

MyPlate Food Model and Family Grocery Shopping with Second and Third Graders are Significant Interventions for the Development of Interactive Health Literacy Skills

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Abstract

A school-based nutrition education intervention was implemented with second and third graders who used their functional health literacy skills of reading, writing, and speaking to learn about the MyPlate food model from the United States Department of Agriculture. The pretest-posttest intervention determined if children had ever seen the MyPlate food picture and if children participated in grocery shopping and meal making events with their family at home. Interactive health literacy accounted for the conversations that children had with their teachers about food and nutrition when learning about the MyPlate food model and when preparing three recipes over three days in the school classroom. Interactive health literacy strategies also included children's ability to interact and learn about the MyPlate food model as a valid and reliable print and electronic material associated with meal planning. Implications and guidelines for teachers and parents are discussed for advancing the need for and understanding of functional and interactive health literacy for elementary children in the United States.

Keywords:

Myplate Food Model, Functional Health Literacy, Interactive Health Literacy, Family Grocery Shopping, Meal Making

Introduction

Health literacy is considered a cognitive and functional term (Baek et al., 2019), and a skill that can be practiced in preK-12 school health education in a developmentally appropriate way (National Consensus for School Health Education, 2022). Historically, the concept of health literacy has included a focus on the functional literacy skills of reading and writing as ways to determine improved health status (Morrison et al., 2019) with more recent interests in health literacy as a social practice (Samerski, 2019; Pitt et al., 2019). Health literacy is also known to have a social gradient that ties the concept of health literacy to the social determinants of health (Tamayo-Fonseca et al., 2023; Felter & Ubbes, 2023). In global contexts, one of the social



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determinants of health is education. Lastrucci and colleagues (2019) found that functional health literacy mediated 19% of the association between education and self-reported health, and functional health literacy mediated 13% of the relationship between financial status and self-reported health. Interactive health literacy was not addressed.

Across all academic disciplines, reading and writing are related to thinking (Pearson & Tierney, 1984; Staton-Spicer & Wulff, 1984). Writing is the action of expressing ideas, opinions, and views in printed or written communication (Gerde et al., 2012). Reading is useful in accumulating curriculum knowledge in the form of facts, topics, and skills (Ubbes, 2002) through receptive language (Webb, 2013, p. 346), whereas writing is useful in “putting knowledge and personal ideas to work” (Wang & Wang, 2012, p. 40) through expressive language (Brannon & Dauksas, 2014). For example, the writing of grocery lists and recipes is an expressive language that can help with memory recall and reading comprehension about food and nutrition. Children build background knowledge in a health-related topic like nutrition (i.e., domain knowledge) as they read and develop an ability to make inferences when decoding the meaning of words, symbols, and gestures from print and electronic materials. When thinking and learning alone and especially when thinking and talking with others, children learn to put their own thoughts into words, symbols, and gestures during an encoding process which is foundational to functional literacy. When functional literacy skills and processes are practiced by children while also learning about health information, functional health literacy emerges (Ubbes, 2023). When the health information is verified through an interactive process with significant others while using valid and reliable materials, interactive health literacy will also develop (National Consensus for School Health Education, 2022).

Health literacy activities for nutrition include reading recipes, reading food labels, writing and talking about grocery lists, reading and talking during grocery shopping, talking and reading recipes during meal making, and talking and eating meals in social interactions. Such nutrition-related activities are examples of functional health literacy because people are reading, writing, and speaking about health (Ubbes et al., 2023). As such, nutrition-related activities like those named above could also be called health literacy events (Rumenapp et al., 2023). Health literacy events are opportunities when individuals transform their health-related knowledge into practice (Rumenapp et al., 2023). Health literacy events give individuals opportunities to demonstrate their functional health literacy skills which serve as developmental precursors to health habits and routines (Ubbes, 2023). Health literacy events can also

help people to develop their interactive health literacy skills when participating in food-related conversations in social settings. Interactive health literacy increases when the context requires people to use literacy skills to access and act on print and electronic information when making decisions about health (Pitt et al., 2019).

