vegetable consumption can have impacts on obesity risk. In Virginia, where 28.2% of high school students are overweight or obese, 16% of children consume at least one sugar sweetened beverage daily and only 18% meet the guidelines for fruit and vegetable consumption daily.³⁵

Obesity can have many serious health consequences involving nearly every organ system in the body.²⁶ Diabetes, hypertension, and fatty liver disease have been seen in obese children.^{25,26} Overweight and obese children are at a significantly increased risk for cardiovascular disease, sleep apnea, and metabolic syndrome as they progress into adulthood.²⁶ Fifty percent of severely obese children have metabolic syndrome.³⁶ Additional potential consequences of childhood obesity include a deficiency in vitamin D and iron, acceleration of puberty, serious atherosclerotic changes, and skeletal changes.²⁶ Obesity during a child's teenage years is associated with an increased risk of mortality, including double the risk of death from heart disease compared to a

non-obese adolescent, in adulthood.^{25,26} For obese children over the age of six, the risk of being obese as an adult increases from 10%, for a non-obese child, to 50% for an obese child.³³

Aside from consequences to physical health, childhood obesity can also have consequences on the mental health of children.^{25,26} Obese children are often mislabeled as unintelligent, lazy, and slovenly. These stereotypes can have negative consequences for the child's self-image and ability to develop social relationships.²⁵ These stereotypes, and corresponding social and psychological effects, are most pervasive among non-Hispanic white females.²⁵ These psychological effects can persist into adulthood.

School-Based Childhood Obesity Prevention Interventions Are Existing Strategies to Address this Problem

There are many efforts to reduce the prevalence and severity of childhood overweight and obesity, including prevention programs.²⁶ Interventions to prevent obesity are able to target more children than interventions to promote weight loss in already overweight or obese children.²⁶ Schools are the most commonly utilized setting for interventions, with most interventions being implemented in elementary schools.^{37,38} Prevention strategies focusing on schools are able to reach many students simultaneously as 56.6 million children, 98% of all school-aged children, attend public or private schools.³⁹ Students also consume up to half their daily calories while at school and spend significantly more time at school than in any other setting where so many children can be reached at once. Children spend approximately seven hours a day for 180 days a year in school.¹⁴ Additionally, schools are an important site for intervention because the nutrition education needs of children are not being met. Elementary schools typically provide nine to thirteen hours of nutrition education annually, but previous research shows students need between thirty-five and fifty hours of health education to produce a behavior change.^{40,41} Adding more nutrition

information to the health education curriculum and implementing a Farm-to-School program are two ways to increase the amount of nutrition education provided to students. Finally, children are developing their beliefs and values and beginning to understand social norms during their early school years. Because of this, developing school norms around healthy eating and physical activity can have lasting impacts on the children.¹⁴

National School Lunch Program

One opportunity for schools to develop social norms around healthy eating is through the meals served at lunch. The National School Lunch Program (NSLP) was established as part of the National School Lunch Act in 1946.⁴² NSLP provides students who qualify within public schools and non-profit private schools with lunches. The program is regulated by Food and Nutrition Services within the United States Department of Agriculture (USDA) on the national level and with agencies within each state.⁴³ The state agencies work with the school nutrition directors for each school district to administer the program. Changes have been made since the program's inception to better meet the needs of schools and students.⁴² The Child Nutrition Act in 1966 added the School Breakfast Program (SBP). The Healthy Meals for Americans Act of 1994 required schools to produce meals that met the current *Dietary Guidelines for Americans*.⁴² Around this time, the Commodity Improvement Council was created to improve the quality and healthfulness of commodities that were donated to schools, namely reducing sodium and fat. The 2004 Child Nutrition and WIC Reauthorization Act required schools to develop wellness plans and made the Fruit and Vegetable program permanent.⁴² In 2010, the Healthy, Hunger-Free Kids Act was instituted to improve school nutrition standards and fund improvements to the NSLP and SBP.⁴ In

addition to legislative changes, the participation in the program has changed dramatically since 1946.

In the first year of the NSLP, 7.1 million children participated. This number has grown substantially to 30.4 million children in 2016.⁴³ The number of lunches served annually has grown at a rate of 1.3 percent.⁴² To receive reimbursement for a meal, the school must meet the NSLP meal guidelines and offer the meal to the student at a free or reduced rate if the child is eligible.⁴³ To be eligible for a free meal, a child's family must participate in other federal assistance programs, such as the Supplemental Nutrition Assistance Program, or have a family income that is at or below 130 percent of the current Federal poverty level. Reduced price meals are given to children of families with an income between 130 and 185 percent of the Federal poverty level.⁴³

Providing students with healthy food without decreasing involvement in the school's lunch program and without raising the cost for the school has been a difficult challenge. Schools may rely on revenue from the sale of competitive foods, foods such as snacks or beverages that are sold outside of the NSLP reimbursable meals.⁴² However, these competitive foods are often very energy dense and can cause overconsumption of total caloric needs or decreased consumption of the healthier, more balanced school meal. Schools are encouraged to adjust menus to result in greater consumption of fruits, vegetables, and milk through various methods.⁴² While many schools are trying to do this, and grants from the USDA can help schools to make the transition, the schools need to balance participation in the program. Making dramatic changes to the current program may result in a decrease in participation that causes greater food waste and decreased income.

Current evidence is mixed as to whether or not students who participate in the NSLP consume the same number of calories and nutrients as the nonparticipants. It is difficult to directly compare participants to nonparticipants because there may be other factors, such as family income

level, that separate the two. A study by Gleason and Sutor in 2003 showed that participants in the NSLP consume significantly more total and saturated fat, protein, riboflavin, vitamin B12, calcium, phosphorous, and fiber during an average lunch and during an average day.⁴⁴ The participants also consume significantly less added sugar. Overall, changes to the NSLP occurring at that time were resulting in positive effects on the students, as participants consumed more milk and meat during lunch than nonparticipants.⁴⁴ Participants in the NSLP also consumed less added sugar at lunch and daily than non-participants. Gleason and Sutor did not see a significant change in total energy intake.⁴⁴ A similar study conducted from 2013 to 2015 showed students who participated daily in the NSLP consumed more dairy and calcium than students who never or occasionally ate school lunches.⁴⁵ There were no other significant differences in dietary intake between regular and sporadic NSLP participants, including added sugar. A study by Capogrossi and You in 2017 showed children who only participated in the NSLP for one to four years show a significant increase in weight over that time compared to non-participants. This difference is even greater in rural areas, as well as the South and Northeast.⁴⁶ Even when adjusting for selection bias, children who participate in both the NSLP and SBP throughout elementary and middle school have a significantly higher probability of being overweight compared to students not participating in either program.⁴⁶ Since meals served at lunch are an opportunity to create social norms of healthy eating within schools, some studies have investigated if participation in the NSLP effects consumption of unhealthy foods in other settings. NSLP participants consumed fewer calories from SSBs than nonparticipants in both elementary and middle/high school groups while at school.^{44,47} Neither group was more likely to consume energy-dense foods or beverages in locations outside of school.

Evidenced-Based, School-Based Prevention Interventions

Improving physical activity accessibility and access to healthy foods at school are validated strategies for reducing BMI.^{37,48} Many prevention interventions have been conducted at schools with promising improvements in at least one outcome measure, such as fruit and vegetable consumption, physical activity, or nutrition knowledge.⁴⁹⁻⁵⁴ Some studies also show declining rates of obesity when compared to a control group.^{26,50,51,55} The duration of interventions varies greatly from a few days to several programs lasting two years.^{51,52,54-56} Interventions with a nutrition education component are popular and some of these programs are efficacious.^{50-54,57} Changes to the composition of school lunches, the availability of alternative physical activity options, and parental education were also incorporated into interventions, many combined with a student education component.^{51,56} An eighteen-month study conducted by Williamson and colleagues showed that elementary school students selected, consumed, and wasted fewer total calories than the students in the control group after changes were made to improve the healthy options at lunch.⁵¹ The intervention also reduced fat and protein intake and increased physical activity in comparison to the control group. There was no significant reduction in BMI, which the authors posited might be due to the six-month follow-up after the intervention not being long enough to see significant changes in BMI.⁵¹ However, the length of time required for changes in BMI to be seen is unclear, as Llargues and colleagues saw changes in BMI after an educational intervention targeting students in sixth grade also over a two-year period.⁵² While the BMI increased from baseline to the end of the study in both the intervention and control groups, the increase in the intervention group was significantly less than the increase in overweight and obesity prevalence seen in the control group. Students in the intervention group were also significantly more likely to self-report consuming a second piece of fruit daily and participating in physical activity after school.⁵² This program utilized a Train-the-Trainer method to deliver the intervention in all the local schools.

Train-the-Trainer

Train-the-Trainer is a cost-effective method of providing intervention in a variety of settings. Specific individuals, usually those with more experience in the specific field, will be trained to implement a specific intervention and then disseminate that intervention to other, typically less experienced individuals, thereby building community capacity.⁵⁸⁻⁶⁰ This training method has been successfully implemented within a variety of public health related fields.⁶⁰ For the Train-the-Trainer model to be effective, the audience must be engaged, typically through comprehensive and interactive programs. The trainers must also feel supported and confident in their ability to train. Providing training materials is shown to improve trainer confidence.⁵⁸ Most fundamentally, for the Train-the-Trainer model to be successful, the trainer must be motivated enough to actually train the trainees. One serious limitation of the Train-the-Trainer model is staff, particularly trainer, turnover.⁵⁸ Additionally, as the intervention messaging is passed from one person to another, implementation fidelity decreases.^{58,61} Finally, there is a delay after a Train-the-Trainer workshop before results are seen in the cafeteria. Changes begin to occur in some schools after one year, but most changes are not seen until two years after the initial training.³

When using the Train-the-Trainer method, it is important to have engaged facilitators who are highly motivated to implement the program. Unfortunately, little is known about the characteristics of facilitators that lead to better implementation. Facilitators with higher self-efficacy are more likely to implement a program as intended, as are facilitators who feel strongly that the health issue being addressed is serious.¹³ Facilitators experiencing professional burnout are less likely to implement an intervention as intended, likely due to perceived time constraints.¹³ One study showed that having a support system of other professionals implementing the same intervention is also indicated to improve implementation.¹¹ Similarly, having support and training from the intervention creators is linked to more complete information compared to just providing

intervention guidelines.^{62,63} Based on interviews with instructors in a childcare setting, incorporating the intervention into existing curriculum to meet the needs of the instructor may increase implementation.⁶³ Overall, relatively few studies have addressed the characteristics of facilitators that drive implementation and future studies should address this gap in the literature.

Potential Limitations of Current School-Based Interventions

There are some potential limitations to the current school-based obesity prevention intervention development and research including limited availability of resources, small effect of interventions on BMI reduction, and reliance on RCTs for study design.^{37,41,48,64-66} School and community fiscal restrictions are one possible limitation to long-term intervention implementation in schools. These budgetary restrictions can result in reduction in cafeteria menu quality, reduction in physical activity education, and loss of appropriate spaces within the community to engage in physical activity.³⁷ In addition, food service staff often use sales of typically energy-dense à la carte items as an important source of revenue. However, schools with high à la carte sales often have lower lunch participation rates.⁶⁷ Other barriers to nutrition education are that there is limited time available for each subject within a health education curriculum and instructors are not aware of existing education curriculum, like the Team Nutrition program.^{41,64} Most schools, approximately 72%, incorporate nutrition education with health education or science.⁴¹ To increase the amount of time spent on nutrition topics, instructors would have to decrease time spent on another health topic. A study in New York asked public school teachers what would encourage more teachers to add nutrition education to their curriculum and most teachers suggested access to age appropriate curriculum and materials.⁴¹ Many of these teachers were not aware of evidence-based programs and materials that are available at low or no cost.

Another limitation is that the reduction in BMI achieved by most studies of obesity prevention is small. For the 6 to 12 age group, there is some evidence to support both physical activity interventions and diet combined with physical activity intervention, but the reduction in BMI was very small or had no effect overall.^{37,48,66} However, prevention interventions may have other objectives, such as the development of healthy eating behaviors, rather than weight reduction, and many studies with low or no effect on BMI still achieve some or all of these other goals.⁴⁸

Limitations of School-Based Intervention Study Design

The gold standard for research experimental design is RCTs to determine program efficacy.⁶⁵ However, when RCTs are used to determine efficacy of an intervention, the results do not always translate from a controlled research setting to a community-based setting.^{15,65} Glasgow and colleagues posited that this phenomenon occurred because the samples used in the RCTs are not representative of the general population. The participants included in the sample are often the most motivated to change of the total population and the results of the RCTs may be overstated because of this bias.⁶⁵ Additionally, RCTs try to control for as many external variables as possible, thereby improving the internal validity of the study so that a causal relationship can be proven. Internal validity is a measure of study bias. For example, an RCT looking at the effect of physical activity during recess on obesity may want to control physical activity outside of recess. While this will make it easier to determine a causal relationship between the intervention and a reduction in obesity, it is not practical in a community setting.⁶⁸ This phenomenon can also be seen in the sample of intervention settings when compared to all possible intervention settings. In order to control for as many factors as possible, thereby maximizing internal validity, researchers have a

tendency to select settings that are more organized or motivated to participate in an intervention than what is commonly seen in a community setting.^{15,65}

Despite the potential limitations, RCTs have proven individual interventions to be efficacious and systematic reviews have shown the types of interventions that are most effective for each age group, however these interventions are not being implemented successfully in enough schools. To determine if an intervention can be broadly implemented, indicators of external validity must be assessed. Because external validity is not the priority of RCTs, other study designs may be more useful for determining program effectiveness in a real-world setting.

Low-cost, proven, easy to implement interventions are needed in many school districts. These interventions do exist, but they are not being adequately disseminated to the relevant stakeholders in the community setting because of the lack of understanding the external validity of these interventions.^{37,38,66,69} Research focusing on how to practically disseminate and implement these evidence-based interventions is needed to fill the gap between research and practice in schools.

