NUTRITION EDUCATION AND TECHNOLOGY:

CAN DELIVERING MESSAGES VIA NEW MEDIA TECHNOLOGY EFFECTIVELY MODIFY NUTRITION BEHAVIORS IN PRESCHOOLERS AND THEIR FAMILIES

by

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(Under the Direction of REBECCA MULLIS)

ABSTRACT

Obesity, especially in children, is a major problem in the United States. This study aimed to test technology use in effecting change in nutrition behaviors in preschoolers and their families. Using the theory of diffusion of innovation and a child as change agent model, the researchers designed a five week curriculum appropriate for preschool children. One class recorded daily webcam videos about their activities, while the control condition relied on traditional communication. Children and parents in both groups completed pre- and post-surveys to determine the effect of the intervention on knowledge, preference and behavior. While the data yielded largely insignificant results, increase in fruit consumption in parents' of the children in the experimental condition was significant. This study suggests that media is useful in reaching parents of young children. However, revision of the instruments and streamlining the use of technology would be an important step prior to repeating this intervention.

INDEX WORDS: obesity; children; technology; nutrition; fruits; vegetables; behavior

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# CHAPTER 1

# REVIEW OF RELEVANT LITERATURE

## Childhood Obesity

Childhood obesity has recently been brought to the forefront, in part by First Lady Michelle Obama championing it as her cause. Her initiative, Let's Move, is designed to promote healthy eating and physical activity in children.[1] It is based on an increasing concern regarding the alarming obesity rates among American children. Statistics from the National Health and Nutrition Examination Survey (NHANES) conducted by the Center for Disease Control show the prevalence of childhood obesity is increasing two to three fold among those under eighteen. Overweight and obesity is defined by Body Mass Indexes (BMI) above the 85$^{th}$ and 95$^{th}$ percentiles respectively[2]. The prevalence of these conditions or those at risk for them among preschool children between the ages of two and five was around 12.4% in 2003-2006, more than a two fold increase from 5% in the 1976-1980 NHANES[3]. This steady increase in obesity prevalence over time mirrors the trends in other age groups; the rate among those aged 6-11 has increased from 6.5% to 17%, while ages 12-19 have increased from 5% to 17.6%[3]. These increases are expected to continue in the future if appropriate interventions are not developed and implemented and demonstrates the need for early intervention programs[4].

There are many risks and complications associated with childhood obesity[4]. Psychosocial factors represent a significant portion of child and adolescent concerns[4]. Discrimination and stigmatization due to being overweight account for many of the problems[4]. The resulting low self esteem can lead to issues such as academic and

social stunting[4]. Increased cholesterol levels, high blood pressure and abnormal glucose tolerance are additional medical complications that can arise from excess weight[4]. Asthma, type 2 diabetes, sleep apnea and hepatic steatosis also stem from being overweight or obese during childhood[4]. Overweight children are more likely to be overweight adults and these health related issues only worsen in degree and become more prevalent[4].

**Development of Eating Patterns**

Although children have documented neophobia, a fear of the unknown, pertaining to food, research supports helping children develop healthy eating patterns early in life[5]. Young children, after repeated exposure to novel foods, show acceptance and preference for those foods[5]. This demonstrates that providing a variety of foods to children on a regular daily basis, and being patient with the process can lead to a greater acceptance of new foods and a willingness to try new tastes, looks, smells and flavors [5].

Eating nutrient dense foods rather than calorie dense, nutrient empty foods can contribute to healthy weight loss and maintenance of normal BMI levels[2, 6]. Failure to do this continues to compound the epidemic the country faces today. This indicates that the intake of low calorie, nutrient rich fruits and vegetables among children constitutes a serious problem. In any given day, 50 percent of children between the ages of two and five do not meet the MyPyramid recommendations for fruit consumption[6]. Seventy eight percent of children in this age group do not eat enough vegetables[6]. Older children fare even worse, with 74.1 percent of children between the ages of six and eleven years not eating the recommended servings of fruits per day

and 83.8 percent not consuming the recommended number of servings of vegetables. Compounding this, the vast majority of the vegetables are French fries and the fruits are from juice drinks that are only a small percent of real juice [6].

**This Generation and Their Technology Usage**

The 2010 preschooler child is have been born between the years of 2004 and 2007. According to the Statistical Abstract published by the United States Census Bureau in 2006, the largest group of women having children was between the ages of 20-34 years old [7]. This indicates that the parents would be between the ages of 22 and 40 in 2010

For this age group, technology is omnipresent. Currently, young adults are swept up in a wave of technology and new media, compelled by a need for immediacy and accessibility. Cell phones are primary modes of communication, and provide internet access, useful applications and even recording, media sharing and shopping opportunities. The internet now forms the basis for many of the technology devices in use today. According to the Census statistical abstract, approximately one third of people aged 18-34 have internet access either at home, work or some other location [8-9]. Around 90 percent of 18-29 year olds use the internet in some location and this decreases only slightly to 85 and 70 percent in the 30-49 age bracket and the 50 to 64 group respectively[9]. In addition, from 2001 to 2006, residential and pay phone use has decreased from 75 to 49.9 percent of total telephone services; meanwhile, cellular phone service has increased from 23 percent of the market share to 48.2 percent[10]. These trends provide further evidence of the increasing use of technology as a component of daily living and the importance of taking advantage of the burgeoning area of study

involving new media. Therefore, it seems logical to utilize internet and cell phone technology to implement a nutrition intervention with this age group.

Barriers to such technology use are most often economic issues or resistance to change, especially among older populations. Since much of the research regarding nutrition education is geared towards low income audiences, technology has not been the focus of nutrition education research for this audience. Web-based interventions represent the largest sector of the technology research and frequently mimic one-on-one counseling session with personalized feedback[11]. This pilot study addressed the use of cell phone technology to send healthy eating messages to parents of preschool children. The study was implemented in an upper middle class preschool setting, where it was assumed all parents have cell phones. This nutrition education study utilized the appropriate curriculum for the preschool setting and can further research in the field of investigating the maximum potential of new media for the purpose of nutrition education.

**Children's Influence on Their Parent's Decisions**

It is established that marketing companies have capitalized on the ability of children to persuade their parents to purchase certain products[12-14]. The cereal aisle stands alone as the single most obvious evidence of the marketing industry's conclusions from research that children do indeed influence their parents to a great extent. Marketing statistics related to children show that children constitute a vast share of purchasing power and possess a wide sphere of influence. James McNeal, of Texas A & M University, has completed a number of studies regarding advertising geared towards children[14]. Over the years, he has put together a large body of

evidence documenting the influence of children on their parent's purchases. For example, he reported that the so termed "nag factor" by kids between the ages of two and twelve indirectly manipulated their parents into spending somewhere in the realm of 320 billion dollars[14]. This is in addition to the more than 200 billion dollars in direct influence, such as actually voicing a desire for certain products and physically pulling goods off shelves and placing them into shopping carts[13] [14]. Research by Jenkins at the University of Tennessee examined the role of children in family decision making by interviewing 105 husband and wife pairs as to how they viewed the influence of their children in decision making situations[12]. He found that the most influence children have on their parents decisions was in the vacation and activity arena and less so in financial choices and other areas[12]. Food is a product that falls in between, as grocery shopping or a restaurant outing may be a family activity with opportunity for children to influence parents[12]. The food decision category was second only to the vacation and activity category[12].

**Child as Change Agent**

One example of using children as change agents in their families was tested in the Bringing It Home program, an intervention designed to increases fruit and vegetable intake in low income families. Using videos, food diaries and lesson plans, children were taught healthy eating patterns and then asked to relay this information to their families and caregivers [13]. Results showed increases in fruit and vegetable consumption largely due to the involvement of the children [13]. Parents stated that their children were their main motivation to change their behavior [15]. With respect to general health, Fors et al. completed research using children to educate their parents

about hypertension and heart disease [14]. His results showed that children could be effective as health messengers [16]. Thus, the idea that children can influence their parents' health behavior has merit.