In school health education, elementary children have the potential to build their interactive health literacy skills by learning about the MyPlate food model based on the 2020-2025 Dietary Guidelines for Americans (United States Department of Agriculture, 2020). When students interact with valid and reliable health information from a governmental agency to demonstrate their health literacy skills, they will also learn nutrition guidelines and practice the skills of decision making and goal setting for improved nutrition. Support from parents and teachers is necessary so children can scaffold their growing understanding of the MyPlate food model. When students demonstrate the ability to access valid information, products, and services to enhance health, they meet a health education curriculum standard called health literacy (National Consensus for School Health Education, 2022). Students who practice the MyPlate application in school health education class (<https://www.choosemyplate.gov/node/5760>) can also advocate for nutrition guidelines at home by showing their parents, caregivers, and siblings how to keep track of food groups from printed documents and digital devices as a form of interactive health literacy.

Communicating about common goals for healthy eating in a family helps to establish social and cultural norms that can build nutrition and health habits for a lifetime. Prior to going to the grocery store, families can use the MyPlate application on their digital devices to negotiate what foods will be purchased and which foods will not be purchased when shopping. From 1992 to 2011, an older Food Pyramid model was promoted by the United States Department of Agriculture (USDA) until research showed that only 16% of Americans ate their meals in alignment with the Food Pyramid guidelines (Neuhauser et al., 2007). People reported that the serving sizes of the MyPyramid was confusing, and the model did not define or categorize some cultural foods. When the MyPyramid food model was replaced with the MyPlate food model in 2011 (Schwartz & Vernarelli, 2019), a serving plate was incorporated as a meal template to guide the amount of each food group to eat for breakfast, lunch, and dinner. As such, the MyPlate food model became a less confusing, simple visual for people of all literacy levels to use and understand. Evidence from a nationally representative sample indicated that subjects who reported using the MyPlate or MyPyramid plans made significantly healthier food choices than subjects who did not use the plans – even after adjusting for age,

sex, race or ethnicity, education, household size, family income, smoking status, beverage energy density, and physical activity (Schwartz & Vernarelli, 2019).

The three purposes of our nutrition intervention with second and third graders was 1) to educate children about the MyPlate food model from the United States Department of Agriculture using interactive health literacy practices; 2) to describe ways that children can practice interactive health literacy when grocery shopping with their family; and 3) to determine if student involvement in classroom meal making increased home meal making events with their family. As such, students were asked three main curricular questions to guide the pretest-posttest intervention: 1) Have you ever seen the MyPlate food picture? 2) Do you go grocery shopping with your family? and 3) Do you cook and prepare meals with your family?

Methods and Materials

Participants in the study included children (N = 126) from three elementary schools within one school district in the midwestern United States. Two of the elementary schools had second grade students participate, and one elementary school had third grade students participate.

The procedures for the current study were to assess students on their nutrition knowledge after a three-hour intervention with guest nutrition educators (n = 15) who were concurrently enrolled in a nutrition course at the local university. Classroom instruction at the elementary schools was led by a faculty member from the university, who was a registered dietitian and instructor of a senior-level nutrition course. The instructor contacted the local school district for the possibility of offering nutrition education in three of the district's elementary schools. Access to the classroom was approved by the district-level school health coordinator and the principals of each elementary school.

The registered dietitian involved her university students as co-instructors (n = 15) during the classroom lessons which were organized and implemented over three days. The three elementary teachers remained in their respective classrooms during the nutrition lessons that were led by the guest nutrition educators. The guest instructors were introduced to the children before sharing the purpose of the nutrition lessons. The learning process included the following methods and materials:

1. A pre-test was given to the children before any nutrition content was shared.
2. Instruction about the MyPlate food model began by the drawing of a MyPlate diagram on the white board and asking students what food groups made up the MyPlate.

Each child then selected a three-dimensional plastic food model from the food model box.

Students approached the whiteboard with their plastic food model and then wrote the name of their selected food where it belonged in the MyPlate diagram. If they needed guidance, other students in the class offered to help them. In some classes, one or two children were chosen to write all the food names on the whiteboard while other children in the class identified, named, and placed the food into the MyPlate diagram. Sometimes the classroom teacher suggested which students had good penmanship and spelling to write information on the board and sometimes the guest nutrition educators assisted in writing content on the board with oral responses from the students.