Using a Dissemination and Implementation (D&I) Approach Could Maximize the Potential of Existing Evidence-Based Programs Addressing Childhood Obesity

Using a D&I framework to evaluate the dissemination and implementation of a program can elucidate some of the factors that influence intervention effectiveness, including indicators of external validity. This is an area of the literature that is widely underexplored.^{14,70} Currently, it takes seventeen years for approximately 14% of research to become widely accepted and implemented within community settings.⁶⁸ There are a number of factors that slow the process of translation: the time required to write and submit an article on the findings for publication (including the review process prior to publication), for a systematic review to be published that

including the findings, and to create, disseminate, and implement the guidelines based on the findings into community practice.^{68,71} This process is further slowed when researchers continue to develop new interventions, despite a preponderance of evidence showing the efficacy of previously developed interventions that could easily be adapted to the new setting.⁶⁸ This emphasis on new efficacy studies occurs as a result of little funding being available for D&I studies compared to traditional efficacy studies.⁷² This problem stems in part from a misguided impression that D&I studies are inherently less rigorous because many use other research designs than RCTs. In fact, these different experimental designs are intentionally selected because they allow for a focus on both internal and external validity.⁷²

This slow process of translation indicates a need for research exploring the processes of dissemination and implementation and ways to more efficiently create public health practices from laboratory research. While these two forms of research are closely intertwined, dissemination is the process of educating the relevant stakeholders about proven intervention, whereas implementation focuses on the process of integrating the intervention into a community setting and the evaluation of that integration process. D&I research places importance on both process and outcome measures with the aim of understanding and streamlining the process of translation.^{68,72}

The RE-AIM Framework

Disseminating effective interventions to the public health community is a critical step in the research process. Translation of the intervention requires adequate description of the intervention design and the sample population. If data is missing from the articles published on these interventions, it can make the dissemination process take significantly longer. The RE-AIM

framework, one of the most commonly used D&I frameworks, was created to assist researchers to plan, evaluate, and report about interventions more effectively by gathering evidence on internal and external validity at both the participant and organizational levels.⁶⁵ The five key constructs of RE-AIM are reach, efficacy, adoption, implementation, and maintenance.⁶⁵ Reach, efficacy, and maintenance can be measured at the individual participant level. Adoption, implementation, and maintenance are measured at the setting or facilitator level.^{65,73} Table 2-1 lists the five RE-AIM dimensions with the definitions and indicators for each construct and the indicators.

To utilize RE-AIM, the difference between efficacy and effectiveness must be understood. Efficacy research is typically conducted under ideal conditions with a homogenous sample of participants and settings to determine if the intervention has any effect.⁷⁴ Because of the narrow conditions under which efficacy trials are typically conducted, interventions must be adapted for a variety of reasons before they can be scaled-up.^{74,75} Effectiveness studies seek to determine if the intervention has an effect in a community setting with few or no exclusion criteria. The adaptations made for an effectiveness study may include expanding the eligibility criteria for participants and settings to include more of the target population and adjusting the delivery method or dose to make the intervention more practical to implement in a real-world setting.⁷⁴ These adaptations often result in a “voltage drop,” where the effect of the intervention is reduced compared to the efficacy trial.^{74,75} When adapting the intervention for an effectiveness study, the drop is typically more severe when the intervention requires more adaptation to be successfully implemented in a real-world setting. Studies typically report a 25% or greater reduction in efficacy.⁷⁵ However, adapted interventions may still be as or more effective than the pilot-tested version of the intervention if it can be more accurately implemented in the community setting with greater reach and adoption.^{65,74}

Use of the RE-AIM Constructs

Within the RE-AIM framework, measuring both the individual level constructs and the setting level constructs are important to obtain an accurate measurement of the intervention's impact.¹⁵ All five of the constructs, at both levels, are intended to be used together, though the importance of each construct may vary depending on the specific intervention. According to the framework, the impact of the intervention is determined by the sample size and the efficacy of the intervention.⁶⁵ Mathematically, that equation would be $\text{Impact} = \text{Reach} \times \text{Efficacy}$. This equation shows that a large impact can be a result of a highly efficacious intervention that targets a small sample or an intervention with lower efficacy but that reaches a greater percentage of the population.⁶⁵

Another interaction between the constructs in the RE-AIM framework is seen with efficacy and implementation. Effectiveness of the intervention, which is similar to efficacy but is used for interventions in real-life settings, is determined by efficacy and implementation.⁶⁵ Mathematically represented as $\text{Effectiveness} = \text{Efficacy} \times \text{Implementation}$, this equation highlights the importance of designing efficacious interventions that can be realistically implemented in real-world settings.⁶⁵ Implementation is measured at the setting level and is a measure of program fidelity.⁶⁵ Based on this equation, highly effective interventions can be those that have high efficacy but low fidelity or lower efficacy but are easily implemented correctly in community settings.^{15,65}

To properly and completely measure each indicator of a construct, evaluation methods should be determined prior to the trial with the RE-AIM framework used as a guide.⁶⁵ Certain indicators are well reported within public health literature, but other indicators are underreported.⁷³ Within Reach, the number of participants is well reported and 45% to 63% of studies report the participant rate.^{76,77} However, representativeness of the sample compared to the target population is underreported in current literature, between 4% and 11% of studies report

representativeness.^{15,76,77} For some interventions, this may or may not be possible depending on the access researchers have to data on the comparison group. If the demographic information for the participant group varies greatly from the comparison group, the impact of the program may be over or underestimated.^{15,65} Glasgow and colleagues note that while carefully selecting the sample in RCTs by using extensive exclusion criteria makes it easier for researchers to find significant changes without confounding variables, it greatly reduces the ability to generalize the results to the full target population.⁶⁵ Similarly, in adoption, an overestimation of a program efficacy can be achieved by excluding too many settings or only including the most motivated settings and agents.⁶⁵ By measuring exclusion and representativeness, it is possible to detect if efficacy or effectiveness have been overestimated. Another method that can be used for increasing the representativeness of the sample is anticipating barriers to participation, for both individuals and settings, during intervention development and eliminating or minimizing as many of the barriers as possible.⁶⁵ By evaluating the reach and representativeness of the participants and settings compared to the total target population, researchers will be able to see any patterns in recruitment or attrition that arise and adapt the intervention as needed in the future to better reach the entire target population.

In addition to seeing potential programmatic areas for adaptation, fully reporting indicators can also show if there are factors about the intervention that would reduce the effectiveness of the program when delivered in a community setting. Within effectiveness, the impact of the intervention on quality-of-life is underreported. While this is not always feasible, it provides important information that can be used to determine if the intervention should be implemented in other settings.¹⁵ For example, an efficacious intervention that reduces quality-of-life measures considerably could negate benefits of the program and likely should not be implemented in other

settings.^{15,65,73,76} High programmatic costs are similarly underreported and is an important component of deciding if an intervention should be implemented in other settings. An expensive program with a small positive impact will likely not be feasible to implement in a community setting, making it ineffective.¹⁵ Finally, follow-up data collection at least six months after the study concludes, is rare with only 20% of studies reporting maintenance measures.^{15,77,78} For those that do report measures of program maintenance, attrition rates of settings or participants observed during the follow-up period is also often underreported but has an impact on the overall effectiveness of the program. For example, if a program is deemed effective after initial analysis of the intervention data, that effect could be significantly reduced if the participant attrition rate is found to be high during follow-up.^{15,65}

Overall, there are several areas in which reporting results from intervention trials can improve. Representativeness data and setting inclusion criteria are systematically under-reported.⁷⁷⁻⁷⁹ In addition to being an important part of the RE-AIM framework, both are necessary to disseminate results of intervention trials to the public health community.⁷⁹ Using D&I frameworks, such as RE-AIM, for planning and evaluation of an intervention is critical to disseminating and effectively implementing those interventions into more communities.⁷⁸

Using RE-AIM within the Context of Childhood Obesity School-Based Interventions

Utilizing a D&I framework in community settings is critical for advancing not only nutrition research, but also D&I research. Many studies have been conducted using D&I frameworks to understand implementation in health care, but there are significant differences between health care settings and community settings that warrant further study.⁸⁰ Use of a D&I framework is still rare in school-based obesity prevention research, however the RE-AIM

framework has been used to design and evaluate a variety of childhood obesity prevention interventions.⁸¹ Many of the studies using RE-AIM as a framework are evaluating the dissemination and implementation of an intervention that has been previously proven efficacious.⁸²⁻⁸⁷ A study conducted in Finland in 2019 used the RE-AIM framework to pilot test a new intervention and evaluate the feasibility of the intervention for future dissemination and implementation on a wider scale.⁸¹ The intervention group did make modest improvements in the number of students meeting daily physical activity recommendations. The authors noted changes that could be made to the program to improve effectiveness without diminishing the ease of implementation of the current program.⁸¹ Without the thorough evaluation from using the RE-AIM framework, the authors may not have noticed the weak areas of the intervention that could potentially be adapted to improve the program. While the previous study evaluated a new intervention, more studies evaluated interventions that were widely available, but not widely utilized.⁸⁸⁻⁹¹ A study in California elementary schools evaluated the dissemination and implementation of an intervention with resources that were freely available to California teachers and had been previously been proven efficacious in a pilot test with twenty-five classes.⁸⁸ The intervention was able to reach 42% of third grade students in California in 39% of third grade classes. Students in the intervention group consumed more vegetables and less sugar sweetened beverages and unhealthy foods. Intervention group students also had more nutrition knowledge and higher self-efficacy.⁸⁸ These differences between the intervention group and the control group were still present during the three-month follow-up data collection. Of all the teachers who participated, 37% continued facilitating the intervention in their classrooms the following year.⁸⁸ This intervention illustrates the feasibility of evaluating the dissemination and implementation of an evidence-based intervention on a state-wide level using the RE-AIM framework.

RE-AIM and Team Nutrition

While Team Nutrition has been studied in a variety of settings, the external validity of the program has yet to be explored. Assessing indicators of external validity is imperative for widespread dissemination and implementation of a program. Because of the focus on maximizing external validity, RE-AIM is the ideal framework for the evaluation of a statewide implementation of Team Nutrition.

CH 3. Methods

Intervention Overview

The overall goal of the Team Nutrition intervention developed by Virginia Department of Education (VDOE) is to help foster a healthy lunchroom environment through providing training and technical assistance to give SNDs the resources to produce healthy meals for school-age children in Virginia. Using Team Nutrition principles, VDOE aims to make healthy eating a norm within schools. Figure 3-1 shows the intended flow of the effects of the intervention from VDOE to students. The intervention was disseminated to SNDs at the training workshops using a train-the-trainer approach. The SNDs returned to their divisions and trained the school nutrition staff to implement the changes in schools, ultimately affecting the students through changes to the school food environment.

Figure 3-2 shows the timeline of intervention activities and data collection. Two training workshops were planned, organized, and delivered by VDOE for the SNDs, one in June 2018 and the other in September-October 2019. An additional training session was held in February 2020 but was not included in the analysis. During the first workshop, participants received training related to six target areas (Menu Planning and Development, Farm to School, Culinary Skills, Strategic Planning, Community Outreach and Engagement, and Nutrition and Physical Activity Promotion), with an emphasis on the development and implementation of Farm to School programs and creation of a strategic plan to improve one area of their nutrition program during the following school year. The workshop was conducted in each of the eight superintendent regions of Virginia. Attendance by SNDs, or a representative, was encouraged but not required. Each of the six target area was the focus of a session within the workshop. The September 2019 training

workshop was offered along with the annual VDOE Fall Regional Meeting in four locations, two regions per meeting. The sessions in the second training workshop (Procurement 101, Procurement Profiles, Data Driven Decision Making using Key Performance Indicators, and Financial Management) were selected based on participant feedback after the first training. During the second workshop, participants also had an opportunity to revise their strategic plans or develop a new strategic plan if they did not attend the 2018 workshop

Quarterly check-ins, conducted by the VDOE, were scheduled for the remainder of the study to provide ongoing technical assistance and monitor progress towards the goals outlined in the strategic plans. Lunchroom observations were completed in Spring 2019 and scheduled for Spring 2020 to evaluate the changes to the cafeteria environment and offerings. In September 2019, four eModule/online training videos were launched. The eModules (Procurement 101: Developing Written Procurement Procedures, Procurement Profiles: Sharing Your School Nutrition Vision, Financial Management: Mastering the SNP Financial Report, and Data-Driven Decision Making with Key Performance Indicators) are housed on the VDOE website. SNDs were encouraged to watch at least one eModule before attending the Fall 2019 training workshop.

Study Design

The study was a quasi-experimental longitudinal design with no comparison group that took place over two years. The goal of the study was to evaluate both process and outcome measures of the intervention implemented by VDOE. VDOE did not specify target grade levels as the focus of the Team Nutrition program. Elementary schools were selected as the focus for this analysis because the literature shows young children's dietary behavior is more impressionable through marketing, aesthetics, availability of choices and peer selections.⁹² Elementary students'

food environments are typically controlled by their parents and school.^{93,94} Therefore, change would be most likely to occur first at the elementary school level.

Change was tracked both at the SND level and the setting level (divisions and schools). Tracking behavior change at the student level was beyond the scope of the current study. While there was no comparison group for the evaluation overall, data for specific measures was collected when possible from schools within divisions not represented at the training to compare to the intervention group. Data was collected using surveys for trainings and check-ins and through lunchroom observations. The RE-AIM model was used to evaluate the implementation process for the intervention, though no measures of maintenance were included in this study as it was beyond the time horizon of the study.

All SNDs who attend the June 2018 training workshop and completed both the pre and post surveys were considered part of the intervention group. Attendance was optional so SNDs self-selected to attend. The September 2019 training workshop was scheduled during the required annual VDOE Fall Regional Meeting, which resulted in greater attendance than the earlier training workshop. For lunchroom observations, a convenience sample of elementary schools was chosen to ensure representation of school schools within both the intervention and comparison divisions. These schools were selected based on proximity to a Virginia Cooperative Extension Family and Consumer Sciences SNAP-Ed Agent and the ability to contact and receive approval to conduct lunchroom observations from school officials. For the lunchroom observations conducted in Spring 2019, the comparison group was defined as schools in divisions not represented at the June 2018 training.

Measures

Table 3-1 outlines each measure, the data collection method, and the statistical test that was used to analyze it for each dimension of the RE-AIM framework.

Virginia School Quality Profiles⁹⁵ (Reach and Adoption)

The Virginia School Quality Profiles contains data on each public school in Virginia compiled by VDOE and available on the VDOE website. For every elementary school in Virginia, the following data was collected: number of schools in the division, population of schools, percentages of students of each gender, percentages of students of each race and ethnicity, percentage of students receiving free or reduced-price lunches, and absenteeism. Schools were separated into intervention and comparison groups based on SND attendance from the June 2018 training session.

Pre/Post Survey 2018 (Effectiveness, Implementation)

A paper pre/post survey was administered June 2018 training session participants (Appendices A and B). The surveys collected demographic information and measured self-efficacy, perceived support from stakeholders, and intention to implement changes related to the 6 target areas in the 2018-2019 school year. For self-efficacy, an overall score was determined for each participant by averaging the scores, on a one to five scale with one being they can do nothing to affect that area of the school nutrition program and five being they can do a great deal, for each question on the validated self-efficacy scale adapted from Bandura's Teacher Self-Efficacy Scale.⁹⁶ For perceived support, participants were given a one to ten scale and asked to rate the level of support they received from each stakeholder for changes to the school nutrition program. Finally, for intention to implement, the participant was asked how likely they were to make

changes relevant to each target area in the 2018-2019 school year using a Likert-type scale, with one being not likely and five being very likely.