# CHAPTER 2

## APPLICATION OF THEORY

The theoretical context for this study is the Diffusion of Innovations Theory. The basic tenets of this theory are demonstrating relative advantage of an innovation, compatibility, ease of implementation, experimental trialability and observability of results and outcomes. This theory is applicable to testing the use of technology to influence social networks. In this case, the family is linked to the daycare center via the child. The family unit is a network in which members often share thoughts and learning experiences and collaborate on ideas and plans. In this case, communication flows from the researchers who developed the study and intervention programs to the teachers, who in turn implemented the intervention with their students. The unique intervention for this study occurred as the children in the experimental condition relayed messages to the home regarding fruit and vegetable information and consumption home via internet and cellular network technology as compared to traditional print delivered messages. The outcomes of knowledge of, preferences for, and consumption of fruits and vegetables in the children for both the intervention and control groups were then compared to determine if there are differences between the groups. The same was done with the purchasing, serving and consumption of fruits and vegetables by the parents.

This study addresses the *relative advantage* of technologically delivered messages versus conventional print communications. The method is *compatible* with the proposed intervention as it is appropriate for a technologically savvy young adult population and their children accustomed to that technology. Considering that messages are already

sent home from the preschool to parents, and given that parents are likely to use cell phones daily, the intervention proved relatively *easy* to implement although certain components were more difficult than others. It was possible to readily test the results on an *experimental basis* as the pilot study and its results are *observable* in multiple forms in both children and parents. It was expected that children would increase their knowledge about fruits and vegetables, their preferences for fruits and vegetables and their consumption of fruits and vegetables. It was also expected that parents would increase their purchasing of fruits and vegetables and serving fruits and vegetables at home resulting in increased consumption of fruits and vegetables.

# CHAPTER 3

## GAPS IN EXISTING LITERATURE

There is limited information on children effecting change in their parents outside of the marketing arena. Applying the theory to nutrition or health education, narrows it to the aforementioned interventions, which do not yet include preschool aged children. Working with preschool children and technology has also been limited, largely due to the fact that young children may need assistance in working with the delivery devices, such as phones and computers. Also, the literature is largely restricted to tailoring and customization using the web and focus mainly on replacing traditional educational methods. The new social media has not yet been used as a communication method within the family unit for health and nutrition information. Using media technology messages is largely limited to mimicking one on one counseling type sessions, rather than being used for broader nutrition education. This study therefore served as a pilot project for using internet and cell phone technology to convey nutrition messages to parents of preschool children.

# CHAPTER 4

## RATIONALE

Childhood obesity is increasing at an alarming rate [2] and at the same time 50% of preschool children between two and five years of age do not consume the recommended amounts of fruits per day and 78% of children ages two to five do not consume the recommended amount of vegetable servings per day [6]. It has been noted that focus groups of mothers of preschool children agree that including more fruits and vegetables in their children's diets is one of their most significant health concerns for their children[17].

According to the US Census Bureau, parents are having children between the ages of 20 and 34 years of age[7]. This puts the population of the parents of preschool children currently between the ages of 22 and 40. This corresponds to the ages which use the internet and cell phone technology more than other age groups. Within this generation, technology is also an increasingly popular mechanism for conducting daily activities. Children and young parents are increasingly technologically savvy and utilize the internet for many aspects of their lives, such as business, social networking, information searching, shopping and entertainment. This became even more pronounced with the advent of smart phones and devices such as the iPod Touch. With the internet accessible in nearly every venue and through wireless networks, this is a probable avenue to convey nutrition information.

Studies show that the sphere of influence of children extends to their parents even regarding health concerns. Millions of marketing dollars are geared towards children who in turn get their parents to purchase certain products [10,11,12]. In the preschool

environment, the students already take home daily projects and activities to report to their caregivers.

The research was designed given the poor nutrition behaviors of young children, their influence on their parents' decisions and their technology infused environment. The purpose of this study was to determine if an integrated curriculum for children focusing on child as change agent and employing technology to deliver messages can influence child fruit and vegetable knowledge, preference and consumption and family fruit and vegetable purchasing, serving and consuming at home. To accomplish this, the researchers developed a curriculum composed of nutrition related activities to integrate into the existing preschool curriculum. The daily reports, which are already part of the preschool routine, were sent home with video and audio of the children via internet and cell phone technology.

# CHAPTER 5

## HYPOTHESIS

The first hypothesis of the proposed study is that by delivering nutrition messages via new media technology integrated into existing routines, preschool aged children will increase their knowledge of, preference for and consumption of fruits and vegetables. In addition, these technology delivered messages will influence the parents of preschool aged children to increase their purchasing, serving and consumption of fruits and vegetables in their home. The components of the study include methods to increase fruit and vegetable intake of children of preschool age, to use technology to send messages to parents of preschool children and to develop appropriate nutrition related activities to incorporate into the existing preschool curriculum.

# CHAPTER 6

# EXPERIMENTAL DESIGN

## Sample Population

The population has been drawn from a carefully selected preschool that has assented to participate. Dunwoody Prep Preschool and Nursery in Dunwoody, an upper middle class city is located in DeKalb County, a very diverse area. It is a private suburban preschool with 21 students per class. It is markedly different from a daycare center in that it provides a comprehensive education program as compared to a babysitter-like setting. The population of this center is relatively homogenous, minimizing socioeconomic differences and ensuring access to the technology necessary for the completion of the project. This is appropriate for the narrow scope of this pilot work. The children were all between four and half and five and a half years old, from the older fours and younger fives classes within the school.

## Study Design

The study has a quasi experimental design, with a control group and an experimental group. The groups were assigned based on the distribution of the consent forms. The experimental condition was assigned to the class of young fives, the older of the two classes participating. The pre-post design allowed for data to be collected to accurately assess any changes in nutrition behavior due to the technology intervention. Both classes received the curriculum in order to test the effects of the technology and to minimize any effects of the integration of the curriculum itself.

This research was designed to study the knowledge, preferences and consumption of fruits and vegetables of preschool children and purchasing, serving and

consumption of fruits and vegetables in their parents. The first stage of the study consisted of observation of the preschool to monitor the activities, kitchen menus and children's food preferences. During this stage of the study, the parents received the pre-intervention surveys and the researcher conducted interviews with the children to gather information on their knowledge of fruits and vegetables and preference for previously selected examples. This was followed by the intervention phase of the study. After the completion of the intervention, the same surveys were distributed to the parents and identical interview activities were done with the children. In addition to this information, interviews were conducted with the teachers to obtain their opinions and assess fidelity of the intervention.

**Description of the Intervention**

The intervention consisted of integrating one activity per day into the existing curriculum during the preschoolers' day for as many days as there are children in the class. Each class consisted of 21 students. At one activity per day, five days a week, Monday through Friday, the intervention lasted for five weeks. It was implemented in two classes, one class serving as a control receiving the curriculum activities and continuing the conventional messages home. The second class served as the experimental group receiving the same curriculum activities, but sending the technology delivered messages home. The idea of adding one nutrition related activity per day was to ensure that each child has an opportunity to record the message for the class and the parents in turn.

The activities included various things such as place mat art which involved putting together a healthy meal on a place mat in the form of an art project, fruit and

vegetable patterns, a version of Red Light, Green Light and other activities which included tasting a variety of fruits and vegetables. The curriculum activities were based the publication *Eat Healthy, Be Active!* compiled at the University of Georgia by Bales, et al [18] and added to by the collaboration of Dr. Diane Bales, the preschool staff and the researcher[19-22]. The *Eat Healthy, Be Active*! curriculum has been tested and validated as a successful educational tool for preschoolers. The activities were food centered and focused on trying new foods and making healthy choices[19-22]. (See Appendix A)

Regarding the food projects, one child reported the class' daily activities to all of the parents. The most feasible method of getting these messages home was to have one representative from the class record the video with the help of a teacher. The parents then received notification that they have received an email containing the video message and were able to view and hear the student from their child's class tell them about the activity that day. This was expected to appeal to the parents' emotional and connectedness to their children and to influence their food purchasing and preparation decisions.

**Evaluation**

Evaluation was completed by way of survey and interview. The surveys focused on fruit and vegetable knowledge, preference and consumption for the children and purchasing, serving and consumption at home for the parents. Interviews were conducted with the children to evaluate their fruit and vegetable knowledge and preferences and with the teachers to obtain their opinions about the intervention and their observations of the children's fruit and vegetable consumption.