3. The closing activity consisted of each student making a snack called yogonana which contained rice cereal, yogurt, and bananas. While children ate the yogonanas, students identified and named the food items included in the snack and then sorted and categorized each ingredient into a food group on the MyPlate diagram. During the closing discussion of Day 1, students wrote down which foods they ate for breakfast that day. Students were also encouraged to make the Yogonanas with their family at home.

4. On the opening discussion of Day 2, students were asked who made the yogonana food at home with a family member, followed by a review of which food groups made up the yogonana. Only three to four children from each classroom made the snack at home.

Students were asked again what they ate for breakfast and the name of their favorite breakfast foods. Students then categorized their breakfast foods into different food groups on the MyPlate diagram.

5. Students made another snack, which included a tortilla (grain), cheese (dairy), turkey (protein), and vegetables. A rap-music competition followed the snack activity, which involved small groups of students creating lyrics for a rap song about the tortilla snack and the food groups.

6. The concluding activity was a spelling game called "Sparkle" for which students sat in a large circle to be tested on twenty nutrition vocabulary words that had been introduced during the lesson. "Sparkle" began when a vocabulary word was given to the class to spell one letter at a time. The first student in the circle said the first letter of the vocabulary word, then the next student said the second letter of the vocabulary word until the word was completely spelled out by students in the circle. When the vocabulary word was completely spelled out, the next student in the circle shouted the word "Sparkle" to indicate the completed word. If the next student failed to recognize that the word was completed and did not say "Sparkle", that student was determined "out" and was asked to step away from the circle to join any students who misspelled a letter earlier in the game.

7. On Day 3 of the nutrition lessons, a written posttest was given to students with the same three questions as the pretest.

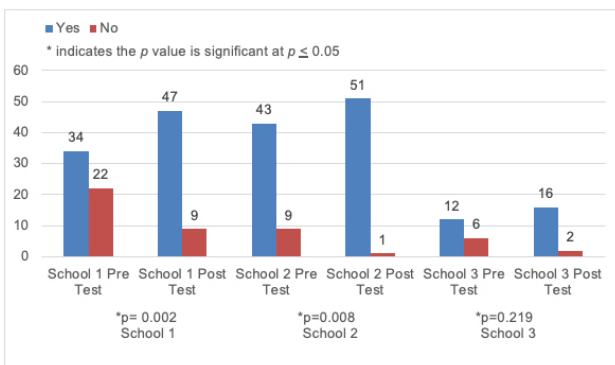
8. The third lesson concluded with students making a snack containing three food groups. The four dips and sauces included: a vanilla yogurt dip served with bananas, apples, and grapes (dairy and fruit); a honey mustard dip with pretzels (grain); buttermilk ranch dip with carrots (dairy and vegetables); and a pizza sauce with mozzarella sticks (vegetables and dairy). Students were encouraged to share the dip recipes with their family at home.

Results

Data analyses were completed using SPSS 25.0 (SPSS, Inc., Chicago, IL). Descriptive statistics captured the means and percentages of the second and third grade students who recalled the MyPlate food picture, went grocery shopping with their family, and helped their family cook and prepare meals. Statistical significance was set at 95% or $p \leq 0.05$.

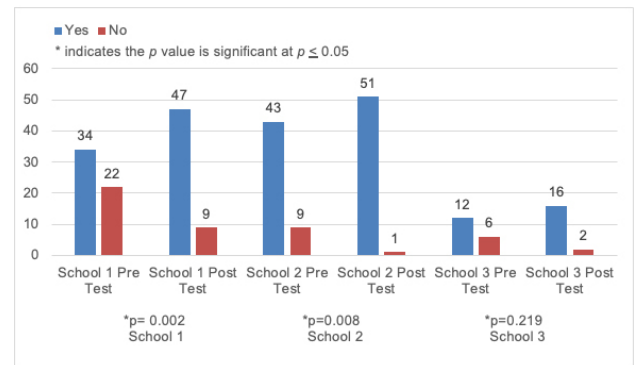
Results showed that the school-based nutrition lessons were effective in teaching the children about the different food groups as well as familiarizing them with the MyPlate model. For the first research question, "Have you ever seen the MyPlate food picture?", there was a significant increase ($p < 0.05$) in the number of children who saw the MyPlate food picture before ($n = 77$) and after ($n = 99$) the nutrition lessons in the classroom. Figure 1 shows statistically significant differences for children attending School 1 ($p = .002$) and School 2 ($p = .008$), but not for School 3 ($p = .219$).