Pre/Post Survey 2019 (Effectiveness, Implementation)

The paper pre/post survey was administered September 2019 training participants training (Appendices C and D). Similarly to the 2018 pre/post survey, demographic data, and measured perceived support and self-efficacy exactly as the 2018 pre/post survey did. This survey asked participants if they had attended the June 2018 training and, if so, had they implemented any strategies from that training. Participants were also asked if they had watched any of the eModules and if they would be interested in future training opportunities through the eModule format. Additionally, participants rated their intention to implement Farm to School programs and the Virginia Harvest of the Month program in the 2019-2020 school year on a Likert-type scale, with one being not likely and five being very likely. Finally, participants were asked to report how confident they were that they could make data-driven decisions, develop a procurement profile, complete a financial report, and develop a solicitation for the Farm to School procurement process. Confidence was measured on a one to five scale, with one being not at all confident and five being extremely confident.

“Quarterly” Check-ins (Effectiveness)

The check-ins, to be administered quarterly, were to follow up with participants from the June 2018 training (Appendix E). A standardized data collection for tool was developed for check-ins that included demographic information and asked participants which, if any, strategies they had implemented from the training and if those strategies were part of their strategic plan. SNDs

were asked to elaborate on the changes as well as barriers and areas where they wanted support from VDOE. Finally, they were asked to complete the perceived support and self-efficacy questions from the original survey.

Lunchroom Environment Changes (Effectiveness, Implementation)

The Smarter Lunchroom Scorecard (SLS) is a list of sixty no or low-cost strategies to improve the school cafeteria environment (Appendix F).⁹⁷ The scorecard is divided into eight key target categories: fruits, vegetables, salads, white milk, reimbursable meals, atmosphere, student involvement, and school community involvement. Schools receive one point for each of the sixty strategies that is fully implemented. Researchers, FCS SNAP-Ed Extension agents, and VDOE staff collected data at a convenience sample of forty-two elementary schools throughout Virginia. Data was collected in Spring 2019 and baseline scores for Fall 2018 were reconstructed by asking SNDs or school staff what changes had been made since the Fall. Although this was not ideal, taking baseline measures in Fall 2018 had not been feasible. A final observation will be conducted after the completion of this thesis.

The CDC School Health Index (SHI) is a tool designed for schools to use to evaluate themselves based on validated strategies to improve the overall health and safety of the school.⁹⁸ The tool is quite extensive and encompasses many areas of school health, but only two questions were used for this study. The questions are displayed in Appendix G. The first question focuses on nutrition components in the school's health education program. Participants are presented with a list of 21 topics and asked how many of those topics are covered in their curriculum. Participants receive a score of three if all topics are addressed, two if more than 14 are addressed, one if less than 14 but more than one are addressed, and zero if one or less are addressed. The second question

asked about opportunities for students and family members to provide suggestions and feedback regarding the food available at the school. Schools received a score of a three if both students and families could provide suggestions and feedback, a two if both students and families could provide suggestions or feedback, a one if either students or families could provide suggestion or feedback, and a zero if no opportunities for suggestion or feedback are available. The SHI was only completed for the subset of schools that had a lunchroom observation completed.

RE-AIM Score (All Dimensions)

The RE-AIM score for the intervention was calculated using a system to measure how completely the RE-AIM constructs were reported.^{77,99,100} For each construct within a dimension, a score of zero or one is given to indicate the construct was not or was reported on, respectively. For each dimension, a percentage of the constructs that are reported on is given. Finally, a total score out of 100% is given to indicate how complete RE-AIM is measured overall.

- Within Reach, there are five constructs included in the score: methods to identify the target population, inclusion criteria, exclusion criteria, participation rate, and representativeness.
- Effectiveness has four measures: intent to treat analysis, unintended consequences, attrition, and outcome measures from at least one follow-up.
- Adoption includes staff participation rates, descriptions of the intervention setting, methods to identify staff, level of staff expertise, inclusion and exclusion criteria, and representativeness.
- Implementation has three measures included in the score: duration, extent to which the protocol is delivered as planned, and costs associated with implementation.

- Maintenance also has three measures. These are costs of maintenance, measures of maintenance at the site-level, and measurements at least six months after the intervention.

Analysis

Data analysis was completed to examine differences between groups, when a comparison sample was available, and across timepoints for the repeated measures. The analysis plan is outlined in Table 3-1. A descriptive analysis was used to analyze rates of activity completion, achievement of self-set goals, and the proportion of students and divisions reached by the intervention. Unpaired t-tests were used to compare differences in characteristics between the intervention group and the population at the student and setting levels to determine the representativeness of the sample. Change in SND's attitudes and intention to implement changes was analyzed using paired t-tests for pre/post analysis. Average perceived support and self-efficacy were measured across all time points using a one-way ANOVA. There were too few completed cases to warrant a paired test. If the ANOVA indicated a significant effect, pairwise t-tests were used to determine significant differences between timepoints. To compensate for an increase in Type I error from performing many t-tests, a Bonferroni correction was used.

CH 4. Results

Reach

Number of Students

The number of students reached was based on the number of divisions represented by SND, manager or staff attendance. The 2018 VDOE Training Workshop reached 484 out of 1,149 elementary schools with a total of 245,243 students compared to the state total of 611,134 elementary school students (40.13%). The 2019 VDOE Training Workshop drew more participants and reached 889 out of 1,149 elementary schools representing 488,278 elementary school students (79.9%). Overall, 512,953 elementary school students (83.9%) had their division represented during at least one of the training workshops.

Representativeness

Table 4-1 contains an analysis of the representativeness of the two training workshop samples compared to the total population of Virginia elementary schools. The Bonferroni adjusted p-value threshold for significance was 0.0013. There were no significant differences between the 2019 training group and all Virginia school group for any demographic feature, however there were three significant differences between the 2018 group and the other two groups. The students in divisions in all three groups (2018 workshop, 2019 workshop, and All Schools) were 51.7% male and 48.3% female. For all three groups, the percentage of American Indian students was 0.2% and the percentage of Native Hawaiian students was 0.1%. The schools represented in the 2018 group were 52.4% White students; this did not differ significantly from the 2019 group (50.0%) or the All Schools group (50.8%). The percentage of students in the All Schools group that identify as two or more races was 6.0%. This did not differ significantly from the 2018 group

(5.9%) or the 2019 group (5.9%). There was a significant difference in the percentage of Black students in divisions in the 2018 training (26.1%, n = 484 schools) compared the 2019 training (20.4%, n = 889 schools) and all Virginia groups (21.8%, n = 1,149 schools). The 2018 training group also had significantly lower percentages of Asian (2.9%) and Hispanic (12.2%) students than the 2019 training group, 6.5% and 16.7% respectively, and All Schools group, 5.7% and 15.3% respectively.

Effectiveness

Collecting student behavior change data was outside the scope of this project. Changes in SND attitudes, intentions, and behavior were used to approximate change or intent to change at the division level.

Perceived Support

Perceived support was assessed before and after each training workshop and at three check-ins between the two workshops. Table 4-2 shows the mean perceived support score, on a 1 to 10 scale with one indicating no support and 10 being complete support, for each of the stakeholder groups on the pre and post-surveys from the 2018 training workshop. The only significant change from before to after the training was a decrease in average perceived support from cafeteria staff, from 8.9 to 8.6. Perceived support from parents, the community, teachers, principals and other administrators, and the superintendent did not change. Table 4-3 shows the average perceived support scores for the relevant stakeholder groups from the 2019 training workshop. Similarly to the 2018 results, there was a significant decrease in perceived support from cafeteria staff from before (9.0) to after (8.6) the training. There was also a significant decrease in perceived support

from the community, from 6.9 pre to 6.4 post. In both years, perceived support was highest from cafeteria staff on both the pre (8.88 in 2018, 9.03 in 2019). and post surveys (8.55 in 2018, 8.57 in 2019). Perceived support from teachers was lowest before and after the 2018 training workshop (6.51 before and 6.59 after). For the 2019 training workshop, perceived support from teachers was lowest before the training (6.68) and from the community was lowest after the training (6.64). Table 4-4 shows the average overall perceived support score over each time point. There was no significant change across the seven time points.

Self-Efficacy

SND self-efficacy was also measured before and after each training and during the three check-ins. The average self-efficacy scores, on a scale from 1 to 5 with 5 indicating high self-efficacy and 1 indicating the lowest, are in Table 4-4. Analysis indicated that there was a statistically significant increase average self-efficacy score following the 2018 training workshop compared to any other time point. Check-in 1 was not significantly different from any time points. Average self-efficacy was highest on check-in 1 (3.6) and lowest on the 2018 pre-survey (3.4).

Intention to Implement Changes

The effect on intention to implement changes related to the training workshop target areas was also examined. For the 2018 training workshop, SNDs were most likely to implement changes related to the Menu Planning and Development session in the 2018-2019 school year before and after the training, 4.5 and 4.7 respectively. This slight increase in likeliness of implementation from pre to post was not statistically significant. The likelihood of implementing change related to the other five sessions (Farm to School, Culinary Skills, Community Outreach and Engagement,

and Nutrition and Physical Activity Promotion) all significantly increased ($p < 0.001$) from before to after the training (Table 4-5). The likelihood of implementing a Farm to School program increased the most from before (3.1) to after (4.0) the training, 3.1 to 4.0 ($p < 0.001$).

For the 2019 training workshop, likelihood and/or confidence in implementing programs from training sessions was assessed (Table 4-6). SNDs were most likely to implement a Harvest of the Month program, a specific Farm to School strategy, before (3.8) and after training (4.1). This increase was not statistically significant using the Bonferroni adjusted p-value threshold of 0.0038. Confidence with Data-Driven Decision Making increased the most from before (3.2) to after (3.7) the training ($p < 0.001$). There was also a significant increase for Confidence with Solicitation for Farm to School Procurement, 2.7 to 3.1 respectively ($p < 0.001$).

Changes to the Lunchroom Environment

In addition to measuring intention, actual behavior change to the lunchroom environment was measured at the school level using the Smarter Lunchroom Scorecard and CDC SHI.^{97,98} Twenty-five elementary schools from divisions that attended the 2018 training and 17 elementary schools from divisions that did not attend that training were compared. Table 4-7 shows the results of that analysis at the reconstructed baseline (Fall 2018) and Spring 2019 time points. There were no statistically significant differences when analyzed by Wilcoxon Signed-Rank test. The most commonly implemented strategies between baseline and Spring 2019 were to move white milk in front of all other beverages in the cooler and to provide information about the benefits of school meals to teachers and administration annually. Table 4-8 shows the results of the SHI questions. On average, schools in the intervention group covered 6.7 of the 21 listed nutrition topics ($n=10$ schools); there was no change from Fall 2018 to Fall 2019. The comparison group ($n=8$ schools)

covered 13.5 of the topics in Fall 2018 and 13.9 in Fall 2019. There was no significant difference between the two groups or between time points. There were also no significant differences in opportunities for families and students to provide suggestions and feedback between groups or time points.

Adoption

Number of Divisions

The 2018 training workshop had representatives from 69 of Virginia's 132 divisions (52.3%). The 2019 training workshop had representatives from 96 divisions (72.7%). Overall, 111 (84.1%) of divisions had representatives attend at least one of the trainings, with 54 divisions (40.9%) attending both.

Representativeness

Table 4-9 shows characteristics of divisions in attendance at the 2018 and 2019 training workshop compared to all divisions in the state. There were no significant differences when analyzed by unpaired t-test using the Bonferroni adjusted p-value threshold of 0.0013. There were significant differences in accreditation status between both training groups compared to the all schools group ($p < 0.05$), with no differences between the two training workshop groups. The one accreditation withheld school was removed from the analysis due to lack of power.

SNDs and managers who attended the 2018 training session reported having been in their current position for an average of 8.2 years and serving as a SND for 8.3 years. Region 7 had the most representatives at the 2018 training workshop ($n=17$) and Regions 2, 5, and 8 had the least ($n=7$). All the SNDs and managers who attended the training workshop reported having implemented efforts to improve the school nutrition program in their divisions either currently or

in the past. SNDs who attended the 2019 training workshop reported being in their current position for an average of 8.9 years and serving as an SND for 10.5 years. Region 4 had the most attendees (24) at the 2019 workshops and Region 3 had the fewest (11).

Perceived support and self-efficacy were both correlated with average likelihood of implementation for the June 2018 training; the estimates of correlation were 0.63 and 0.59 respectively ($p < 0.001$). The number of years the SND had spent in their position was not correlated with average likelihood of implementation.

Implementation

Participation in Intervention Activities

The check-ins were intended to be implemented quarterly, however only three were completed. At the 2018 training, 76 pre-surveys were completed. This is higher than the 69 divisions represented because seven SNDs represented schools not included in the Virginia School Quality Profiles⁹⁵, the source for the demographical data. During the first check-in period, 30 check-ins were fully completed (39.5%). The second check-in was missed and only 21 check-ins were fully completed in the third period (27.6%). During the fourth period, 54 check-ins were fully completed, with 16 the check-ins being with SNDs who did not attend the 2018 training session.

A survey containing the two CDC SHI questions was sent to the 28 SNDs who oversaw the 42 schools where the lunchroom observations were completed; some divisions had lunchroom observations completed at multiple schools within the division. Twelve of the SNDs (43.0%) representing 20 of the 42 schools (47.6%) completed any part of the two questions. The question about nutrition lessons in the health education program was only completed by 10 SNDs (36.0%) representing 18 schools (42.9%).

The pre-survey at the 2019 training session asked participants if they had watched any eModules released by VDOE in September 2019. Thirty of the 126 (23.8%) participants who completed a pre-survey had watched at least one of the eModules. The most watched of the four eModules were Procurement 101 and Data-Driven Decision Making using KPIs, each watched by 23 of the 30 SNDs who had watched any (76.7%). Procurement Profiles was watched by 17 participants (56.7%) and Financial Management was watched by 15 participants (50%). Most of the participants, 81 of 84 respondents (96.4%), indicated they would like more eModules in the future.

Areas of Implementation

SNDs completed strategic plans at the 2018 training workshop related to one of the six target areas. Twenty-seven participants (43.6%) completed strategic plans related to Farm to School, the most of any target area. Plans related to Menu Planning were created by 14 participants. Culinary Skills was the least frequently selected target area for the strategic plans with only four people (6.5%) selecting this area.