*Instruments*

Survey instruments were designed to evaluate the outcomes of preference and consumption of fruits and vegetables in children and the purchasing, serving and consumption of fruits and vegetables in parents as determined by the theoretical model. The surveys, weekly food logs, and kitchen inventories were completed by the parents about their own habits in addition to their children's habits. Evaluations were done with the children to measure their knowledge and preferences by interview using activities and pictorial representations and other methods appropriate for children such as icons, scales and familiar imagery, including traffics lights and smiley faces[23]. Detailed descriptions of each instrument and methods of collecting data follow.

*Demographic Data*

Demographic data was collected via survey. Information collected included race/ethnicity, the child's gender, parents' ages and marital status, annual household income and their number of dependent children. (See Appendix B)

*Technology Usage*

Surveys assessed information on internet and cell phone usage. This included how often they accessed the internet, and what types of activities they do on the world wide web. They could choose from eight options across the subsequent range: "never," "1-2 times/month," "1-2 times/week," "3-5 times/week, but not every day," "1-2 times/day," "3-5 times/day," "1-2 times/hour" or "3+ times/hour." They could indicate all of the activities that applied, from a list of email, news, shopping, information searching and entertainment. The frequency of cell phone use and their uses for that technology was also collected. The parents chose how often they used their cell phones

from four categories over the following span: "rarely," "a few times/day," "a few times/hour," or "extremely often, I never set it down." Parents' also checked all applicable cell phone activities from phone call, texting, picture taking, games, alarm, media sharing, internet access, email, calendar, and business. Participants were also asked whether or not they had landline telephone service. (See Appendix B)

*Children' Knowledge Instrument*

Interviews were conducted by the researcher with the children in order to assess their knowledge of fruits and vegetables. The knowledge activity was made to mimic packing a lunch, which was one of the activities in the five week curriculum. The children were asked to pack a lunch to get in the most fruits and vegetables possible. They could choose one main dish, two sides, a drink and a dessert from a selection of pictures. The main dishes were pepperoni pizza, supreme pizza, a ham sandwich with lettuce and tomato and chicken nuggets. The six side choices were macaroni and cheese, broccoli, carrots, apple, potato chips and granola bars. Drinks could be chosen from water, milk, fruit juice or soda and dessert was between skittles, chocolate pudding and fruit cocktail. Foods with fruits and vegetables were worth two points, and all other foods were worth one point, giving each child a score between five and ten. (See Appendix C)

*Children's Preference Instrument*

The children were interviewed by the researcher to collect their preferences for certain fruits and vegetables. The activity was developed for use with young children and involved pictures. Their preferences were determined by asking them if they liked, disliked or were unfamiliar or neutral about a particular fruit or vegetables. The task

consisted of a list of ten foods with pictures of each and a traffic light diagram with a smiley face on the green light, a neutral face on the yellow light and a frowney face on the red light. The children were shown a picture of each food and asked to point to which face or traffic light component most appropriately described how they felt about the taste of a particular fruit or vegetable. (See Appendix D)

*Children's Consumption Instrument*

In the survey's, the parents reported how many half cup servings of both fruits and vegetables their child consumes daily on average over the past month. (See Appendix B)

*Parents' Purchasing Instrument*

There were multiple ways to collect this data. The surveys included a checklist for the frequency with which a parent purchased fruits or vegetables. They were asked to choose from every time groceries were purchased, 75 percent of the time groceries were purchased, 50 percent of the time groceries were purchased, 25 percent of the time groceries were purchased , or that they rarely purchase fruits or vegetables. The food log also allowed parents to provide purchasing information. They indicated whether or not they had purchased any of the fruits or vegetables listed by checking a box. Numbers of fruits and vegetables purchased were totaled for each parent respondant. (See Appendices B and E)

*Parents' Serving Instrument*

The food log was a simple list of 36 fruits and vegetables, some common and others not, which families could have in their houses. They were asked to check if they had purchased the food in the past week and then to elaborate with the number of

times that each food was served, how many times their preschool child ate it and how many times they ate it themselves. (See Appendix E)

*Parents' Consumption Instrument*

The parents' fruit and vegetable consumption was measured by asking them to fill in how many half cup servings of each they consumed daily on average over the past month. (See Appendix B)

*Kitchen Inventory Instrument*

The kitchen inventory was an open chart which asked parents to look in their pantries, refrigerators and freezer to see which fruits and vegetables why had on hand. After writing the name of the food, they checked boxes to let the researchers know the form, fresh, frozen or canned, which would also include packaged dried fruits, etc. (See Appendix F)

*Teacher Interview Protocol*

At the end of the intervention, the teachers of the two classes were interviewed to get their input on how the activities went and to see whether or not everything was implemented as planned. They were asked questions on whether or not they had followed the activities' instruction and if they had time to fit them in each day to assess fidelity. They were also questioned about their opinions of the curriculum and for future suggestions. Lastly, the interview incorporated discussion on any signs of change in nutrition behaviors, in an attempt to collect anecdotal evidence appropriate for a pilot program. (See Appendix G)

# CHAPTER 7

## EXPECTATIONS

It was expected that after implementing the curriculum activities, the children would have a basic understanding of healthy choices for meal and snack decisions. In addition, it was anticipated that they would develop an increased willingness to try new foods. In turn, these children would be able to pass their new knowledge and preferences along to their parents. This was anticipated to influence their parents' purchasing behaviors, leading to buying more fruits and vegetables and new varieties. Due to the more frequent purchasing of a wider variety of fruits and vegetables and decreased neophobia, it was projected that intake of fruits and vegetables by the preschoolers and their families would increase.

# CHAPTER 8

## PARTICIPANTS

Of the 42 children and families enrolled in the two classes during the intervention, sixteen of the control class consented to participate in the study. All 21 of the parents of the students in the class exposed to the experimental condition agreed to participate. The average household income of those who reported it was between $100,000 and $200,000 per year, with no one indicating an income lower than $60,000 per year. The vast majority of the respondents were Caucasian while there were two Indian families and one East Asian. However, this does not account for any ethnic differences within families. Depending upon which parent filled out the surveys, mixed families may not have indicated that their spouse or child was of a different ethnic group. The population participating was older than anticipated for the intervention based on census data. The age range for the parents was 32 to 49 years old and the average age for both parents was between 40 and 41 years of age. All families had three children or fewer and only one family was divorced. The majority of the children were female.

# CHAPTER 9

# RESULTS

The surveys were collected both prior to the intervention and after the program was completed. Unfortunately, out of 16 families who consented four returned both sets of surveys for accurate comparison in the control class and four out of 21 parents returned both sets of surveys from the experimental condition. However, 18 baseline surveys and 18 post intervention surveys with Food Logs and Kitchen Inventories were collected from both conditions together, but they were not consistently matched. Therefore, the researchers decided to pool the data from baseline and from port-intervention for analysis.

The variables included in the hypothesis provide a wide range of mixed results.

## Children's Knowledge Data

At baseline, the children showed some knowledge of including fruits and vegetables, with four scores of ten, the highest possible score, one in the control class and three in the experimental group. The majority of children scored in the middle in the control class with a mode of eight. The experimental class appeared bimodal with six students scoring six and five student scoring nine.

Due to interviewing the children personally, there were enough matched pairs for this variable to provide a more meaningful analysis. The children's knowledge data, showed a decrease in the knowledge information. However, the difference between the decrease in the control group and the decrease in the experimental group is not significant with a p-value of 0.2221.

*Table 1: Children's Knowledge Data: Average Change in Knowledge Evaluation Scores*

| | Pretest | Post-test | Difference |
|---|---|---|---|
| Control | 7.733 | 7.133 | -0.6 |
| Experimental | 8.25 | 7.9375 | -0.3125 |

**Children's Preference Data**

The children's preferences at baseline were consistent across groups, with bananas being the most frequently enjoyed fruit or vegetable from the list in the experimental group and fourteen partial to asparagus in the control group. The average student in the control group liked 5.7 fruits or vegetables, while the experimental groups students averaged five foods liked per student. Neutral or unfamiliar foods averaged at 1.3 foods for the control group and 1.5 foods for the experimental group, while disliked foods averaged 2.8 and 3.44 per student, respectively.