Figure 1.
Have you ever seen the MyPlate food picture?



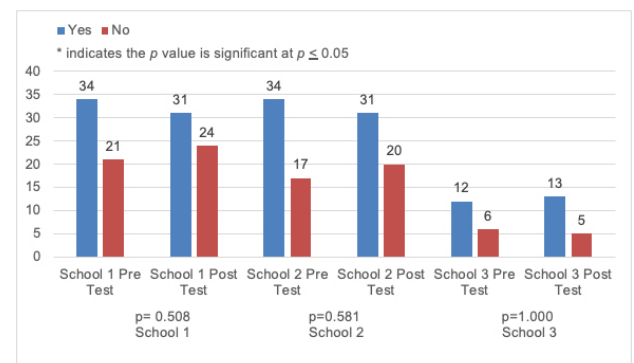
For the second research question, "Do you go grocery shopping with your family?", there was a significant increase ($p = 0.05$) in the number of children who did grocery shopping with their family before ($n = 82$) and after ($n = 97$) the nutrition lessons in the classroom. Figure 2 shows statistically significant differences for children attending School 1 ($p = .0001$), but not for School 2 ($p = .219$) or School 3 ($p = 1.0$).

Figure 2.
Do you go grocery shopping with your family?



For the third research question, "Do you cook and prepare meals with your family?", no significant results were found between the three elementary schools (Figure 3). On the combined totals for the three schools, 80 students said "yes" on the pretest and 74 students said "yes" on the posttest that they cook and prepare meals with their families. Hence, six fewer students said "yes" after the classroom intervention. For all three schools, 44 students said "no" on the pretest and 49 said "no" on the posttest that they did not cook and prepare meals with their family. Hence, five more students said "no" after the classroom intervention.

Figure 3.
Do you cook and prepare meals with your family?



Discussion

Literacy is a universal skill that allows people to acquire knowledge or understanding at a functional level in society (Mbanda et al., 2021). Health literacy emphasizes the need to also "access valid and reliable health information, products, and services" which is a more sophisticated ability (National Consensus for School Health Education, 2022) than literacy. Hence, functional health literacy is an ability to "function" when demonstrating the universal skills of reading, writing, and speaking in the context of health. Functional health literacy is foundational to interactive health literacy.

Similar when learning literacy skills, children benefit from social role models when learning health-related

skills. The value of social role models to demonstrate consistent eating behaviors and healthy habits (Bandura, 1986) can be beneficial whether the role models come from observations in person, in print, or in electronic materials. Health-literacy informed interventions (Morrison, 2019) that aim to strengthen children's self-efficacy beliefs when making healthy choices are crucial for forming nutrition habits (Bandura, 1986). Self-efficacy beliefs support children when taking action to eat foods from the MyPlate model. Hence, school-based nutrition lessons taught by competent teachers can help children to gain confidence in healthy eating. In schools, the hidden curriculum is strongly related to cultural and academic capital (McIntee et al, 2018, p. 16), so students who would not usually have exposure to an equitable nutrition experience can gain health knowledge, attitudes, and practices about nutrition through a federal guideline like the MyPlate food model. Visual learning in nutrition has been shown to increase food choices among kindergarten to grade five children in a structured grocery aisle setting with image-based labeling (Privitera et al, 2015). Visual textual learning is also promoted in children's cookbooks (Christensen & Wistoft, 2022), a curriculum of children's picture books about food and nutrition in different community settings (Ubbes & Spillman, 2000), and a vegetable liking survey of food and nutrition research with children (Ubbes, Killeen et al., 2023).