The 2019 training workshop pre-survey asked participants who had attended the 2018 training workshop in which target areas, if any, they had implemented strategies in the previous year. Thirty-three participants indicated they had implemented strategies related to Farm to School and thirty-two had implemented strategies related to Menu Planning and Development. Community Outreach and Engagement strategies were implemented by 24 participants. Eighteen participants indicated they had implemented strategies related to Nutrition Education and Physical Activity Promotion, while 16 indicated strategies related to Culinary Skills.

During the 2019 training workshop, participants had an opportunity to create or revise their strategic plans. These plans were open-ended and not restricted to a specific target area. Table 4-10 shows the major action areas identified in the strategic plans as areas the participants intend to implement change in the 2019-2020 school year. **Procure and Promote Local Produce** was the action area most commonly mentioned in strategic plans overall. It was mentioned more frequently in the group of participants that attended both trainings, 62% of plans, than in the group who only attended in 2019, 32% of plans ($p < 0.05$). Differences were analyzed by Chi Squared test. There was also a significant difference between the 2018 and 2019 group and the 2019 only group for the intention to **Create or Maintain School Gardens**, 40% and 7% respectively ($p < 0.001$). A higher percentage of strategic plans from the 2019 only group, 29%, mentioned **Improving Menu Selection** than in the 2018 and 2019 group, 19% ($p < 0.05$).

Maintenance

The time horizon of the study was too short to include measures of maintenance. Table 3-1 includes a list of measures that ideally would have been addressed to adequately measure maintenance as a dimension of the RE-AIM framework but were not feasible in this current study.

RE-AIM Score

The main results of the study are summarized in Table 4-11. These results highlight the constructs of RE-AIM that were included in this analysis. Table 4-12 summarizes the RE-AIM score by construct and Figure 4-1 displays the results visually by dimension. All five measures of reach were assessed in this study, therefore the study scored 100% for this dimension. Within effectiveness, only **measures from at least one follow-up** was reported which resulted in a score

of 25% for effectiveness. Five of the six constructs within adoption were assessed, which led to a score of 83%. Both duration and extent of the protocol delivered as intended were included in the analysis for implementation, therefore the score for this dimension was 67%. Finally, as previously reported, no measures of maintenance have yet been assessed for this study, resulting in a score of 0% for this dimension. Overall, thirteen (62%) of the twenty-one total indicators were reported on. If the three maintenance constructs are excluded, 72% of RE-AIM constructs were assessed in this study, which is significantly greater than similar studies.

CH 5. Discussion

The results of this study can be used to inform expanded implementation of Team Nutrition on a statewide level, with potential adaptations to improve effectiveness and implementation, and to encourage thorough reporting of all aspects of a community-based prevention intervention. This study also addressed a gap in D&I research, as the use of D&I frameworks have become more common in childhood obesity research. Researchers within the fields of behavioral nutrition and physical activity understand the importance of a D&I approach to reduce the timeline for translation of the intervention into practice, yet only 54% of researchers surveyed indicated they had the necessary knowledge and skills to conduct D&I research.¹⁰¹ This study adds to the D&I literature exploring the dissemination and implementation of a school-based nutrition intervention on a statewide level. Had the analysis focused only on efficacy, the modest improvements in likelihood of implementation may have suggested not continuing to implement this intervention. However, when effectiveness is considered as one component of overall programmatic impact, the intervention was shown to be more successful, largely due to widespread reach and adoption.

Representativeness of Students Exposed to the Intervention (Reach)

The students represented at the 2018 training were more likely to be Black and less likely to be Asian and Hispanic than the 2019 and the all schools groups. It is unclear why this difference is present, however SNDs self-selected to attend the 2018 training workshop, therefore participants in this group had to expect the intervention to have a positive outcome for them and be motivated enough by this expectation to prioritize it over other tasks and choose to attend. Previous research showed participants who self-selected for a happiness intervention reported a greater increase in

well-being compared to those who were assigned to the intervention.¹⁰² Therefore, while the 2018 group was not a fully representative sample of the all Virginia group in school level demographics, the group of SNDs representing those schools also likely differed from the whole population in motivation and interest for the intervention as well, which likely affected outcomes from the 2018 workshop. While there is little research on what motivates people to self-select into an intervention, previous research with a mental health intervention found that people who self-selected into the study were more likely to have a diagnosis of a mental illness and therefore need the intervention.¹⁰³ It is possible that the SNDs self-selected to participate in the 2018 training workshop because their districts had a greater need for intervention.

Focus on Farm to School (Effectiveness)

Farm to School was the only training area targeted in both training workshops and was a priority for VDOE. Virginia has made implementing Farm to School programs a priority for the state over the last decade, with an increased emphasis in the last five years. In 2007, a Farm to School Task Force was created to develop a Farm to School program in the state.¹⁰⁴ Purchases of local produce for schools doubled between 2014 and 2017, \$7 million to \$15.4 million annually.¹⁰⁵ In 2019, First Lady of Virginia Pamela Northam, the Secretary of Education, and the Secretary of Agriculture and Forestry, introduced a goal to increase school procurement of produce from local farms to \$22 million by 2022.¹⁰⁵ A 2018 survey of Virginia SNDs found some barriers to implementing a Farm to School program were lack of consistent availability, complex ordering and purchasing procedures, and cost.¹⁰⁶ VDOE aimed to address some of these barriers in the training workshops and through the eModules explaining procurement procedures.¹⁰⁷

The emphasis on Farm to School contributed to high intention to implement, frequency of mentions in strategic plans, and self-reported implementation. Farm to School strategies were the most popular action area on the 2018 and 2019 strategic plans, especially among participants who attended both training workshops, indicating strong intention to implement Farm to School strategies. The interest in Farm to School strategies among participants who attended both training workshops may be due to an increased focus on the intervention, which emphasized Farm to School programs.

Self-Efficacy and Perceived Support on Implementation (Effectiveness)

Self-efficacy, along with perceived support, were both correlated with intention to implement changes related to the target areas reported on the 2018 post-survey. This is consistent with previous literature that suggests perceived support, self-efficacy, and the number of years SNDs spent in their current role are all correlated with intention to implement changes.^{14,108-110} However, the literature on the effect of years of experience on implementation was mixed, with one study suggesting a positive correlation and another suggesting a negative correlation.^{14,110} In this study, the number of years in the current role was not correlated with implementation intention.

There were significant differences in perceived support from cafeteria staff on both pre/post surveys. Although the reason for the decreases are unclear, it is possible that after learning about strategies for improving the school nutrition program in their divisions, participants felt that cafeteria staff would be less supportive of changes to the program than they had originally anticipated. This idea is supported by previous research indicating part of perceived support is an estimation of perceived stakeholder approval of the intervention.¹¹¹ If participants do not believe the stakeholder group will support the intervention, perceived support from that group could

decrease from before to after the training. This is problematic because perceived support from subordinates has been shown to affect motivation and the adoption of strategies learned in the training.^{111,112}

Little research has been done on SNDs' perceptions of school nutrition staff support, however, previous research does indicate SNDs generally feel supported by their staff to improve the school food environment.^{61,94,113-115} This is consistent with the finding in this study that perceived support was highest from cafeteria staff on both the pre- and post-surveys in 2018 and 2019. General resistance to change and lack of time or adequate staffing to support those changes are perceived as potential barriers to cafeteria staff support by SNDs.^{61,113}

SNDs as Agents of Change (Adoption)

SNDs are a strong choice for an agent of change for nutrition interventions as they are typically supportive of policies and interventions that result in healthier meals for students.^{116,117} This is supported by 84% of SNDs participating in at least one training workshop. SNDs also have the ability to directly affect change to the school nutrition program in their divisions. Additionally, SNDs are ideal for train-the-trainer interventions as each SND can train cafeteria staff at multiple schools.

However, there are also several barriers to overcome when using SNDs as agents of change. First, change at the school level requires buy-in from multiple stakeholders. Previous research on Farm-to-School highlighted the need to have support from both school and community stakeholders for change to occur.¹¹⁸ The decrease in perceived support from cafeteria staff from before to after the training workshop, in 2018 and 2019, and from the community, in 2019, may have been caused by the SNDs realizing the complexity of implementing changes and not being

confident in their ability to obtain buy-in from those groups. Secondly, there is potentially significant variation in education level and experience among SNDs, even just within Virginia. The minimum qualifications for SNDs varies based on the size of the school nutrition program from a high school degree and three years of experience in a small program to a Bachelor's Degree in a field related to school nutrition for the largest programs.¹¹⁹ Thirdly, SNDs often report lack of time to implement all the policies and procedures they want to.⁹⁴ Therefore, competing time interests when SNDs are in their divisions may be a significant barrier to implementation.

Participation in Intervention Activities (Implementation)

Within implementation, rates of completion for intervention activities outside of the in-person training workshops was low, likely due to time limitations and lack of structure in these activities. In addition to the low participation, VDOE reported that the check-in process was very time consuming, which resulted in inconsistent spacing of the check-ins and one check-in timepoint being missed entirely. As previously mentioned, SNDs often have many competing time priorities which could have been a barrier to participation in intervention activities. VDOE addressed the time barrier by creating eModules to provide participants with training that could be completed at a convenient time and did not require taking time off to come to a workshop. These eModules were well received by participants.

Another potential barrier is that perhaps SNDs did not understand their role within this study or felt that the data collection activities outside of the training workshops lacked structure and therefore they chose to focus on other competing interests. Previous research with volunteers suggests that a lack of structure in activities after the initial training and a lack of role clarity within the organization contribute to decreased participation.¹²⁰ This suggests that a more structured and

efficient method of check-in to improve fidelity of this intervention component in future implementations of this program is warranted. Potential barriers, such as this one, may not have been elucidated without using a D&I framework for evaluation.

RE-AIM Score

Although using the RE-AIM framework was not part of the original evaluation plan, 62% of RE-AIM indicators were reported on in this study. Previous research in reporting of RE-AIM indicators among interventions related to sugar-sweetened beverages, health literacy, and community interventions have reported average scores across dimensions of 29%, 42%, and 43% respectively.^{77,121} Within reach, all five indicators were assessed in this study. Previous reviews examining the reporting of RE-AIM indicators in studies has shown that exclusion criteria and representativeness are significantly underreported, especially in environmental interventions.^{77,100,121,122} In the present study, only one of the indicators of effectiveness was addressed, an outcome measure with a follow-up. This is not uncommon in the current literature, as the other indicators of effectiveness, especially impact on quality-of-life, are less frequently reported. Reviews have reported that only 4-28% of studies report on quality-of-life effects.^{77,100,121} Within adoption, 83% of indicators were addressed in this study. It was not feasible to report on the level of staff expertise as background information on SNDs who did not attend the training was not collected. Also within adoption, representativeness of intervention sites is also underreported, but was reported on in this study.^{100,121} One review reported that zero of the fifty-five trials coded in the study reported on representativeness of intervention sites.⁷⁷ For implementation, this study reported on 67% of the indicators. That was slightly higher than average (54%) based on 27 community interventions reviewed in one study, as the amount of intervention

that is delivered as intended is often underreported.¹⁰⁰ Finally, this study did not include any measures of maintenance and thus did not report on indicators related to maintenance, though this is an area for future research.

Strengths and Limitations

There were several strengths of the study. Using the RE-AIM framework for this evaluation helped to elucidate the strengths and limitations of this research. The training workshops were attended by representatives from 84% of divisions, and therefore reached 512,953 elementary school students. The data set used to calculate representativeness at both the student and division level included data on all divisions in the state regardless of participation. Since this indicator of external validity was high and the study was done in the real world, the results of this study are useful for generalizing to the total population of Virginia school districts. Another strength of this study was the utilization of a D&I approach to fill a gap in the current school-based nutrition intervention research through a strong focus on process as well as outcome measures.

The study also had several limitations. First, the study was not initially designed as a RE-AIM study. Using the data available, the evaluation was structured to report on as many of the constructs of RE-AIM as possible. Had the study been designed using RE-AIM, more constructs could have potentially been addressed. Secondly, under the dimension of reach, there were significant differences in the representativeness of students based on demographic data of the schools represented by the SNDs at the 2018 training than the 2019 training or all Virginia groups. This is likely due to SND self-selection for 2018 training workshop attendance, although it was not feasible to examine differences in characteristics of SNDs who did and did not attend the trainings as characteristic data was collected on the pre-surveys at the training workshops and there

was limited information on the characteristics of SNDs who did not attend at least one of the trainings.

Thirdly, the lunchroom observations were limited by a comparison group that was not maintained throughout the study and a small sample size. The comparison group was selected based on 2018 workshop attendance and those who selected to not attend. However, many SNDs from this group attended the 2019 training session. It was not pragmatic to conduct an RCT with strict intervention and control groups, as state organizations are interested in the process of implementing the intervention in a whole state.^{74,75,123,124} The check-ins and SHI survey were similarly limited by a small sample size resulting in low power for analysis on these measures. Overall, the strengths and limitations of the study can be used to inform future research.

Implications for Practitioners

Based on the findings of this study, Team Nutrition should be continued to be implemented within Virginia. Below are several recommendations for improving the future impact of this intervention through improving effectiveness and implementation.

Recommendation 1: Emphasize One Area for Improvement

For the greatest impact, practitioners should emphasize a specific subject for greater acceptance and intention to implement instead of offering multiple options. Sessions should include methods on reducing the barriers associated with implementing strategies related to target areas. VDOE successfully encouraged SNDs to implement or expand Farm to School programs when they emphasized this target area in the trainings. The two least implemented target areas

were Nutrition Education and Physical Activity Promotion and Culinary Skills. Practitioners should consider emphasizing these areas in the future.

Recommendation 2: Implement Strategies to Improve Self-Efficacy and Perceived Support

Practitioners should consider implementing strategies into future training to intentionally increase perceived support and self-efficacy among SNDs. Since self-efficacy and perceived support were shown to be correlated with intention, improvement in these areas may improve intention to implement changes related to future workshop sessions.

Recommendation 3: Utilize Strategies to Reduce Barriers to Participation

Future practitioners should implement strategies to reduce the barriers to participation in intervention activities. VDOE implemented strategies, such as the eModules, designed specifically to decrease time barriers to participation by SNDs. Participants at the 2019 training workshop indicated that they overwhelmingly wanted more eModules in the future. Other strategies to reduce barriers associated with participation and implementing changes should be explored as well.