Examining the children's preference data, the results were not significant between the two groups. However, the results changed in the expected direction. Children's preferences changed slightly in both classes. There was a notable increase in the fruits and vegetables liked by the children, in addition to decreases in both the unfamiliar or neutral fruits and vegetables and the number of foods that the children disliked. There was a larger decrease in disliked fruits and vegetables in the control class, but a larger decrease in unfamiliar foods in the experimental class. The experimental class also had a larger increase in preferred fruits and vegetables. Even though the pairs were able to be match by child from baseline to post intervention, none

of the changes were considered to be significant. Bananas remained the most popular in the experimental group with fifteen liking them, and asparagus remained the favorite among the control group.

*Table 2: Children's Preference Data: Average Changes in Likes, Unfamiliar/Neutrals and Dislikes*

| | Likes | Neutrals | Dislikes |
|---|---|---|---|
| **Control** | +0.6 | -0.4 | -0.2 |
| **Experimental** | +0.8125 | -0.1875 | -0.5 |
| **P-value (95% CI)** | .3206 | .6491 | .2869 |

**Children's Consumption Data**

Prior to the intervention, children in the control group consumed close to two and a quarter servings of fruits daily and almost two and a half servings of vegetables daily over a week's time. Children in the experimental group ate the same amount of both fruits and vegetables at nearly two servings daily over the course of a week.

There were two sets of data collected on children's consumption data reported by the parents on the surveys and weekly food logs. Parents first recorded the number of half cup servings of both fruits and vegetables eaten by their child. Children in the control group consumed 2.375 servings of fruits before the intervention and 2.429 afterwards. The children in the experimental group ate 2.188 servings of vegetables prior to the program and 2.5 serving post-intervention. The control group consumed

1.911 servings of fruits and vegetables each before the curriculum began and consumed 3.00 servings of fruits after the intervention and 2.363 servings of vegetables. Using these numbers, there were increases in both the control group and the experimental group in the number of both fruits and vegetables eaten. The results of the control group produced no significant increases in the number of servings of fruit or vegetables eaten by the children. The results from the experimental group were significant at a level of $p<0.10$ ($p=.063$) with respect to the number of fruit servings only. The slight increase in the number of servings of vegetables consumed was not significant for those in the experimental condition.

*Table 3: Children's Consumption Data: Average Daily Number of ½ Cup Servings of Fruits (Survey Data)*

| | Pre | Post | Difference | P-value |
|---|---|---|---|---|
| **Control** | 2.3750 | 2.4286 | +0.0536 | 0.918 |
| **Experimental** | 1.9111 | 3.0000 | +1.0889 | 0.063 |

*Table 4: Children's Consumption Data: Average Daily Number of ½ Cup Servings of Vegetables (Survey Data)*

| | Pre | Post | Difference | P-value |
|---|---|---|---|---|
| **Control** | 2.1875 | 2.5 | +0.3125 | 0.391 |
| **Experimental** | 1.9111 | 2.3636 | +0.4525 | 0.351 |

Parents also recorded the number of times certain fruits and vegetables were eaten in the weekly food log. At baseline, both control and experimental group participants consumed just over 21 servings per week. This yields a higher daily average than the reported of number of servings in the surveys and could produce different results by counting fruits and vegetables together. The control group increased by approximately one serving over the course of a week but this was not a significant increase. The experimental group mirrored this with a marginal increase that was also not significant.

*Table 5: Children's Consumption Data: Total Number of Times Eating Certain Fruits and Vegetables (Weekly Food Log Data)*

| | Pre Average | Post Average | Average Difference | P-value |
|---|---|---|---|---|
| **Control** | 21.29 | 21.43 | +0.14 | 0.980 |
| **Experimental** | 21.71 | 22.75 | +1.04 | 0.855 |

**Parents' Purchasing Data**

The parents provided information regarding their purchasing of fruits and vegetables. They did this in two ways. The provided how often they purchased fruits and vegetables as part of their grocery shopping in the surveys and how many fruits and vegetables they bought in the Weekly Food Log.

The survey data produced numbers on the frequency of purchasing fruits and vegetables individually. At baseline, the survey data for both conditions showed that parents purchased fruits and vegetables 89 percent of the time they bought groceries. Fruits purchases decreased, while the vegetables showed a difference between the experimental group and the control group. The control group decreased and the experimental purchasing frequency increased, but not significantly. The weekly food log also showed whether or not a family purchased certain fruits and vegetables. Before the program implementation, the parents of both groups purchased approximately thirteen fruits and vegetables per week. The control group reported decreases in the numbers of fruits and vegetables purchase by the parent. The experimental group showed small increases, although not significant.

*Table 6: Parents' Purchasing Data: Purchasing Frequency of Fruits as a Percentage of the Times Groceries were Purchased (Survey Data)*

| | Pre | | Post | | Difference | | P-value |
|---|---|---|---|---|---|---|---|
| **Control** | 4.56 | 89% | 4.00 | 75% | -0.56 | -14% | .182 |
| **Experimental** | 4.56 | 89% | 4.55 | 88.75% | -0.01 | -0.25% | .980 |

*Table 7: Parents' Purchasing Data: Purchasing Frequency of Vegetables as a Percentage of the Times Groceries were Purchased (Survey Data)*

| | Pre | | Post | | Difference | | P-value |
|---|---|---|---|---|---|---|---|
| **Control** | 4.44 | 86% | 3.86 | 71.5% | -0.58 | -14.5% | .186 |
| **Experimental** | 4.56 | 89% | 4.73 | 93.25% | +0.17 | +4.25% | .588 |

*Table 8: Parents' Purchasing Data: Total Number of Fruits and Vegetables Purchased (Weekly Food Log Data)*

| | Pre | Post | Difference | P-value |
|---|---|---|---|---|
| **Control** | 12.88 | 10.71 | -2.17 | 0.387 |
| **Experimental** | 13.00 | 15.00 | +2.00 | 0.448 |

**Parents' Serving Data**

The baseline data reveals that parents purchase 12.88 fruits and vegetables per week. The data on the serving of fruits and vegetables indicated a decrease in the number of times fruits and vegetables were served in the households in the control group. The experimental group showed an increase, however it was not significant.

*Table 9: Parents' Serving Data: Total Number of Times Fruits and Vegetables Served (Weekly Food Log Data)*

| | Pre | Post | Difference | P-value |
|---|---|---|---|---|
| **Control** | 34.38 | 31.86 | -2.52 | 0.731 |
| **Experimental** | 28.89 | 38.00 | 9.11 | 0.245 |

**Parents' Consumption Data**

Lastly, the baseline consumption information from parents shows that they consistently consumed more vegetables than fruits. The control group ate 2.125 servings of vegetables per day and 1.875 servings of fruit. The experimental group ate 2.833 servings of vegetables per day on average and .989 servings of fruits per day. This self reported consumption of fruits and vegetables by the parents demonstrated a decrease in the number of times fruits and vegetables on the list were consumed in the control group. The experimental group showed an increase in the total number of servings eaten by the parents, yet again, not significant at any level.

*Table 10: Parents' Consumption Data: Average Daily Number of ½ Cup Servings of Fruits (Survey Data)*

| | Pre | Post | Difference | P-value |
|---|---|---|---|---|
| **Control** | 1.8750 | 2.2143 | +0.3393 | 0.395 |
| **Experimental** | 0.9889 | 2.9091 | +1.9202 | 0.018 |

*Table 11: Parents' Consumption Data: Average Daily Number of ½ Cup Servings of Vegetables (Survey Data)*

| | Pre | Post | Difference | P-value |
|---|---|---|---|---|
| **Control** | 2.1250 | 2.5 | +0.375 | 0.477 |
| **Experimental** | 2.8333 | 3.0455 | +.2122 | 0.757 |

*Table 12: Parents' Consumption Data: Total Number of Times Eating Certain Fruits and Vegetables (Weekly Food Log Data)*

| | Pre | Post | Difference | P-value |
|---|---|---|---|---|
| **Control** | 27.57 | 23.57 | -4.00 | 0.550 |
| **Experimental** | 23.00 | 26.25 | +3.25 | 0.608 |

**Kitchen Inventory Data**

Another portion of data collected was the amount of fruits and vegetables that the families had in their kitchens. By totaling the numbers of fresh, frozen and canned fruits and vegetables, the researchers noticed slightly increased numbers of the fruits and vegetables in the pantries and refrigerators, 0.75 foods in the control group and 1.34 foods in the experimental group.