Our first research question was to investigate if there was a significant increase ($p < 0.05$) in the number of children who were able to recognize the MyPlate food picture before and after the nutrition intervention. Results indicate that classroom teachers should teach the MyPlate food model as one way for children to practice functional health literacy skills in second and third grade. By downloading and using the MyPlate app from the United States Department of Agriculture website, interactive health literacy can also be practiced. Interactive health literacy is defined as "interpersonal communication between people, including their interactive use of print and electronic materials for health enhancement" (Ubbes & Ausherman, 2018). By interacting with valid and reliable health information from the MyPlate app, children may be more motivated to learn about nutrition and practice the skill of decision making for improved nutrition. Since goals can energize and direct motivation (Schunk & DiBenedetto, 2021, p. 2), and goal setting is a "mental representation of what one is attempting to gain" (Schunk & DiBenedetto, 2021, p. 2), students can also practice goal setting with the MyPlate app. Students who learn about the MyPlate application at school (<https://www.choosemyplate.gov/node/5760>) can also serve as advocates for health in their home environments by showing their parents, caregivers, and siblings how to organize their meals and keep track of food group goals on printed

MyPlate food models or digital devices. The MyPlate food model is structured so that all food groups are consumed in moderation. Eating too much of one food group can be detrimental to one's health and cause adverse health effects (Miller et al, 2022). Because the MyPlate food model is designed with a specified amount for each food group, individuals can plan a balanced diet to improve their functional health and prevent disease.

In the United States, the Health Education Curriculum Analysis Tool (HECAT) is designed to help schools evaluate and improve their health education curricula for nine priority health topics, which includes food and nutrition (Centers for Disease Prevention and Control, 2024). Teachers could benefit greatly from the HECAT to ensure that nutrition and health are being taught, along with the MyPlate food model. Even though Crisman and colleagues (2020) found that teachers and principals lack knowledge about the MyPlate model, and are not required to use the MyPlate as part of their core curriculum due to limited curriculum time, valid and reliable health information is still needed for children and their families. Teachers could be encouraged by the current study, because the National Health Education Standards focus on student use of media (Standard 2) and student demonstration of health literacy (Standard 3) when learning about health (National Consensus for School Health Education, 2022). For example, Standard 3 focuses on students demonstrating "health literacy by accessing valid and reliable health information, products, and services to enhance health". By the end of second grade, teachers can help students meet several performance expectations for Standard 3 such as: 3.2.1 Use functional health literacy (e.g., reading, writing, and speaking) to access trustworthy health information to learn functional health knowledge; 3.2.3 Demonstrate interactive health literacy by talking with a trusted adult to obtain valid and reliable health information; 3.5.1 Use functional health literacy skills (e.g., reading, writing, and speaking) to access valid and reliable health information to learn about health behaviors; 3.5.5 Read a variety of print material (e.g., books, magazines, billboards) from valid and reliable health resources to develop functional health knowledge; and 3.5.6 Interpret visual and numerical representations (e.g., graphs, figures, tables, charts) to understand a health product; and 3.8.9 Access credible websites or health-related applications using technology to support health behaviors.

For our second research goal, there was a significant increase in the number of children who did grocery shopping with their family from the pretest to the posttest. This is a promising finding because the three nutrition lessons influenced the interactive health literacy skills of the children. Physical participation in grocery shopping and food preparation are often the

precursors to more elaborations in health-related talk and conversations. Oral and written language will help to reinforce literacy skills, build a food vocabulary, and refine word spelling (Leyva et al, 2012). According to a study, spelling is one of the most difficult aspects of writing for children in third and fourth grades (Harlin & Lipa, 1993, p. 292). Since writing is an expressive form of language development, making a grocery list from a recipe or from the MyPlate food model supports children's functional health knowledge about food and helps them to translate nutrition information into potential health behaviors. Since it is important to reinforce health concepts with multimodal approaches (Ubbes & Njoku, 2022), writing and then using a grocery list while shopping becomes what Rumenapp et al (2023) calls an interactive health literacy event. Based on the current research, we suggest that grocery shopping with a list and meal preparation from recipes are examples of interactive health literacy events, especially if there are opportunities for nutrition-related conversations.