Recommendation 4: Obtain Buy-In from Stakeholders

Practitioners should consider including methods to obtain buy-in from stakeholders in future training workshops. In addition to training for SNDs, Team Nutrition also contains components for community members and teachers.¹²⁶ Offering trainings for these stakeholder groups, along with administration, may increase buy-in for changes proposed by SNDs. Alternatively, training workshops for SNDs could include teaching strategies to obtain buy-in from stakeholders.

Implications for Future Research

Future research should examine student behavior change and intervention maintenance. Once changes have been made in the lunchroom environment, studies examining student behavior change would provide a more accurate assessment of effectiveness. Additionally, measuring the maintenance of the intervention at the SND and student level would elucidate if the intervention activities and the overall effect persist over time when SNDs are not actively participating in trainings. Maintenance should be measured at least six months following the end of the intervention.⁶⁵

Recommendation 1: Measure Student Behavior Change

Students' knowledge and beliefs about nutrition education could be tracked with a survey before and after implementation of changes. Additionally, self-reported consumption both inside and outside of school could be tracked to see if change persists outside of the regulated school environment. Based on the goals of the Team Nutrition program, the intervention could result in an increase in consumption of fruits, vegetables, and whole grains along with a decrease in consumption of fats and sugar.² While it would be more time consuming, measuring meal selection in the cafeteria and food waste would add more accurate measures for effectiveness at the student level.

Recommendation 2: Measure Maintenance at the Student and Setting Level

Within maintenance, it would be important to measure which strategies SNDs chose to continue implementing and which were not continued. At the student level, maintenance of

nutrition knowledge, attitudes, and behavior could be examined through surveys and lunchroom observations with a food waste study.

Recommendation 3: Recalculate the RE-AIM Score

Once student effectiveness data has been collected and maintenance has been evaluated, the RE-AIM indicators score should be recalculated to include reporting of indicators related to those dimensions. Additionally, an impact score can be calculated based on King and colleagues system for environmental interventions.¹²⁷

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TABLES

Table 2-1: Constructs of the RE-AIM Framework

Dimension	Definition	Indicators
Reach	A measure of the uptake of the intervention by individual participants. ^{15,65,73}	<ul style="list-style-type: none"> ▪ The percentage of individuals who participate compared to all people in the target population.^{15,65} ▪ Representativeness of the sample population is measured by comparing characteristics of participants to non-participants.^{15,65}
Effectiveness	A measure of the impact of the intervention on health behavior ⁶⁵	<ul style="list-style-type: none"> ▪ A measure of the primary outcome for the intervention. ▪ Measures of broader outcomes, which should include unintended consequences.⁶⁵ ▪ The attrition rate during the intervention.⁷³
Adoption	A measure of the uptake of the intervention by settings and intervention agents ^{15,65}	<ul style="list-style-type: none"> ▪ The percentage of settings and intervention agents that participate in the intervention.⁶⁵ ▪ Representativeness of the characteristics of intervention settings compared to non-participating settings to determine the representativeness.^{65,73} ▪ Representativeness of the characteristics of agents who participate compared to eligible agents who do not participate or total setting staff .^{65,73}
Implement-ation	A measure of the amount of the intervention that was delivered as intended by the settings and agents ^{65,73}	<ul style="list-style-type: none"> ▪ Program fidelity should be measured at each site and for the whole program.^{15,65} ▪ Any adaptations made to the original program during intervention should be reported. ▪ The overall cost, both monetary and time costs, should be calculated for the program.⁶⁵ ▪ A measure of consistency of implementation across different characteristics of settings and agents.^{15,65}
Maintenance	A measure of the long-term consequences/impacts for participants and at the setting level ^{15,65}	<ul style="list-style-type: none"> ▪ Measure of primary outcome at least six months after the intervention has ended.⁶⁵ ▪ Measure of broader outcomes and unintended consequences at follow-up.^{15,65,73} ▪ Long-term attrition and the representativeness of participants who are lost to follow-up.⁶⁵ ▪ The elements of the program that settings continue or discontinue to implement.¹⁵ ▪ Overall sustainability of the program.⁷³

Table 3-1: Overview of Methods by RE-AIM Dimension

Dimension:	Measure	Data Source	Analysis
Reach (Student Level)	Number of public-school elementary students reached by the intervention compared to number of total public-school elementary students in the state	<ol style="list-style-type: none"> List of school divisions that had representatives attend the June 2018 training Student population from Virginia School Quality Profiles 	Descriptive statistics
	Characteristics of students in divisions with SNDs who attended the training compared to characteristics of non-participants	Characteristics data from Virginia School Quality Profiles	Unpaired T- test
Effectiveness (Student and SND Level)	Student behavior changes ₁	[no data – no effectiveness data pull on students]	
	Changes in SND’s indicators related to implementation (e.g., perceived support, self-efficacy, and intention to implement changes)	Pre/post surveys and check-in data	Paired t-test and one-way ANOVA
	Differences in intention to implement changes by SND characteristics (years in position, self-efficacy, perceived support)	Pre/post surveys- 2018 and 2019	Pearson’s Correlation
	Number of SND who do not complete final activity (TBD) ₁	[no data – no data on final activity]	
Adoption (Setting and Intervention Agent Level)	Percentage of divisions with engaged public elementary schools	<ol style="list-style-type: none"> List of school divisions that had representatives attend the June 2018 training Division information from Virginia School Quality Profiles 	Descriptive statistics
	Characteristics of engaged divisions compared to non-engaged	Characteristics data Virginia School Quality Profiles	Unpaired T-test
Implementation (Intervention Agent Level)	Rates of completion of intervention activities (trainings, surveys, check-ins)	<ol style="list-style-type: none"> Pre/post surveys 2018 Pre/post survey 2019 Quarterly Check-ins 	Descriptive statistics
	Achievement of self-set goals (e.g., completed, not completed, added new)	<ol style="list-style-type: none"> Pre/post surveys 2018 Pre/post survey 2019 	Descriptive statistics
	Adaptations to the intervention made by VDOE ₁	Do not have data or would be very difficult to extrapolate	

Dimension:	Measure	Data Source	Analysis
	Cost of the training for VDOE (time and money) and participants (time and transportation) ₁	Do not have data or would be very difficult to extrapolate	
	Cost of making the changes ₁	Do not have data or would be very difficult to extrapolate	
	Compare implementation in the 6 target areas at baseline, mid, and the end of the study	<ol style="list-style-type: none"> 1. Pre/post survey 2018 2. Pre/post survey 2019 3. Smarter Lunchroom Scorecards 	Descriptive statistics and Wilcoxon Signed-Rank Test
	Compare intent to implement changes in the 6 target areas at baseline, mid and the end of the study	<ol style="list-style-type: none"> 1. Pre/post survey 2018 2. Pre/post survey 2019 3. Strategic Plans 	Descriptive statistics and Paired T-Test
Maintenance (Student and SND Level)	Maintenance of student behavior or weight changes ₁	[No student level data]	
	Maintenance of SND/rep self-efficacy and intention ₁	[No data]	
	Student attrition from program ₁	[No student level data]	
	Maintenance of changes in specified areas ₁	[No data]	
	Descriptions of changes ₁	[No data]	
	Compare perceived importance to implementation (intentions) ₁	[No data]	

¹ Data to evaluate the measures in grey ideally would have been collected, but it was not possible within the scope and timeframe of the current project.

Table 4-1: Representativeness of Students Represented at the Trainings Compared to State

Demographic Features	2018	2019	All Schools
Total Number of Schools	484	889	1,149
Total Number of Students	245,243	488,278	611,134
Gender (%)			
Male	264 (51.68%)	284 (51.68%)	275 (51.67%)
Female	247 (48.31%)	265 (48.32%)	257 (48.34%)
Race (%)			
American Indian	2.45 (0.20%)	2.74 (0.23%)	2.67 (0.22%)
Native Hawaiian	2.30 (0.10%)	2.19 (0.10%)	2.39 (0.12%)
White	254 (52.43%)	257 (50.00%)	252 (50.75%)
Black	139 ^a (26.14%)	111 ^b (20.43%)	117 ^b (21.8%)
Asian	20.9 ^a (2.86%)	56.2 ^b (6.53%)	47.1 ^b (5.67%)
Two or More Races	32.3 (5.92%)	34.0 (5.87%)	33.8 (6.02%)
Ethnicity (%)			
Hispanic	72.8 ^a (12.21%)	104 ^b (16.73%)	92.8 ^b (15.31%)

1 Only schools with complete demographic data available through the Virginia School Quality Profiles

2 were used to calculate differences between groups.

3 Differences were analyzed by unpair t-test with a Bonferroni adjusted p-value threshold of 0.0013.

4 The values with different superscript letters in a row are significantly different at the adjusted p-value.

Table 4-2: Changes in Perceived Support from the 2018 Training Workshop

Stakeholder	n	Mean on Pre (SD)	Mean on Post (SD)	Difference of Means	Significance
Parents	68	6.53 (1.94)	6.68 (1.71)	0.15	0.3611
Community	67	6.72 (1.99)	6.81 (1.86)	0.09	0.5602
Teachers	68	6.51 (2.02)	6.59 (1.85)	0.07	0.5118
Principals and other administrators	67	7.46 (1.69)	7.48 (1.58)	0.01	0.9052
Superintendent	65	8.63 (1.75)	8.52 (1.78)	-0.11	0.18
Cafeteria Staff	67	8.88 (1.10)	8.55 (1.24)	-0.33	0.0022*

1 Perceived support scores were from 1, no support, to 10, complete support.

2 Differences were analyzed by paired t-test.

3 * indicates significance at the adjusted p-value threshold of 0.0038.

Table 4-3: Changes in Perceived Support from the 2019 Training Workshop

Stakeholder	n	Mean on Pre (SD)	Mean on Post (SD)	Difference of Means	Significance
Community	97	6.90 (2.04)	6.44 (2.12)	-0.46	0.0004*
Cafeteria Staff	97	9.03 (1.33)	8.57 (1.64)	-0.46	0.0002*
Principal and other administrators	97	7.75 (1.95)	7.46 (2.05)	-0.29	0.0117
Parents	97	6.86 (1.81)	6.57 (1.81)	-0.29	0.0138
Superintendent	94	8.51 (2.02)	8.38 (2.16)	-0.13	0.1326
Teacher	97	6.68 (1.84)	6.71 (1.94)	0.03	0.8202

1 Perceived support scores were from 1, no support, to 10, complete support.

2 Differences were analyzed by paired t-test.

3 * indicates significance at the adjusted p-value threshold of 0.0038.

Table 4-4: Average Scores for Perceived Support and Self-Efficacy Over Time

Time Point	Perceived Support (SD)	n	Self-Efficacy (SD)	n
Total Possible	10		5	
Pre-Survey 2018	6.68 (2.59)	76	3.39 (0.49) ^a	71
Post-Survey 2018	7.25 (1.48)	72	3.52 (0.47) ^b	72
Check-in 1	7.86 (1.55)	30	3.58 (0.61) ^{ab}	29
Check-in 3	7.54 (2.25)	21	3.44 (0.92) ^a	21
Check-in 4	7.60 (1.59)	54	3.46 (0.64) ^a	54
Pre-Survey 2019	7.60 (1.47)	96	3.49 (0.57) ^a	97
Post-survey 2019	7.32 (1.59)	99	3.45 (0.64) ^a	98

¹ The values with different superscript letters in a column are significantly different at the adjusted p-value.

² The value labeled ab is not significantly different from values labeled a or b.

Table 4-5: Average Likelihood of Implementation at the 2018 Training Workshop

Session	n	Mean on Pre	Mean on Post	Difference of Means
Farm to School	67	3.1 (1.37)	3.96 (1.04)	0.85
Culinary Skills	65	3.25 (1.05)	4.08 (0.85)	0.83
Strategic Planning	65	3.78 (0.86)	4.48 (0.78)	0.7
Community Outreach & Engagement	67	3.46 (1.06)	4.01 (0.70)	0.55
Nutrition & Physical Activity Promotion	68	3.54 (1.00)	3.91 (0.83)	0.37
Menu Planning & Development	66	4.5 (0.66)	4.65 (0.56)	0.15

1 Measured on a 1 to 5 scale with 1 being very unlikely and 5 being very likely to implement change in the 2018-2019 school year

2 The * indicates a p-value that was considered significant using the Bonferroni adjusted threshold of 0.0038.

Table 4-6: Average Likelihood of Implementation at the 2019 Training Workshop

Question	n	Mean on Pre (SD)	Mean on Post (SD)	Difference of Means	Significance
Confidence with Data-Driven Decision Making	93	3.21 (1.18)	3.74 (1.14)	0.54	0.0001*
Confidence with Solicitation for F2S	95	2.64 (1.27)	3.06 (1.05)	0.42	0.0003*
Confidence with Procurement Profiles	92	2.93 (0.99)	3.25 (1.15)	0.32	0.0154
Likelihood of Implementing HOM	96	3.84 (1.23)	4.14 (1.07)	0.30	0.0040
Confidence with Financial Report	89	3.71 (1.12)	3.95 (0.95)	0.23	0.0369
Likelihood of Implementing F2S	94	3.68 (1.35)	3.77 (1.28)	0.09	0.3395

1 Measured on a 1 to 5 scale with 1 being very unlikely and 5 being very likely to implement change in the 2019-2020 school year

2 The * indicates a p-value that was considered significant using the Bonferroni adjusted threshold of 0.0038.

Table 4-7: Average Section Scores of the Smarter Lunchroom Scorecard

	Questions per Section	Comparison (n=17)		Intervention (n=25)	
		Baseline (SD)	Spring 2019 (SD)	Baseline (SD)	Spring 2019 (SD)
Total	60	37.94 (6.31)	38.18 (7.27)	35.79 (8.88)	35.32 (8.77)
Fruit	6	3.53 (1.23)	3.59 (1.32)	3.83 (1.44)	3.88 (1.32)
Vegetable	8	5.59 (0.94)	5.65 (1.00)	5.67 (1.35)	5.76 (1.22)
Salad	4	2 (1.32)	2 (1.32)	1.83 (1.29)	1.76 (1.23)
Milk	5	3.35 (0.79)	3.35 (0.79)	3.46 (0.97)	3.52 (0.97)
Reimbursable Meals	11	5.82 (2.10)	6 (2.24)	4.96 (2.26)	4.88 (2.38)
Atmosphere	10	8.18 (1.24)	8.18 (1.24)	7.46 (1.80)	7.12 (1.88)
Student Involvement	6	3.24 (1.25)	3.29 (1.45)	3.04 (1.41)	2.96 (1.41)
School Involvement	10	6.24 (1.44)	6.12 (1.45)	5.54 (2.10)	5.44 (2.17)

1 Obtained during lunchroom observations

2 The comparison schools were from divisions where the SND did not attend the 2018 training workshop

3 There were no significant differences between the two time points or the two groups

Table 4-8: Results of the CDC School Health Index Survey by Group and Time Point

SHI Question	Intervention		Comparison	
	Fall 2018	Fall 2019	Fall 2018	Fall 2019
Number of Topics Covered in Nutrition Education	6.7	6.7	13.5	13.9
Students Provide Suggestions or Feedback				
Neither	1 (8%)	1 (8%)	0 (0%)	0 (0%)
Suggestions or Feedback	5 (42%)	5 (42%)	3 (37.5%)	2 (25%)
Both	6 (50%)	6 (50%)	5 (62.5%)	6 (75%)
Families Provide Suggestions or Feedback				
Neither	5 (41.7%)	5 (41.7%)	4 (50%)	4 (50%)
Suggestions or Feedback	3 (25%)	3 (25%)	1 (12.5%)	0 (0%)
Both	4 (33.3%)	4 (33.3%)	3 (37.5%)	4 (50%)

1 The parentheses indicate the n for that question.

2 The number of topics covered in nutrition education was out of a possible 21 points.

3 There were no significant differences between time points or groups.

Table 4-9: Representativeness of the Divisions at the Trainings Compared to State

Demographic Features	2018	2019	All Divisions
Total Number of Elementary Schools	484	889	1149
Accreditation Status			
Accredited	449 ^a (92.8%)	841 ^a (94.6%)	1081 ^b (94.1%)
Accredited with Conditions	34 ^a (7.0%)	47 ^a (5.3%)	67 ^b (5.8%)
Accreditation Withheld	1 (0.2%)	1 (0.1%)	1(0.1%)
Schools per District	7.01	9.26	8.70
Students per School	468.00	472.00	465.0
Free or Reduced Lunch (%)	52.75	51.30	50.6600
Absenteeism (%)	10.40	10.50	10.28

¹ There were no statistically significant differences between the number of schools per district, the number of students per school, the percent of students receiving free or reduced-price lunch, or the percent of absenteeism.