*Table 13: Total Number of Fruits and Vegetables on Hand, Fresh, Frozen and Canned/Packaged (Kitchen Inventory Data)*

| | Pre | Post | Difference | P-value |
|---|---|---|---|---|
| **Control** | 17.11 | 17.86 | +0.75 | 0.789 |
| **Experimental** | 17.56 | 18.90 | +1.34 | 0.607 |

**Testimonial Data**

Testimonial data provides hints to the promising nature of the program and can help develop future similar interventions. Teacher interviews both before and after the intervention provided insight as to how this can help the children alter their eating habits. Stories of children refusing to eat "burnt lettuce" when field green salads were placed on their plates at lunch can compare to the teachers reports of children eating more fruits and vegetables at around the lunch table and at snack time. After the intervention, the teacher recounted a parent informing her that her daughter had asked for a grapefruit for dinner, a completely unfamiliar situation to her parent prior to the intervention.

# CHAPTER 10

# DISCUSSION

The data from this study showed some changes in the expected directions, although very few are statistically significant at a level of $p<.05$. A few results show significance at an alpha level of .1 and a 90% confidence interval. This is enough to be considered promising for pilot work and can indicate a good basis for future research.

The children's preference data shows that there were increases in the fruits and vegetables liked. However, the decreases in disliked fruits and vegetables and the neutral/unfamiliar category did not always contribute to the increased number of liked foods. The decrease in unfamiliar or neutral fruits and vegetables can be attributed to the learning about previously unknown foods. This would suggest that the objective of decreasing kids' neophobia was accomplished. Analyzing individual data might show that for some children, certain foods went from unfamiliar to disliked, which would still imply less neophobia due to the fact that the foods were known to them after the intervention. However, other children noted that foods were disliked prior to the intervention and then fell into the neutral category. This ambiguity represents a limitation to be discussed later.

The collection of information on the children's knowledge of fruits and vegetables was based on the fact that they would know what defined a fruit or vegetable, or that they would at least be able to identify them upon sight. It was noted that the decrease was smaller in the experimental group. However, the decreases seen in both groups may be indicative of issues with the evaluation instruments, addressed later in this paper.

The children's consumption data was based on parental report. The increases were consistently higher in the experimental group than in the control group. However, without the ability to compare match pairs, the differences merely signify change due to the interventions and it is not possible to tell whether or not the two groups are significantly different.

The consistently larger increases in the experimental group could indicate that the technology communication component of the intervention was successful. Due to the nature of the small sample size, the results had to be pooled for analysis. Without the matched pair data for both groups, the scope of the implications of the results is narrow.

# CHAPTER 11

## LIMITATIONS

This study was extremely limited in terms of the extent to which the results can be interpreted. Relying simply on the numbers does not provide an accurate picture. Issues with the data may be accounted for by several factors. Both classes were introduced to the educational program. If the technology was not utilized or was ineffective, there would be no difference between the two classes. The class that received the webcam videos may have had several factors affecting their results. For about a week and a half the emails did not get sent out due to internet issues on a private server. After this problem had been solved, the emails were sent out but there was no technology in place to ensure that the families were receiving the emails, that they had the ability to watch them or whether or not they chose to ignore them.

Due to the fact that only four families returned both pre and post intervention surveys in each condition, the total of eight matched pairs did not provide sufficient data to analyze. Instead of using this optimal statistical analysis, the data was pooled into a control group and an experimental group to supply enough data to yield results. Significant differences may have been observed had more surveys been return with sufficient data to analyze.

The technology component was also difficult to measure. Only one family relied completely on cellular phone service and most families were found to use the internet and their cell phones multiple times per day, with some noting that they hardly ever put their phones down. Without sufficient numbers of families participating in the evaluation both at baseline and after the intervention, there was no correlation between

technology usage and any changes in nutrition behaviors in each class. This limits the scope of the study severely since the purpose was largely focused on technology as the intervention rather than the curriculum itself.

The parents' age may have also had an impact on the results. When the study was designed, it was speculated that the parents of five year old preschool children were between the ages of 25 and 39. Given that the majority of participants were older than this range at an average of 41 years old, it may have affected their knowledge and use of the technology we were employing. This may be explained by the fact that they could have older children and this was their youngest child, or by rationalizing their socioeconomic status. This high income group is likely to have a higher level of education. Those with a higher education tend to have children at a later age. This can be taken into consideration in choosing populations in future studies.

The survey data also presented difficulties. Families were inconsistent in listing how often they purchased fruits and vegetables. However, consumptions of servings stayed the same across the board. For example, those who reported two servings in their pre-intervention surveys, may have noted a count between two and three afterwards. These were averaged to count at two and a half servings. Some cases also have to be counted as missing, such as those who did not follow the given instructions and simply placed check marks in the columns for "Eaten by Child" and "Eaten by Parent" rather than indicating the number of times they had consumed them as directed. For example, one parent did not check that they had purchased any of the fruits or vegetables and therefore had to be discarded. One parent also did not understand the concept of counting half cup servings and wrote in that they and their

child had eaten more than one half cup serving of both fruits and vegetables. The servings count in the surveys should include more fruits and vegetables than just the ones listed in the log and should therefore have been higher than the log data. This represents another issue with the instrument validity.

Given the manner in which knowledge was assessed, the system may not have been completely understood by the children. When presented to the children, the instrument proved to be more of a preference evaluation. For the main dish for the packed lunch, the activity was to choose one of four, a sandwich with lettuce and tomato, a supreme pizza, a pepperoni pizza and chicken nuggets. Although the sandwich contained vegetables and children received two points for picking it, it was noted that children stated what they liked and chose that instead. Some even made a point of telling their interviewer that they would deliberately choose the one they liked better. This could be seen in all categories of the lunch. The side items, from which the students could pick two, were macaroni and cheese, an apple, broccoli, granola bars, potato chips and carrots. This posed the same problem as the desserts, which were chosen from chocolate pudding, fruit cocktail and skittles. Again, students chose what they liked best rather than the healthier choice. There may be confusion between the fruity nature of skittle and the inclusion of the word potato in the chips. They may masquerade as a fruit or vegetable to the children. The drinks presented another interesting issue. From water, milk, fruit juice and soda, most did not select the obvious poor choice of soda. Water and milk were often toss ups with children stating that they would choose these since they were healthy. Given that this was not the point of the

evaluation and even though they were asked to point out the ones with the most fruits and vegetables, they mistook this for meaning healthy and decided on water or milk.

The kitchen inventory data may have not counted some packaged fruits and vegetables if a parent did not consider them as belonging to either of the fresh, frozen or canned categories. Some noted dried fruits and other did not indicate any. This may have led to a lower number than what should have been reflected. The decreases evidenced by the kitchen inventories and food logs may reflect timing of grocery store runs and depletion of the pantry stock or may be indicative of how many times a family ate out one week as compared to another.

The inability to match enough pairs of data is a severe weakness. When examining the few matched pairs, the food log data was mixed. In the control group, three out of four parents reported that they consumed more fruits and vegetables, and two out of four claimed increases in purchasing, serving and consumption on the part of the child. One family noted that the child consumed the same amount both before and after, while reporting decreases in purchasing and serving. This family was also the third parent who reported eating more fruits and vegetables. From the experimental group, one of the three families reported increased purchasing, serving and consumption of fruits and vegetables in the home. This is still a negligible difference between the two classes. The food log data also only included certain fruits and vegetables, some common, and some not. This limits the counts if the family purchased other fruits and vegetables. It also is unable to account for a family making multiple trips to the grocery store and buying the same fruit or vegetable more than once, since this column was merely marked by a check.

The kitchen inventory data was also minimally successful in showing a difference. Only one family in each group had an increase in the number of fruits and vegetables in the kitchen. While the control group had an average drop of .5625 total fruits and vegetables in their households, the experimental class noticed a .3333 decrease in the total number of fruits and vegetables on hand. Still, a person may have had fresh and frozen versions of the same fruit or vegetable, which can inflate these numbers, but would still indicate a higher purchasing level.