According to Pettersson et al (2004), "... a public place such as the grocery store facilitates pedagogical situations and can work as a tool for informal education". When parents and children go grocery shopping together, there are numerous opportunities for interactive health literacy to occur, as well as opportunities for parents to model healthy food selections (Lively et al., 2017). According to Calderon and colleagues (2017), children initiate 70% of parent-child interactions while at the grocery store by using verbal communication, pointing gestures, grabbing an item, and carrying the food to the register themselves. Morrison et al (2019) have noted that 1 in 4 parents have low health literacy that affects their ability to use valid and reliable health information to make health decisions for their children. Thus, parents with low health literacy have a negative effect on their own nutrition knowledge and behaviors with potential challenges for their children's health. The term 'low health literacy' is defined as having a limited ability to read, write, and speak about health with interactive health literacy requiring a higher cognitive ability (Pawellek, et al., 2022). Lower cognitive abilities can have negative consequences for adults who may have unnecessary hospitalizations, higher risk of medication errors, higher health care costs, and higher mortality rates (Berkman et al., 2011).

In a systematic review of longitudinal cohort studies, Tandon et al (2016) found that a healthier diet was associated with better neurocognitive outcomes for young children. Given that early childhood from six months to five years of age are critical for neurocognitive development, parents need to be good role models and meal planners for their children's health from the beginning of their young lives and throughout their school years. As social

role models for their children, parents control their children's access and preparation of foods at home in addition to influencing their attitudes towards certain foods and food groups (Suggs et al., 2018). Nutrition learned in the early stages of development will shape how a child views and practices nutrition into adulthood, including how they will eventually model food preferences and dietary behaviors for their own children. According to Mollborn and Lawrence (2018), a child's health behaviors are generally consistent and largely impacted by the family until a child reaches adolescence when peers often become a greater influence. While in kindergarten and elementary school, children do not have much control over what groceries are purchased, when meals are eaten, or where meals are eaten. Sugg et al (2018) found that "Eating at home with the family appears to be associated with higher intake of fruit, vegetables and dairy and a lower consumption of soft drinks than eating in other social settings". By eating more nutritious meals at home with the assumption that there are adequate family resources and food knowledge, children can demonstrate developmentally appropriate school readiness (Mollborn & Lawrence, 2018).

Previous studies have shown positive outcomes between a variety of dietary behaviors when children are involved in purchasing food ingredients, preparing a meal, or setting the table (Quelly, 2019). Child involvement in meal making and food preparation leads to a better diet and overall quality of health (Smith et al., 2013). According to Quelly (2019), a child's involvement with meals was positively associated with eating more fruits and vegetables and inversely associated with the consumption of soft drinks and fast foods.

Children can also influence their parents through purchases at the grocery store. Children and their parents need to make decisions about what food and health-related products to be placed on the grocery list. A source states, "... the three stages – configuration, negotiation and outcome – can be considered in the decision-making process in families" (Pettersson et al., 2004). The configuration stage involves the writing of the grocery list; negotiation involves the interactive shopping, talking, and purchasing process at the grocery store; and the outcome involves the groceries that are taken home to make a meal through an interactive health literacy event. Grocery shopping is seen as a social practice between parents and their children (Keller & Ruus, 2004). While in the grocery store, interactive conversations between children and parents may occur. Pettersson et al (2004) found that some parents listened and talked to their children and then provided feedback on specific items that were being selected in the grocery store. Other parents in the study were dismissive and did not involve their children in the food shopping process. This could be for several

reasons. First, parents might be in a hurry with limited time. Page et al (2018) found that the time spent in a grocery store increased by ten percent when a child was present during the shopping event. Parents have more recently increased their use of food delivery apps to facilitate convenient and quick food delivery (Tandon et al., 2021), which may reduce opportunities for the development of interactive health literacy skills between children and their parents. Second, parents may plan to stick to their grocery list to structure and itemize their family budgets whereas children maybe more impulsive when they see a food they like or want their parents to buy. Although many factors influence a child's request for a specific grocery item, children try to influence grocery shopping decisions as young as eighteen months to two years of age (Calderon et al., 2017), and both parents and children face numerous pressures in co-shopping as a social practice (Keller & Ruus, 2014). Third, parents may not be knowledgeable about a variety of healthful food options and may lack valid and reliable health information to tell their children during the grocery shopping experience. According to a study of 100 parent-child or grandparent-grandchild dyads during a 30 minute shopping trip, children made 144 food requests with only one interaction involving a nutrition education attempt by a parent to their child (Calderon et al., 2017). The most common responses from parents were "no reaction" (24%), followed by a hard "no" (22%) and an explanation (17%) (Calderon et al., 2017).