² Seven schools were excluded from the 2018 data because the school was not included on the Virginia School Quality Profiles.

³ Four schools were excluded from the 2019 data for the same reason.

Table 4-10: Most Common Action Areas on Strategic Plans in 2019

Action Area	Mean 2018-2019	Mean 2019 Only	Mean difference
Increase lunch participation	26%	18%	8.33%
Increase breakfast participation	29%	50%	-21.43%
Incorporate nutrition education into curriculum	10%	7%	2.38%
Procure and promote local produce ¹	62%	32%	29.76%*
Create or maintain school gardens ¹	40%	7%	33.33%**
Increase community engagement and understanding of changes	17%	4%	13.10%
Use KPIs to improve meal selection ¹	5%	14%	-9.52%
Get students involved with menu planning	2%	18%	-15.48%
Improve menu selection	19%	29%	-9.52%*

1 Mean 2018-2019 indicates percent of plans mentioning that theme among participants who attended both trainings

2 Mean 2019 Only indicates percent of plans mentioning that theme among participants who attended the 2019 training workshop only

3 P-values less than 0.05 are indicated with an *

4 ** denotes a p-value less than 0.001

5 1 Indicates training priority area in 2019

Table 4-11: Summary of Main Results by RE-AIM Dimension

Dimension:	Measure	Main Results
<p align="center">Reach (Student Level)</p>	<p>Number of public-school elementary students reached by the intervention compared to number of total public-school elementary students in the state</p>	<p>83.9% of public-school elementary students had their divisions represented during at least one training</p>
	<p>Characteristics of students in divisions with SNDs who attended the training compared to characteristics of non-participants</p>	<p>There was a significantly higher percentage of Black students in the divisions at the 2018 training than the 2019 training or all schools groups.</p>
		<p>There was a significantly smaller percentage of Asian and Hispanic students in the 2018 group as well.</p>
<p align="center">Effectiveness (Student and SND Level)</p>	<p>Changes in SND’s indicators related to implementation (e.g., perceived support, self-efficacy, and intention to implement changes)</p>	<p>There was a significant decrease in perceived support from cafeteria staff from before to after both trainings.</p>
		<p>Self-efficacy was highest on the 2018 post survey and at check-in 1.</p>
		<p>Intention to implement changes related to the 2018 training target areas increased significantly for 5 of 6 areas from before to after the training.</p>
		<p>Confidence with data driven decision making and writing solicitations for Farm to School procurement significantly increased from before to after the 2019 training workshop.</p>
		<p>Actual implementation, measured using the SLS, did not significantly change from baseline to Spring 2019.</p>
<p>Differences in intention to implement changes by SND characteristics (years in position, self-efficacy, perceived support)</p>	<p>Perceived support and self-efficacy were both correlated with average likelihood of implementation,</p>	

Dimension:	Measure	Main Results
		number of years in current position was not.
Adoption (Setting and Intervention Agent Level)	Percentage of divisions with engaged public elementary schools	84% of divisions were represented during at least one training workshop.
	Characteristics of engaged divisions compared to non-engaged	Accreditation status significantly differed for the 2018 and 2019 groups compared to the All Schools group. There were no other significant differences in division level demographic factors.
Implementation (Intervention Agent Level)	Rates of completion of intervention activities (trainings, surveys, check-ins)	Check-ins had very low participation (27.6, 39.5, and 50%).
		23.8% of participants at the 2019 training watched at least one eModule before attending.
	Compare implementation in the 6 target areas at baseline, mid, and the end of the study	52% of divisions attended the 2018 workshop, 72% attended the 2019 workshop, and overall 84% of SNDs attended at least one of the training workshops.
	Compare implementation in the 6 target areas at baseline, mid, and the end of the study	Participants implemented the most changes related to Farm to School and Menu Planning and Development between the two training workshops.

Table 4-12: RE-AIM Scores by Dimension

DIMENSION	Was it Reported?
REACH	
1) Method to Identify Target Population	Yes
2) Inclusion Criteria	Yes
3) Exclusion Criteria	Yes
4) Participant Rate	Yes
5) Representativeness	Yes
<u>Total</u>	100%
EFFECTIVENESS	
6) Intent to Treat Analysis	No
7) Unintended Consequences	No
8) Attrition	No
9) Measures from at Least One Follow-Up	Yes
<u>Total</u>	25%
ADOPTION	
10) Staff Participation Rate	Yes
11) Description of Setting	Yes
12) Method to Identify Staff	Yes
13) Level of Staff Expertise	No
14) Inclusion/Exclusion Criteria	Yes
15) Representativeness	Yes
<u>Total</u>	83%
IMPLEMENTATION	
16) Duration	Yes
17) Extent Protocol Delivered as Intended	Yes
18) Implementation Costs	No
<u>Total</u>	67%
MAINTENANCE	
19) At Least 6 Months Post-Intervention	No
20) Measures of Site-Level Maintenance	No
21) Cost of Maintenance	No
<u>Total</u>	0%
RE-AIM Total Reporting of Indicators	62%

FIGURES

Figure 3-1: Flow of the Intervention Effect from VDOE to the Students

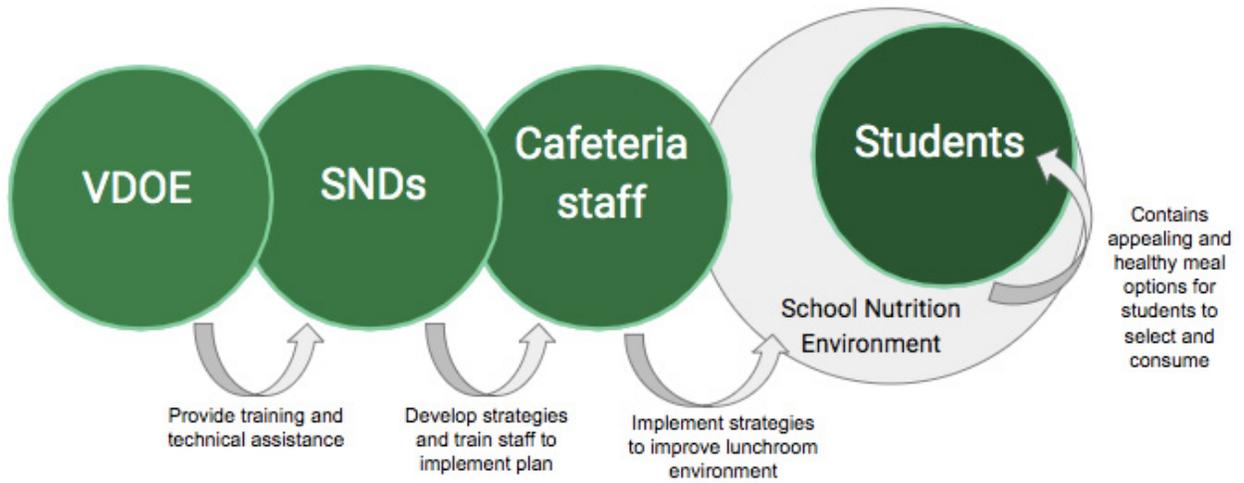


Figure 3-2: Timeline for Data Collection

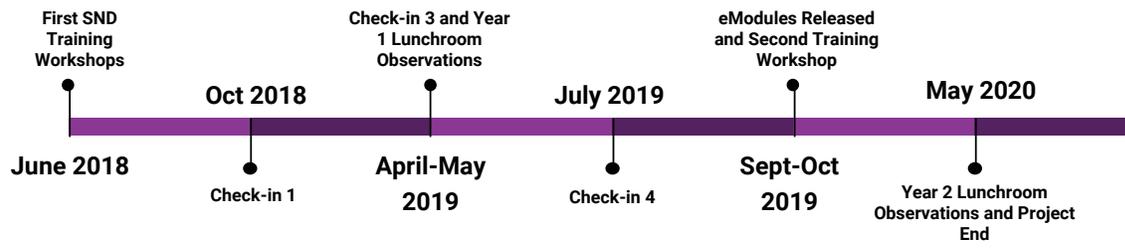
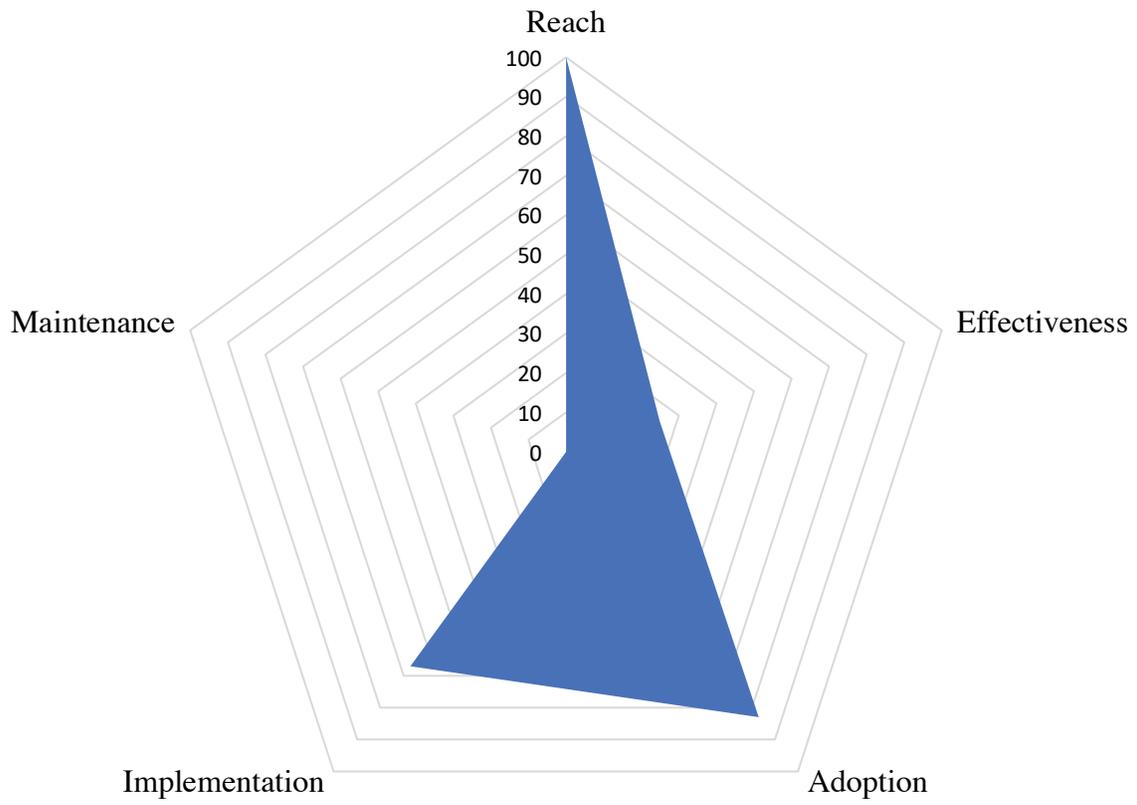


Figure 4-1: RE-AIM Scores by Dimension



APPENDIX A: Team Nutrition June 2018 Training Pre-Survey

Please take 10-20 minutes to complete the following survey. We will use the information you provide to evaluate our June Team Nutrition training.

Please provide the following information:

- Name:
 - School division or education center:
 - Region:
 - Number of schools in your district:
 - Number of years in current position:
 - Number of total years serving as a school nutrition director:
-

Are you currently or have you implemented efforts to improve school nutrition programs in your division?

- Yes
 - No
-

How comfortable are you with using social media (i.e. forms of electronic communication used to build virtual networks and communities) to plan, promote, and enhance school nutrition programs in your division?

- 1. Very uncomfortable
 - 2. Uncomfortable
 - 3. Not sure
 - 4. Comfortable
 - 5. Very comfortable
-

Please indicate the level of support for school nutrition programs on a scale from 1 to 10 with 1 being no support and 10 being complete support in your division from the following stakeholders:

	1	2	3	4	5	6	7	8	9	10
Superintendent	<input type="radio"/>									
Principals and other administrators	<input type="radio"/>									
Teachers	<input type="radio"/>									
Cafeteria Staff	<input type="radio"/>									
Parents	<input type="radio"/>									
Community members	<input type="radio"/>									

How much can you...