The children's data allowed much more to be analyzed, since it could be matched for each child participating in the evaluation both at baseline and post intervention. An average increase was found in the amount of fruits and vegetables each child liked and a decrease in what they didn't like. Another notable piece was the decrease in unfamiliar or neutral fruits and vegetables. This implies that they would have less neophobia and with time may be more receptive to new foods and other fruits and vegetables.

Further examination of the experiment may reveal some threats to validity. A selection threat may stem from the fact that the slightly older class may be more accustomed to eating certain fruits and vegetables. However, the maturation threat is virtually nonexistent due to the short nature of the intervention, even at this fast growing age. Instrumentation was not an issue since the measures were unchanged between the pretest and the post-test. However, in retrospect, the results show that they may not have been valid measures of the construct. The history threat may come from the news and the parents attempting to make similar changes in their homes and families by virtue of the media popularizing the healthy eating trend. Statistical

regression plays a role when the extreme high scores and extreme low scores move towards the mean of the population. This so called natural tendency of regression to the mean may affect some of the data interpretation.

Much of the research pertaining to the influence of children on family decisions and their grocery store purchasing power is based on parental perceptions of that influence. Self report of the information, such as parental opinions about their own children, on the evaluation measures may skew the data. This reporting bias must always be taken into account when using surveys. Their desire to appear helpful and shed themselves in a positive light may alter their response to the survey questions. Timing presented some issues as well. Due to the location of the school, post intervention information could only be collected a week after the program had been completed. Survey data from the parents came in much later, up to 6-8 weeks after the fact. The teachers constitute another factor; the teacher of the control group class admitted to not having sufficient time to fit two of the daily activities into the day. This is an issue when it comes to the fidelity of the intervention. Although the teachers had plenty of leniency to implement the activities as appropriate for their classes, they were expected to complete them all. Furthermore, no two teachers adopt the same practices in their classrooms. The inherent differing methods of the two teachers, as a product of their personalities, teaching styles and levels of experience may lead to difference in interpretations on the part of the children or the influence on them. Also, as this is a pilot study, it is not generalizable. It has been designed to be implemented in an optimal setting, following the logic that if it works in this setting and in an advantaged population, it can be adapted to other settings. Given time, it may be further developed

into social networking and perhaps would be more effective if individual children were able to record for their own families.

# CHAPTER 12

## CONTRIBUTIONS AND FUTURE RESEARCH

This study is contributed to the limited literature available on using children as change agents using customized messages and technology to affect nutrition behaviors of preschool children and their parents. Many of the previous studies examined parent's perceptions, whereas this study examined self reported purchase and intake of fruits and vegetables. The technology and communication aspect contributed to the field by incorporating a technology for delivering nutrition messages. This particular intervention adds a more personal touch and features a different approach from the traditional attempts at interactive designs.

With regards to the possible lack of generalizability, this pilot may further the field by assisting others who are attempting to incorporate new media that may reach a greater proportion of the population. The technology aspect of health communications for the purpose of creating persuasive messages is a different component that has not been previously examined.

It would also be important to validate all instruments prior to their use in a study of this type. Although the response was positive, a separate study could prove useful in determining the appropriateness of the smiley face and traffic light imagery used. The preference evaluation could be extended to include more fruits and vegetables with a wider array of fruits and vegetables to make sure that there are ones commonly liked, often disliked and usually unknown. The knowledge evaluation instrument was difficult to develop and was perhaps too difficult to comprehend by a five year old. To some extent, it did not accurately represent their knowledge and appeared to gauge

preference instead. It is recommended that a future study use a binomial measure where the child has the option to choose from two items when asked which is a fruit or vegetable. They could also be asked to identify fruits and vegetables by name. The kitchen inventory data might have noted that canned fruits and vegetables should include bagged or packaged, with examples such as raisins. The food log data may also need to include open boxes for families to fill in other fruits and vegetables, especially less common or culturally consumed foods that they may purchase often. Restructuring the hypothesis to accommodate the technology, which was unlikely to affect the nutrition behaviors in the children, may also help direct future study toward the correct instruments and items to include. Accordingly, fewer variables would allow for fewer questions and perhaps a higher response rate.

Using a larger sample size can allow for enough data to be collected to ensure that there are numbers to support analysis of the pre-post matched pairs. Computing these p-values gives stronger implications of the results and a more definitive conclusion to such a study. Another way to strengthen the study would be to ideally have two classes of the same age, rather than an older fours class and a younger fives class. The researcher could travel to the school to conduct the activities and guarantee that they are completed in the same manner in each group.

The messaging aspect can be improved as well. Using a more uniform control, such as predetermined print messages to send home may prove useful for comparison. In the future perhaps including components of social networking such as Facebook, which is increasingly popular among the older age groups, and making use of site visit tracking technology can ensure successful implementation of the intervention. Pictures

of the children may be included in these types of sites as well. This can help to ensure how many unique individuals watched the videos sent home.

Based on comments from the teachers, the educational program may be further adapted to their classroom situation. Due to the time constraints of this research, it was done as one activity per day. The teachers seemed much more enthusiastic about including one activity per week throughout the school year and in fact mentioned that they may incorporate their favorites next year. This would allow them a bit more planning to ensure that enough time was allotted for the activity and so that they could adequately prepare.

# CHAPTER 13

# CONCLUSION

This study offers insight into what it may take to effect change in nutrition behaviors using technology. Although the hypotheses of the study were not supported by significant differences in the data, changes in the expected directions were observed. With more time, adaptation, and improved instruments for the future, this study can contribute to the promising field of interactive technology base nutrition education.

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APPENDIX A

CURRICULUM SCHEDULE

| Week | Theme | Monday | Tuesday | Wednesday | Thursday | Friday |
|---|---|---|---|---|---|---|
| **Week One** | Food is my Friend: Building the Basis for a Healthy Pyramid | Food Passport | Color Me Healthy! Version One (Adapted from Fun Fruit and Very Vegetable Tour) | Story Time | The Hungry Alphabet | Food Group Bingo |
| **Week Two** | Veggie-Tables | Let's Taste Some Veggies! (Eat Healthy, Be Active) | Riddles (Adapted from Teaching Children About Food) | Sing Along (Teaching Children About Food) | Toss Me a Salad! (Variation on Let's Taste Some Veggies from Eat Healthy, Be Active) | Color Me Healthy! Version Two (Variation on Let's Taste Some Veggies from Eat Healthy, Be Active) |
| **Week Three** | Root for Fruit! | Let's Taste Some Fruit (variation on Let's Taste Some Veggies from Eat Healthy, Be Active) | Awesome Applesauce (Eat Healthy, Be Active) | Pattern Party (Eat Healthy, Be Active) | Let's Make a Healthy Fruit Salad (Eat Healthy Be Active) | Fruit Salad Foot Races (from Eat Healthy, Be Active Field Day Extravaganza) |
| **Week Four** | Plate It - It's Mealtime! | Food Rainbow | Placemat Art (Eat Healthy, Be Active) | Tasha's Lunchbox Adventure Part One (Eat Healthy, Be Active) | Tasha's Lunchbox Adventure Part Two (Eat Healthy Be Active) | Scavenger Hunt |
| **Week Five** | How I Take Care of Me | The Snack Shack Part One (Adapted from Eat Healthy, Be Active) | The Smelly Box and Feely Socks (Teaching Children About Food) | A-Maze-ing Fruits and Vegetables (adapted from Fight Bac, Kindegarten and First Grade, UGA Extension) | The Snack Shack Part Two (Adapted from Eat Healthy, Be Active) | Healthy Foods help me go, Junk Foods make me slow. (A version of Red Light, Green Light, adapted from Eat Health Be Active Field Day Extravaganza) |

APPENDIX B

CURRICULUM

# Curriculum for Learning About Healthy Fruits and Vegetables for Preschool Aged Children

# Week One
# Food is my Friend:
# Building the Basis for a Healthy Pyramid

**Monday**
**Food Passports**

*Goal*: to create a passport to keep track of the foods tried throughout the curriculum

*Objectives*:

- Children will decorate passports for their food journeys.