The third research goal was to increase student involvement in meal making at home. Results were essentially the same on the pretest to posttest question, "Do you help your family cook and prepare meals?". Although there was an increase in students who recorded that they cooked meals with their families, the results were not significant. In the classroom intervention, students prepared three different snacks over three days consisting of multiple food groups. Students were encouraged to make the food at home which could increase the transfer of nutrition education knowledge and skills to home and hypothetically reinforce what students had learned at school. Many children were eager to share one of the recipes with their family at home. However, there were barriers that inhibited the children from actually remaking the food such as another meal being planned that evening, or the need to buy ingredients before the snack could be made. A more thoughtful coordination between the school curriculum and home life plans could help to reduce future barriers. Future studies should study these barriers because taking the time to purchase nutritious foods to cook and prepare meals is extremely important to health. Unfortunately, "In 2000, 41% of Americans reported eating ≥ 3 commercially prepared meals/week due to the lack of cooking skills and perceived time constraints" (Muzaffar et al., 2018). By making health

literacy more explicit in school to home transactions and home to community transactions, educators and parents can elevate functional health literacy and interactive health literacy as key components of learning about health. In the future, the MyPlate print and electronic versions of the federal nutrition guidelines could be one mechanism for raising awareness and elevating the transfer of valid and reliable health information between the school and home. Educators could provide written recipes and a grocery list organized by the MyPlate food model for children to take home to share with their family after meal making in the classroom. Children could practice writing the genres of recipes and grocery lists in the classroom to share and use at home as examples of health literacy. The printed or electronic material serves as a bridge for building interactive health literacy by increasing adult-child conversations about nutrition and health from school to home environments, and vice versa. Parents may need explicit guidelines on how to become competent in "health talk" through the use of question prompts to elicit basic conversations that can be answered in single words or sentences and elicitation prompts to cue more complex conversations with longer explanations (Hanner et al., 2019). When children communicate topic-related knowledge via oral and written language, they are said to understand or comprehend the health information as long as teachers and parents are checking for understanding and accuracy.

In summary, the current research served as a pilot study for determining the effectiveness of a nutrition education intervention with a meal making component that was replicated across three school buildings with second and third graders. The study is limited by a convenience sample of elementary children who attended one of three elementary schools in a semi-rural district in the midwestern United States. Without a control group, these findings cannot be generalized beyond younger or older-aged children. The research is also limited by self-reported responses from elementary children who may not have understood the three research questions due to low literacy or low health literacy skills. Also, the intertextual or cross-situational connections that children make between school and home environments are difficult to observe and quantify. For example, if the students answered that they go grocery shopping with their parents, it does not imply that they engaged in health-related conversations about grocery items or collaborated on the shopping list. Nonetheless, without this pilot study, we would have lacked adequate background knowledge on second and third graders abilities in health literacy. Going forward, this study will help us write more robust quantitative questions for future research on child health literacy. Future qualitative research could transcribe the oral conversations and

understandings of elementary students and their classroom teachers to further explore what children think, feel, and believe about their food-related learning and health literacy skills at school and at home.

In conclusion, two of the three research questions resulted in significant findings for whether children improved their recognition of the MyPlate food model from the U.S. Department of Agriculture and whether they went grocery shopping with their family after a nutrition intervention with a meal making component in the school classroom. How these findings related to functional health literacy and interactive health literacy were described. Second and third graders demonstrated functional health literacy by reading, writing, and speaking about nutrition and health in the school classroom. Interactive health literacy accounted for the interpersonal conversations and written answers about food and nutrition that children shared with their teachers and peers. Interactive health literacy also included the ability for children to interact and learn about the MyPlate food model as a valid and reliable print and electronic material associated with meal planning and meal making. The role of written recipes and a grocery list organized by the MyPlate food model are suggested improvements for building interactive health literacy skills among children, their families, and peers. Teachers and curriculum decision makers should incorporate the Health Education Curriculum Analysis Tool and the National Health Education Standards when planning health education lessons for the development of health literacy skills and child nutrition.

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