	1. Nothing	2. Very little	3. Some	4. Quite a bit	5. A great deal
Influence the decisions that are made in your division?	<input type="radio"/>				
Do to get the materials and equipment you need to implement school nutrition programming in your division?	<input type="radio"/>				
Do to get parents to become involved in school nutrition programs in your division?	<input type="radio"/>				
Do to get community groups and stakeholders involved in school nutrition programs in your division?	<input type="radio"/>				
Do to enhance collaboration in your division to make school nutrition program run effectively?	<input type="radio"/>				
Help teachers, administrators, and staff with the skills necessary for implementing school nutrition programs in your division?	<input type="radio"/>				
Do to get teachers, administrators, and staff to follow rules and regulations for implementing school nutrition programs in your division?	<input type="radio"/>				
Do to motivate teachers, administrators, and staff who show low interest in implementing school nutrition programs in your division?	<input type="radio"/>				

Currently, how likely is it that you will implement a Farm to School program in your division in the 2018-2019 school year?

- 1. Not likely
 - 2. Somewhat unlikely
 - 3. Neutral
 - 4. Somewhat likely
 - 5. Very likely
-

Currently, how likely is it that you will implement nutrition and physical activity promotion activities in your division in the 2018-2019 school year?

- 1. Not likely
 - 2. Somewhat unlikely
 - 3. Neutral
 - 4. Somewhat likely
 - 5. Very likely
-

Currently, how likely is it that you will start new efforts to engage community stakeholders in school nutrition efforts in the 2018-2019 school year?

- 1. Not likely
 - 2. Somewhat unlikely
 - 3. Neutral
 - 4. Somewhat likely
 - 5. Very likely
-

Currently, how likely is it that you will improve the menu plans for your division in the 2018-2019 school year?

- 1. Not likely
 - 2. Somewhat unlikely
 - 3. Neutral
 - 4. Somewhat likely
 - 5. Very likely
-

Currently, how likely is it that you will implement a culinary skills training program for the cafeteria staff in your division in the 2018-2019 school year?

- 1. Not likely
 - 2. Somewhat unlikely
 - 3. Neutral
 - 4. Somewhat likely
 - 5. Very likely
-

Currently, how likely is it that you will implement strategic planning activities to enhance school nutrition programs in your division in the 2018-2019 school year?

- 1. Not likely
- 2. Somewhat unlikely
- 3. Neutral
- 4. Somewhat likely
- 5. Very likely

APPENDIX B: Team Nutrition June 2018 Training Post-Survey

Thank you for attending the Team Nutrition June training. Please take 10-20 minutes to complete the following survey. We will use this information to guide the development of future training opportunities.

Please provide the following information:

- Name:
 - School division or education center:
 - Region:
 - Number of schools in your district:
 - Number of years in current position:
 - Number of total years serving as a school nutrition director:
-

Are you currently or have you implemented efforts to improve school nutrition programs in your division?

- Yes
 - No
-

How comfortable are you with using social media (i.e. forms of electronic communication used to build virtual networks and communities) to plan, promote, and enhance school nutrition programs in your division?

- 1. Very uncomfortable
 - 2. Uncomfortable
 - 3. Not sure
 - 4. Comfortable
 - 5. Very comfortable
-

Please indicate the level of support for school nutrition programs on a scale from 1 to 10 with 1 being no support and 10 being complete support in your division from the following stakeholders:

	1	2	3	4	5	6	7	8	9	10
Superintendent	<input type="radio"/>									
Principals and other administrators	<input type="radio"/>									
Teachers	<input type="radio"/>									
Cafeteria Staff	<input type="radio"/>									
Parents	<input type="radio"/>									
Community members	<input type="radio"/>									

How much can you...

	1. Nothing	2. Very little	3. Some	4. Quite a bit	5. A great deal
Influence the decisions that are made in your division?	<input type="radio"/>				
Do to get the materials and equipment you need to implement school nutrition programming in your division?	<input type="radio"/>				
Do to get parents to become involved in school nutrition programs in your division?	<input type="radio"/>				
Do to get community groups and stakeholders involved in school nutrition programs in your division?	<input type="radio"/>				
Do to enhance collaboration in your school(s) to make school nutrition program run effectively?	<input type="radio"/>				
Help teachers, administrators, and staff with the skills necessary for implementing school nutrition programs in your division?	<input type="radio"/>				
Do to get teachers, administrators, and staff to follow rules and regulations for implementing school nutrition programs in your division?	<input type="radio"/>				
Do to motivate teachers, administrators, and staff who show low interest in implementing school nutrition programs in your division?	<input type="radio"/>				

Please indicate your agreement with the following statements.
 After attending the Roadmap to Farm to School session, I...

	1. Strongly disagree	2. Disagree	3. Neither agree nor disagree	4. Agree	5. Strongly agree
Have the necessary resources to find farmers in my region	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Understand the informal and formal bid processes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have set local procurement goals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have drafted language for my own procurement goals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

After attending the Roadmap to Farm to School session, how likely is it that you will implement a farm to school program in your division in the 2018-2019 school year?

- 1. Not likely
- 2. Somewhat unlikely
- 3. Neutral
- 4. Somewhat likely
- 5. Very likely

Please use the comment box to provide any feedback on the Roadmap to Farm to School session, including what went well and what could be improved.

Please indicate your agreement with the following statements.
 After attending the Nutrition & Physical Activity Promotion session, I...

	1. Strongly disagree	2. Disagree	3. Neither agree nor disagree	4. Agree	5. Strongly agree
Understand the importance of nutrition education and physical activity promotion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Am able to identify motivators of target audiences	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Am confident in my ability to craft a pitch to sell nutrition and physical activity promotion activities in my division	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

After attending the Nutrition & Physical Activity Promotion session, how likely is it that you will implement nutrition and physical activity promotion activities in your division in the 2018-2019 school year?

- 1. Not likely
- 2. Somewhat unlikely
- 3. Neutral
- 4. Somewhat likely
- 5. Very likely

Please use the comment box to provide any feedback on the Nutrition & Physical Activity Promotion session, including what went well and what could be improved.

Please indicate your agreement with the following statements.
 After attending the Community Outreach and Engagement module, I...

	1. Strongly disagree	2. Disagree	3. Neither agree nor disagree	4. Agree	5. Strongly agree
Am able to define community engagement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Am able to list 2-4 specific ways that working with community partners can enhance or improve nutrition programs in my division	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Am able to identify at least 8-10 stakeholders or community members who I should engage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have an engagement plan for at least one stakeholder	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Am comfortable adapting a nutrition education message for different stakeholders	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



After attending the Community Outreach and Engagement module, how likely is it that you will start new efforts to engage community stakeholders in school nutrition efforts in the 2018-2019 school year?

- 1. Not likely
- 2. Somewhat unlikely
- 3. Neutral
- 4. Somewhat likely
- 5. Very likely

Please use the comment box to provide any feedback on the Community Outreach and Engagement module, including what went well and what could be improved.

Please indicate your agreement with the following statements.
 After attending the Menu Planning & Development session, I...

	1. Strongly disagree	2. Disagree	3. Neither agree nor disagree	4. Agree	5. Strongly agree
Understand the importance and value of strategic menu planning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Am able to plan for unexpected menu issues	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

After attending the Menu Planning & Development session, how likely is it that you will improve the menu plans for your division in the 2018-2019 school year?

- 1. Not likely
- 2. Somewhat unlikely
- 3. Neutral
- 4. Somewhat likely
- 5. Very likely

Please use the comment box to provide any feedback on the Menu Planning & Development session, including what went well and what could be improved.

Please indicate your agreement with the following statements.
After attending the Culinary Skills session, I...

	1. Strongly disagree	2. Disagree	3. Neither agree nor disagree	4. Agree	5. Strongly agree
Can identify the elements of taste	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Am beginning to explore how to combine tastes to build flavor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

After attending the Culinary Skills session, how likely is it that you will implement a culinary skills training program for the cafeteria staff in your division in the 2018-2019 school year?

- 1. Not likely
- 2. Somewhat unlikely
- 3. Neutral
- 4. Somewhat likely
- 5. Very likely



Please use the comment box to provide any feedback on the Culinary Skills session, including what went well and what could be improved.



Please indicate your agreement with the following statements.
 After attending the Strategic Planning session, I...

	1. Strongly disagree	2. Disagree	3. Neither agree nor disagree	4. Agree	5. Strongly agree
Can identify one or more areas of opportunity for enhancing school nutrition programs in my division	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Can create SMART goals and objectives aimed at enhancing school nutrition programs in my division	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have developed a plan/strategy for attaining my goals and meeting my objectives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have determined the resources necessary to attain my goals and meet my objectives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

After attending the Strategic Planning session, how likely is it that you will implement strategic planning activities to enhance school nutrition programs in your division in the 2018-2019 school year?

- 1. Not likely
- 2. Somewhat unlikely
- 3. Neutral
- 4. Somewhat likely
- 5. Very likely

Please use the comment box to provide any feedback on the Strategic Planning session, including what went well and what could be improved.

Thank you for your time.

APPENDIX C: Team Nutrition Fall 2019 Training Pre-Survey

Please take 10-20 minutes to complete the following survey. We will use the information you provide to evaluate our Team Nutrition Fall training.

Please provide the following information:

First and Last Name:

Title/Position:

School division or education center:

Region:

Number of schools in your division:

Number of years in current position:

Number of total years serving as a school nutrition director, if applicable:

Did you attend the 2-day Team Nutrition training workshop in June 2018?

Yes

No

If yes, please check the area(s) in which you have implemented strategies to improve school nutrition programs in your division. (check all that apply)

Farm to School

Menu Planning and Development

Culinary Skills

Nutrition Education and Physical Activity Promotion

Community Outreach and Engagement

I have not implemented any strategies in these areas.

If you checked one or more of the areas listed above, please describe the strategies you have implemented in your division in each area:

Farm to School:

Menu Planning and Development:

Culinary Skills:

Nutrition Education and Physical Activity Promotion:

Community Outreach and Engagement:

Have you watched any of the Team Nutrition eModules (i.e. online videos)?

- Yes
- No

If yes, which ones?

- Procurement 101: Developing Written Procurement Procedures
- Procurement Profiles: Sharing Your School Nutrition Vision
- Data-Driven Decision Making with Key Performance Indicators
- Financial Management: Mastering the SNP Financial Report

Would you be interested in additional eModule/online training opportunities?

- Yes
- No

Please indicate the level of support for school nutrition programs in your division on a scale from 1 to 10, with 1 being no support and 10 being complete support from the following stakeholders:

	1	2	3	4	5	6	7	8	9	10
Superintendent	<input type="radio"/>									
Principals and other administrators	<input type="radio"/>									
Teachers	<input type="radio"/>									
Cafeteria staff	<input type="radio"/>									
Parents	<input type="radio"/>									
Community members	<input type="radio"/>									

How much can you...

	1. Nothing	2. Very little	3. Some	4. Quite a bit	5. A great deal
Influence the decisions that are made in your division?	<input type="radio"/>				
Do to get the materials and equipment you need to implement school nutrition programming in your division?	<input type="radio"/>				
Do to get parents to become involved in school nutrition programs in your division?	<input type="radio"/>				
Do to get community groups and stakeholders involved in school nutrition programs in your division?	<input type="radio"/>				
Do to enhance collaboration in your division to make school nutrition programs run effectively?	<input type="radio"/>				
Help teachers, administrators, and staff with the skills necessary for implementing school nutrition programs in your division?	<input type="radio"/>				
Do to get teachers, administrators, and staff to follow rules and regulations for implementing school nutrition programs in your division?	<input type="radio"/>				
Do to motivate teachers, administrators, and staff who show low interest in implementing school nutrition programs in your division?	<input type="radio"/>				

Currently, how likely is it that you will implement a Farm to School initiative/program in your division during the 2019-2020 school year?

- 1. Not likely
- 2. Somewhat unlikely
- 3. Neutral
- 4. Somewhat likely
- 5. Very likely

How confident are you that you can develop a solicitation for the Farm to School/local food procurement process?

- 1. Not at all confident
- 2. A little confident
- 3. Somewhat confident
- 4. Quite a bit confident
- 5. Extremely confident

Currently, how likely is it that you will implement the Virginia Harvest of the Month program in your division during the 2019-2020 school year?

- 1. Not likely
- 2. Somewhat unlikely
- 3. Neutral
- 4. Somewhat likely
- 5. Very likely

How confident are you that you can develop a Procurement Profile?

- 1. Not at all confident
- 2. A little confident
- 3. Somewhat confident
- 4. Quite a bit confident
- 5. Extremely confident

How confident are you in accurately completing the SNP Financial Report?

- 1. Not at all confident
- 2. A little confident
- 3. Somewhat confident
- 4. Quite a bit confident
- 5. Extremely confident

How confident are you in making data-driven decisions using key performance indicators (KPIs)?

- 1. Not at all confident
- 2. A little confident
- 3. Somewhat confident
- 4. Quite a bit confident
- 5. Extremely confident

Thank you for your time.

APPENDIX D: Team Nutrition Fall 2019 Training Post Survey

Thank you for attending the Team Nutrition Fall training. Please take 10-20 minutes to complete the following survey. We will use this information to guide the development of future training opportunities and evaluate the Team Nutrition Training Program.

Please provide the following information:

- First and Last Name:
- Title/Position:
- School division or education center:
- Region:
- Number of schools in your division:
- Number of years in current position:
- Number of total years serving as a school nutrition director, if applicable:

Please indicate the level of support for school nutrition programs in your division on a scale from 1 to 10, with 1 being no support and 10 being complete support from the following stakeholders:

	1	2	3	4	5	6	7	8	9	10
Superintendent	<input type="radio"/>									
Principals and other administrators	<input type="radio"/>									
Teachers	<input type="radio"/>									
Cafeteria staff	<input type="radio"/>									
Parents	<input type="radio"/>									
Community members	<input type="radio"/>									

How much can you...

	1. Nothing	2. Very little	3. Some	4. Quite a bit	5. A great deal
Influence the decisions that are made in your division?	<input type="radio"/>				
Do to get the materials and equipment you need to implement school nutrition programming in your division?	<input type="radio"/>				
Do to get parents to become involved in school nutrition programs in your division?	<input type="radio"/>				
Do to get community groups and stakeholders involved in school nutrition programs in your division?	<input type="radio"/>				
Do to enhance collaboration in your school(s) to make school nutrition programs run effectively?	<input type="radio"/>				
Help teachers, administrators, and staff with the skills necessary for implementing school nutrition programs in your division?	<input type="radio"/>				
Do to get teachers, administrators, and staff to follow rules and regulations for implementing school nutrition programs in your division?	<input type="radio"/>				
Do to motivate teachers, administrators, and staff who show low interest in implementing school nutrition programs in your division?	<input type="radio"/>				

After attending Day 1 of the Fall Regional Meeting, how likely is it that you will implement a Farm to School program in your division during the 2019-2020 school year?

- 1. Not likely
- 2. Somewhat unlikely
- 3. Neutral
- 4. Somewhat likely
- 5. Very likely

How confident are you that you can develop a solicitation for the Farm to School/local food procurement process?