*Materials*:

- Food Passports
- Stamp
- InkPad

*Activity*:

- Discuss with students the role foods play in their lives. Ask them to talk about their favorite foods. Do they know what kinds of foods are healthy for them?
- Explain the benefits of fruits and vegetables (energy, vitamins, etc) and how tasty these health foods can be.
- Explain that they will be trying lots of new fruits and vegetables that they may have never seen, just like traveling to new countries, which you need a passport for.
- Teachers will mark the passports with a stamp every time a child tries a food and when they learn about a new food. (This is because foods are optional for trying). Be sure that there will be no reward for having the most stickers, or penalty for not having any.

*Message Example*

- Recording from Child
    - Hi there! My name is _____ and today I made my passport for new foods. I get stamps in it when I try new foods and learn about fruits and vegetables and can't wait to show it to you when we are done.

**Tuesday**
**Color Me Healthy! Version One**

*Goal*: to identify which fruits and vegetables children are familiar with.

*Objectives*:

- Children will learn what fruits and vegetables are.
- Children will use fine motor skills to color within lines.
- Children will use counting skills to tally the fruits and vegetables they know.

*Materials*:

- Crayons
- MyPyramid for Kids Poster
- Provided Coloring Sheets
- Posterboard with provided graph
- Marker

*Activity*:

- Ask the children what fruits and vegetables are. Try to come up with a class definition of each.
- Using the coloring sheets provided, ask the children to color in the fruits and vegetables that they know. If they are unable to identify something, name it for them.
- Have the class share the fruits and vegetables that they know. Using the posterboard, create a pictorial chart of how many children know each fruit. Come to a consensus on which are the top three known fruits and vegetables in the class. Use this as a counting exercise.

*Message Example*

- Recording from Child
    - Hi. My name is _____ and today we colored in all the fruits and vegetables we knew. Then we counted how many of us knew them and 19 of us knew apples, and 10 knew carrots, but only 2 knew raspberries (fill in with your classes numbers and foods

**Wednesday**
**Story Time**

*Goal*: to achieve a positive attitude about trying new foods

*Objectives*:

- Children will listen to a story about trying new foods.
- Children will talk about times where they tried new foods.
- Children will be introduced to a few new foods.

*Materials*:

- Three types of uncommon fruits and vegetables. (such as radishes, asparagus, kiwi)
- Napkins
- Storybook (*I Will Never Not Ever Eat a Tomato* by Lauren Child)

*Activity*:

- Have children gather for story time.
- Read the book *I Will Never Not Ever Eat a Tomato*
- Ask the children to tell about times they tried different and new foods. Have them talk about whether or not they liked it.
- Bring out three fruits and vegetables to sample. Identify them for the children and ask who wants to try them. Ask those who try them to describe the taste and smell and texture to the rest of the class.

*Message Example*

- Recording from Child
    - Hi. My name is _____ and today we read about Lola and how she doesn't like any healthy foods, but once she tried them she did. We decided to try new fruits and veggies too and even tasted _____!

**Thursday**
**The Hungry Alphabet**

*Goal*: to create an alphabet using the first letters of fruits and vegetables

*Objectives*:

- Children will review the alphabet letters.
- Children will identify new fruits and vegetables.

*Materials*:

- Posterboard
- Book, *Eating the Alphabet* by Lois Ehlert
- Markers
- Food Cards with Pictures and Words

*Activity*:

- Review the alphabet with the class. Sing the alphabet once or twice to remind the children of the letters.
- Read the story to the class. Feel free to discuss the book with among the class.
- Tell the class that many people know that A is for apple, because apple begins with the letter A. Inform them that they will create a new alphabet with all fruits and vegetables.
- Provide them with pictures of fruits and vegetables to identify for each letter. Hold up a few and let them choose which food fits the letter they need next. Allow the children to tell you which letter comes next that they need a food for. If the children do not know how to spell the foods they see on the cards, help them determine which letter begins the words.
- Example: "You just chose banana for the letter B. Good job. Which letter will we do next?" When they respond with "C," hold up pictures of three fruits and vegetables (ie: peach, cherries, asparagus) and have them identify each one (help as needed). Once they have done so, ask them to choose the one that works for this letter. A card may have multiple fruits and vegetables on them to reinforce the letter and introduce new foods.
- See below for a list of sample foods for each letter.
    - A – apple, asparagus, apricot, artichoke
    - B – banana, blueberry, blackberry
    - C – cherry, carrots, celery, cucumber, cantaloupe, collards
    - D – dragonfruit, date
    - E - eggplant
    - F - fig

- G – grape, grapefruit, guava
- H - honeydew
- I – Indian corn
- J – jalepeno, jujube
- K – kiwi, kale, kumquat
- L – lemon, lime, lettuce
- M – mushroom, melon, mango
- N - nectarine
- O – onion, olive, orange, okra
- P – peach, pear, plum, potato, pineapple, passionfruit, peas, pumpkin
- Q - quince
- R – radish, raspberry
- S – spinach, squash, strawberry
- T – turnip, tomato
- U – ugli fruit,
- V - vanilla
- W - watermelon
- X - xigua
- Y – yucca, yam
- Z - zucchini

*Message Example*

- Recording from Child
    - Hi. My name is _____ and today we learned the fruit and vegetable alphabet. There is one for every letter, even Z! Zucchini!

**Friday**
**Food Group Bingo**

*Goal*: to identify foods as part of the correct food group

*Objectives*:

- Children will play a game of bingo identifying foods as part of the correct food groups.

*Materials*:

- Bingo Cards
- Bingo Chips
- Food Calling Cards

*Activity*:

- Explain the concept of bingo to the children.
- Using the Bingo cards provided, explaining the categories as the food groups.
- Hand out 25 chips to each student to mark their board.
- Call out a group and food for the students.
- Go through a couple of rounds to have many children call out BINGO.

*Message Example*

- Recording from Child
    - Hi. My name is _____ and today we played bingo with the food groups. I now know that grapes are fruits and eggs are proteins.

# Week Two
# Veggie Tables

**Monday**
**Let's Taste Some Veggies!**

*Goal*: to help children use all senses to explore the differences in different types of vegetables

*Objectives*:

- Children will identify and describe different types of vegetables.
- Children will have the opportunity to sample different vegetables.

*Materials*:

- Plastic vegetables
- Cut-up pieces of vegetables (such as cauliflower, celery, broccoli, carrots, asparagus, snap peas)
- Bowl of low fat ranch dressing
- Serving spoon
- Small plates
- Small bowls
- Toothpicks or plastic forks

*Activity*:

- Before beginning the activity, wash all vegetables and cut them into bite size pieces. Some vegetables may be more palatable to children when they are cooked. You can lightly steam them or cook them in the microwave.
- Show children different vegetables. Help the children identify the vegetables them. Compare these to the real vegetables. Encourage children to talk about times when they have eaten these vegetables. Find suggested phrases below.
    - "What does this look like? It's broccoli. Have you ever tasted broccoli? Broccoli is hard and crunchy."
    - "What color is this broccoli? It's green, isn't it? How do you think the broccoli feels? It has lots of little stalks on it. I wonder if they feel sort of rough."
    - "Broccoli and other vegetables have special nutrients in them that help keep our bodies healthy. Broccoli has lots of Vitamin A in it."
- Have children wash their hands well. Ask children who would like to taste the different vegetables. Give each child who wants to try the vegetables a small plate and several toothpicks or a plastic fork. Allow them to place a spoonful of low fat ranch dressing on their plates to use as a dip.
- Show children how to pick up the vegetables with the toothpicks or forks and put them on their plates. Be sure that children use a clean toothpick or fork each

time they take a vegetable from the serving bowl. As children choose their vegetables, talk about what the vegetables look and smell like, and encourage them to predict what the vegetables will taste like. Ask whether the vegetables taste different when they are dipped in the ranch dressing. Include some unusual vegetables such as avocado, asparagus, eggplant, cauliflower and radishes as well as more common vegetables such as carrots, corn, broccoli, and peas.

- Allow children to choose whether to try any vegetables and which vegetables to try. Ask children who do sample the vegetables to describe what they feel and taste like. Be aware of any food allergies, sensitivities or diet restrictions. Be sure not to push children to try vegetables if they don't want to, and not to reward children who do try them.