- 1. Not at all confident
- 2. A little confident
- 3. Somewhat confident
- 4. Quite a bit confident
- 5. Extremely confident

Please provide feedback on the Procurement 101 (written procurement procedures) segment of the Fall Regional Meeting:

Currently, how likely is it that you will implement the Virginia Harvest of the Month program in your division during the 2019-2020 school year?

- 1. Not likely
- 2. Somewhat unlikely
- 3. Neutral
- 4. Somewhat likely
- 5. Very likely

Please provide feedback on the Virginia Harvest of the Month segment of the Fall Regional Meeting:

How confident are you that you can develop a Procurement Profile?

- 1. Not at all confident
- 2. A little confident
- 3. Somewhat confident
- 4. Quite a bit confident
- 5. Extremely confident

Please provide feedback on the Procurement Profile segment of the Fall Regional Meeting:

How confident are you in accurately completing the SNP Financial Report?

- 1. Not at all confident
- 2. A little confident
- 3. Somewhat confident
- 4. Quite a bit confident
- 5. Extremely confident

Please provide feedback on the Financial Management (i.e. SNP Financial Report) segment of the Fall Regional Meeting:

How confident are you in making data-driven decisions using key performance indicators (KPIs)?

- 1. Not at all confident
- 2. A little confident
- 3. Somewhat confident
- 4. Quite a bit confident
- 5. Extremely confident

Please provide feedback on the Data-Driven Decision Making with Key Performance Indicators Segment of the Fall Regional Meeting:

Please indicate your agreement with the following statements.

After attending the Strategic Planning segment of the Fall Regional Meeting, I...

	1. Strongly disagree	2. Disagree	3. Neither agree nor disagree	4. Agree	5. Strongly agree
Can identify one or more areas of opportunity for enhancing school nutrition programs in my division	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Can create SMART goals and objectives aimed at enhancing school nutrition programs in my division	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have developed a plan/strategy for attaining my goals and meeting my objectives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have determined the resources necessary to attain my goals and meet my objectives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

After attending the Strategic Planning segment, how likely is it that you will implement the program(s)/initiative(s) included in your strategic plan to enhance school nutrition programs in your division during the 2019-2020 school year?

- 1. Not likely
- 2. Somewhat unlikely
- 3. Neutral
- 4. Somewhat likely
- 5. Very likely

Please provide feedback on the Strategic Planning segment:

Thank you for your time.

APPENDIX E: Team Nutrition Quarterly Check-in Survey

The following survey is for use by regional specialists when performing quarterly check-ins with school nutrition directors. The purpose of these check-ins is to determine school nutrition directors' progress in implementing and/or improving school nutrition programs in their district. This checklist will help you to track their progress over time.

Before contacting a school nutrition director, be sure to review their strategic plan and provide an overview of that plan at the beginning of the check-in.

Quarter__ Year__

Quarter 1: July – September

Quarter 2: October – December

Quarter 3: January – March

Quarter 4: April - June

School nutrition director information:

Name:

School division or education center:

Region:

Number of schools in your district:

Number of years in current position:

Number of total years serving as a school nutrition director:

Are you currently or have you implemented efforts to improve school nutrition programs in your division?

Yes

No

Which efforts?

- Farm to School
- Nutrition education and/or physical activity promotion
- Community engagement in school nutrition programs
- School menus
- Culinary skills training
- Other, please describe:

Are these efforts (i.e. goals and objectives) from the strategic plan developed during the 2018 Team Nutrition Training?

- Yes
- No

If no, why did you switch efforts?

What progress have you made in your efforts to improve your school nutrition programs (i.e. reaching your goals and objectives)?

Have you expanded your efforts or have they remained consistent with your strategic plan?

- Expanded
- Remained the same

If expanded, what motivated you to expand?

What barriers have you experienced?

What else can we do to support you?

How comfortable are you with using social media to plan, promote, and enhance school nutrition programs in your division?

- 1. Very uncomfortable
 - 2. Uncomfortable
 - 3. Not sure
 - 4. Comfortable
 - 5. Very comfortable
-

Please indicate the level of support for school nutrition programs on a scale from 1 to 10, with 1 being no support and 10 being complete support, in your division from the following stakeholders:

	1	2	3	4	5	6	7	8	9	10
Superintendent	<input type="radio"/>									
Principals and other administrators	<input type="radio"/>									
Teachers	<input type="radio"/>									
Cafeteria staff	<input type="radio"/>									
Parents	<input type="radio"/>									
Community members	<input type="radio"/>									

How much can you...	1. Nothing	2. Very little	3. Some	4. Quite a bit	5. A great deal
Influence the decisions that are made in your division?	<input type="radio"/>				
Do to get the materials and equipment you need to implement school nutrition programming in your division?	<input type="radio"/>				
Do to get parents to become involved in school nutrition programs in your division?	<input type="radio"/>				
Do to get community groups and stakeholders involved in school nutrition programs in your division?	<input type="radio"/>				
Do to enhance collaboration in your division to make school nutrition program run effectively?	<input type="radio"/>				
Help teachers, administrators, and staff with the skills necessary for implementing school nutrition programs in your division?	<input type="radio"/>				
Do to get teachers, administrators, and staff to follow rules and regulations for implementing school nutrition programs in your division?	<input type="radio"/>				
Do to motivate teachers, administrators, and staff who show low interest in implementing school nutrition programs in your division?	<input type="radio"/>				

Can researchers at Virginia Tech use the information you are providing for research purposes? Your answer will not impact your performance evaluation in any way. All information will be kept confidential.

Yes

No

Thank you for your time.

APPEDIX F: The Smarter Lunchroom Scorecard



Date _____ School Name _____ Completed by _____

The Smarter Lunchrooms Scorecard is a list of simple, no-cost or low-cost strategies that can increase participation, reduce food waste, and increase selection and consumption of healthy school food.

INSTRUCTIONS

1. Review the scorecard before beginning.
2. Observe a lunch period. Check off statements that reflect the lunchroom.
3. Ask other school nutrition staff, teachers, or administration about items that have an asterisk.*
4. Tally the score.
5. Discuss the results with stakeholders. Choose unchecked strategies to implement in the lunchroom.



SmarterLunchrooms.org

FOCUS ON FRUIT

- At least two kinds of fruit are offered.
- Sliced or cut fruit is offered.
- A variety of mixed whole fruits are displayed in attractive bowls or baskets (instead of stainless steel pans).
- Fruit is offered in at least two locations on all service lines, one of which is right before each point of sale.
- At least one fruit is identified as the featured fruit-of-the-day and is labeled with a creative, descriptive name at the point of selection.
- A fruit taste test is offered at least once a year.*

Focus on Fruit Subtotal _____ of 6

VARY THE VEGETABLES

- At least two kinds of vegetables are offered.
- Vegetables are offered on all service lines.
- Both hot and cold vegetables are offered.
- When cut, raw vegetables are offered, they are paired with a low-fat dip such as ranch, hummus, or salsa.*
- A serving of vegetables is incorporated into an entrée item at least once a month (e.g., beef and broccoli bowl, spaghetti, black bean burrito).*
- Self-serve spices and seasonings are available for students to add flavor to vegetables.
- At least one vegetable is identified as the featured vegetable-of-the-day and is labeled with a creative, descriptive name at the point of selection.
- A vegetable taste test is offered at least once a year.*



Vary the Vegetables Subtotal _____ of 8

HIGHLIGHT THE SALAD

- Pre-packaged salads or a salad bar is available to all students.
- Pre-packaged salads or a salad bar is in a high traffic area.
- Self-serve salad bar tongs, scoops, and containers are larger for vegetables and smaller for croutons, dressing, and other non-produce items.
- Pre-packaged salads or salad bar choices are labeled with creative, descriptive names and displayed next to each choice.

Highlight the Salad Subtotal _____ of 4

MOVE MORE WHITE MILK

- Milk cases/coolers are kept full throughout meal service.
- White milk is offered in all beverage coolers.
- White milk is organized and represents at least 1/3 of all milk in each designated milk cooler.
- White milk is displayed in front of other beverages in all coolers.
- 1% or non-fat white milk is identified as the featured milk and is labeled with a creative, descriptive name.



Move More White Milk Subtotal _____ of 5

BOOST REIMBURSABLE MEALS

- Cafeteria staff politely prompt students who do not have a full reimbursable meal to select a fruit or vegetable.
- One entrée is identified as the featured entrée-of-the-day, is labeled with a creative name next to the point of selection, and is the first entrée offered.
- Creative, descriptive names are used for featured items on the monthly menu.
- One reimbursable meal is identified as the featured combo meal and is labeled with a creative name.
- The combo meal of the day or featured entrée-of-the-day is displayed on a sample tray or photograph.
- A (reimbursable) combo meal is offered as a grab-and-go meal.
- Signs show students how to make a reimbursable meal on any service line (e.g., a sign that says "Add a milk, fruit and carrots to your pizza for the Power Pizza Meal Deal!").
- Students can pre-order lunch in the morning or day before.*
- Students must use cash to purchase à la carte snack items if available.
- Students have to ask a food service worker to select à la carte snack items if available.*
- Students are offered a taste test of a new entrée at least once a year.*

Reimbursable Meals Subtotal _____ of 11

LUNCHROOM ATMOSPHERE

- Cafeteria staff smile and greet students upon entering the service line and throughout meal service.
- Attractive, healthful food posters are displayed in dining and service areas.
- A menu board with today's featured meal options with creative names is readable from 5 feet away when approaching the service area.
- The lunchroom is branded and decorated in a way that reflects the student body.
- Cleaning supplies or broken/unused equipment are not visible during meal service.
- All lights in the dining and meal service areas work and are turned on.
- Compost/recycling and trash cans are at least 5 feet away from dining students.
- There is a clear traffic pattern. Signs, floor decals, or rope lines are used when appropriate.
- Trash cans are emptied when full.
- A menu board with tomorrow's featured meal with creative names is readable from 5 feet away in the service or dining area.

Lunchroom Atmosphere Subtotal _____ of 10

STUDENT INVOLVEMENT

- Student artwork is displayed in the service area or dining space.
- Students, teachers, or administrators announce today's menu in daily announcements.*
- Students are involved in the development of creative and descriptive names for menu items.*
- Students have the opportunity to volunteer in the lunchroom.
- Students are involved in the creation of artwork or marketing materials to promote menu items.*
- Students provide feedback (informal - "raise your hand if you like..." or formal - focus groups, surveys) to inform menu development.*

Student Involvement Subtotal _____ of 6

SCHOOL COMMUNITY INVOLVEMENT

- A monthly menu is posted in the main office.
- A menu board with creative, descriptive names for today's featured meal options is located in the main office.
- A monthly menu is provided to students, families, teachers, and administrators.*
- Information about the benefits of school meals is provided to teachers and administration at least annually.*
- Nutrition education is incorporated into the school day.*
- Students are engaged in growing food (for example, gardening, seed planting, farm tours, etc.).*
- Elementary schools provide recess before lunch.*
- The school participates in other food promotion programs such as: Farm to School, Chefs Move to Schools, Fuel Up to Play 60, Share our Strength, etc.*
- The school has applied for the HealthierUS School Challenge.*
- Smarter Lunchrooms strategies are included in the Local School Wellness Policy.*

School Involvement Subtotal _____ of 10

SMARTER LUNCHROOMS SCORECARD TOTAL

Focus on Fruit	_____	of 6
Vary the Vegetables	_____	of 8
Highlight the Salad	_____	of 4
Move More White Milk	_____	of 5
Reimbursable Meals	_____	of 11
Lunchroom Atmosphere	_____	of 10
Student Involvement	_____	of 6
School Involvement	_____	of 10

Scorecard Total _____ of 60

AWARD LEVEL

-  **Bronze 15-25**
Great job! This lunchroom is off to a strong start.
-  **Silver 26-45**
Excellent. Think of all the kids that are inspired to eat healthier!
-  **Gold 46-60**
This lunchroom is making the most of the Smarter Lunchroom Movement. Keep reaching for the top!

For Scorecard FAQs visit:
SmarterLunchrooms.org

The asterisk * indicates items that may need input from other school nutrition staff, teachers, or administration.

Smarter Lunchrooms Scorecard 2.0

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DEFINITIONS

Point of Sale (POS): Anywhere students leave the line with food and are charged or counted, such as at a register, check-out, or PIN pad
Point of Selection: Anywhere students select food or drink
Service Line: A designated line for meal selection—deli bar, salad bar, hot lunch line, snack window, etc.

Grab-and-Go: A pre-packaged reimbursable meal
Reimbursable Meal/Combo Meal: Any meal that meets all the USDA meal requirements and is priced as a unit
Featured Items: A fruit, vegetable, milk, or entrée that has been identified for promotion

APPENDIX G: The CDC School Health Index Questions

N.1 Essential topics on healthy eating

Does your health education curriculum address all of these essential topics on healthy eating?

- The relationship between healthy eating and personal health and disease prevention
- Food guidance from MyPlate
- Reading and using food labels
- Eating a variety of foods every day
- Balancing food intake and physical activity
- Eating more fruits, vegetables and whole grain products
- Choosing foods that are low in saturated fat and cholesterol and do not contain trans fat
- Choosing foods and beverages with little added sugars
- Eating more calcium-rich foods
- Preparing healthy meals and snacks
- Risks of unhealthy weight control practices
- Accepting body size differences
- Food safety
- Importance of water consumption
- Importance of eating breakfast
- Making healthy choices when eating at restaurants
- Social influences on healthy eating, including media, family, peers, and culture
- How to find valid information or services related to nutrition and dietary behavior
- How to take steps to achieve the personal goal to eat healthfully
- Resisting peer pressure related to unhealthy dietary behavior
- Influencing, supporting, or advocating for others' healthy dietary behavior

3 = Yes, addresses **all** of these topics.

2 = Addresses **most** of these topics. (>14)

1 = Addresses **some** of these topics.

0 = Addresses **one or none** of these topics, **or** there is no health education curriculum

N.1 Student and family involvement in the school meal programs and other foods and beverages sold, served and offered on school campus.

Do students and family members have opportunities to provide both *suggestions* for **school meals** and other foods and beverages sold, served and offered on **school campus** and *feedback* on the meal programs and other foods and beverages sold, served and offered on **school campus**?

3 = Yes, **both** students and family members have opportunities to provide suggestions and feedback.

2 = Yes, **both** students and family members have opportunities to provide **either** suggestions for school meals or feedback on the meal program.

1 = **Either** students or family members have opportunities, **but** not both.

0 = **Neither** students nor family members have these opportunities.