*Message Example*

- Recording from Child
    - Hi. My name is _____ and today we taste all sorts of different vegetables. The class liked the crunchy radishes, but I liked cauliflower the best!

**Tuesday**
**Riddles**

*Goal*: to engage children by using rhymes and clues in riddles to guess vegetables.

*Objectives*:

- Children will guess vegetables based on clues given to them in riddles.

*Materials*:

- Plastic Carrots
- Plastic Peas
- Plastic Broccoli
- Lyrics to Riddles

*Activity*:

- Start by having the children describe the vegetables that will be used in the riddles, one by one. They may talk about its look, smell, taste or any other appropriate description. Encourage them to compare it to other shapes that they know.
- Explain the concept of a rhyme. Talk about how different words can sound alike. Simple examples may be hot and pot, dog and frog. Ask them if they can come up with any pairs of words that sound alike.
- Using the riddles provided below, engage the class by having them guess which vegetable is being described. Explain that the rhymes may help them figure them out.
- Once the riddles have been solved, allow the students who want to try the vegetables to partake in a snack, perhaps adding low fat ranch dressing.

Riddles:
"I have a flower and stem,
But I look like a tree.
I'm all bright green.
I am ???" (Broccoli)

"I'm green and round.
In a pod I am found.
I'm healthy as can be.
I am a ???" (Pea)

"I'm long and orange.

I sound like parrot.
I grow in the ground.
I am a ???" (Carrot)

*Message Example*

- Recording from Child
    - Hi. My name is _____ and today we guessed riddles about fruits and vegetables. The teacher gave us hints and we got them all right!

**Wednesday**
**Sing Along**

*Goal*: to have children learn a song about healthy vegetables.

*Objectives*:

- Children will learn words to a song about vegetables.
- Children will understand that vegetables represent a healthy part of a daily diet.

*Materials*: none

*Activity*:

- As this is simply a song activity, the children will only need to repeat after you, in a song along fashion.
- Ask the children to remember the vegetables that were discussed yesterday.
- Going line by line, engage the children in a sing along the lyrics below.
- Encourage them to share their song with friends and family.

Lyrics (to the Tune of Twinkle Twinkle Little Star)
"Carrots, peas and broccoli,
Vegetables are good for me.
For my snack and in my lunch,
Veggie sticks are great to munch.
Carrots, peas and broccoli,
Vegetables are good for me.

*Message Example*

- Recording from Child
    - Hi. My name is _____ and today we learned a new song like Twinkle Twinkle Little Star all about veggies. (Child may sing song or offer to sing it at home.)

**Thursday**
**Toss Me a Salad!**

*Goal*: to encourage children to eat their vegetables in exciting ways

*Objectives*:

- Children will identify various vegetables.
- Children will taste new combinations of vegetables or new types of vegetables.
- Children will help prepare a salad.

*Materials*:

- Large mixing bowl
- Large sealable plastic bag
- Plastic gloves or two large spoons
- Small bowls
- Lettuce
- Tomato (preferably grape tomatoes, so they do not require cutting)
- Onion
- Carrots
- Bell pepper
- Radishes
- Cucumbers
- Any other vegetables appropriate for a salad
- Low fat dressing

*Activity*:

- Inform the children that they will be helping to prepare their snack or part of their lunch today.
- Have the ingredients for their salad spread out for them.
- Ask the students to identify the vegetables laid out. Ask them what they think they are going to make.
- Tell them that they need to wash the vegetables so that they are clean. Allow them to help wash the vegetables. Vegetables that need to be chopped can be done so ahead of time and put in small bowls ready to be mixed.
- Include the children in the tearing of the lettuce. Attempt to include different and new types of lettuce they may not have previously tried.
- Try putting the salad into plastic bags with the dressing so the children can shake it up and "toss" it themselves with ease.
- Add the low fat dressing and have the children eat it with their lunch.

*Message Example*

- Recording from Child
    - Hi. My name is _____ and today we helped cook lunch. We put all sorts of veggies in the salad and had it with our lunches. It was yummy and had lots of colors in it.

**Friday**
**Color Me Healthy! Version Two**

*Goal*: to encourage the eating of fruits and vegetables by sharing favorites with the class

*Objectives*:

- Children will create a mural from their favorite vegetables.
- Children will draw and cut out pictures of their favorite vegetables to decorate their classroom.

*Materials*:

- Posterboards
- Markers
- Scissors
- Glue
- Pictures of fruits and vegetables
- Construction Paper
- Blank Paper

*Activity*:

- Have the children draw pictures of their favorite vegetables on small pieces of paper or index cards
- Help children write the name of the vegetable on their drawings.
- Encourage the children to glue their pictures to a posterboard to decorate the wall.
- Allow children to cut our pictures of vegetables from magazines to add to the mural.
- Discuss favorites, likes, dislikes, etc.

*Message Example*

- Recording from Child
    - Hi. My name is _____ and today we put up posters of vegetables. I put a broccoli and a carrot on it!

# Week Three
# Root for Fruit

**Monday**
**Let's Taste Some Fruit!**

*Goal*: to help children use all senses to explore the differences in different types of fruit

*Objectives*:

- Children will identify and describe different types of fruit.
- Children will have the opportunity to sample different fruit.

*Materials*:

- Plastic fruits
- Cut-up pieces of fruit
- Bowl of low fat plain yogurt
- Serving spoon
- Small plates
- Small bowls
- Toothpicks or plastic forks

*Activity*:

- Before beginning the activity, wash all fruits and cut them into bite size pieces.
- Show children different fruits. Help the children identify the frutis. Compare them to the real fruits. Encourage children to talk about times when they have eaten these fruits. Find suggested phrases below.
    - "What does this look like? It's a peach. Have you ever tasted peaches? Peaches are soft and sweet"
    - "What color is this peach? It's orange and red, isn't it? How do you think the peach feels? It has lots of little hairs on it. I wonder if they feel sort of fuzzy and soft."
- "Peaches and other fruits have special nutrients in them that help keep our bodies healthy. Peaches have Vitamin A in them."
- Have children wash their hands well. Ask children who would like to taste the different fruits. Give each child who wants to try the fruits a small plate and several toothpicks or a plastic fork. Allow them to place a spoonful of low fat plain yogurt on their plates to use as a dip.
- Show children how to pick up the fruits with the toothpicks or forks and put them on their plates. Be sure that children use a clean toothpick or fork each time they take a fruit from the serving bowl. As children choose their fruits, talk about what the fruits look and smell like, and encourage them to predict what the fruits will taste like. Ask whether the fruits taste different when they are dipped in the yogurt. Include some unusual fruits such as kiwi, starfruit, honeydew, cherries,

and blackberries as well as more common fruits such as apples, oranges, and bananas.

- Allow children to choose whether to try any fruits and which fruits to try. Ask children who do sample the fruits to describe what they feel and taste like. Be aware of any food allergies, sensitivities or diet restrictions. Be sure not to push children to try fruits if they don't want to, and not to reward children who do try them.

*Message Example*

- Recording from Child
    - Hi. My name is _____ and today we taste all sorts of fruits. The class liked the mango best, but I liked the blueberries.

**Tuesday**
**Awesome Applesauce**

*Goal*: to encourage children to eat applesauce as a healthy snack and to recognize that fruits such as apples are an important part of healthy eating.

*Objectives*:

- Children will work together to create no cook applesauce.
- Children will practice math skills by measuring and combining ingredients.
- Children will practice fine motor skills by cutting up pieces of apple.
- Children will identify apples as a fruit.

*Materials*:

- Blender
- 5 or 6 large apples
- 2 pears
- Sugar
- Water
- Brown sugar
- Cinnamon
- Measuring spoons
- Metal table knives (not sharp)
- Sharp knife (keep out of children's reach)
- Wooden spoon
- Paper plates
- Vinyl food service gloves
- Small bowls or cups
- Spoons
- MyPyramid poster for kids

*Activity*:

- If possible, select several different types of apples and pears for this activity to make it easier to compare colors. Before the activity begins, wash all fruit well. Use the sharp knife to core the apples and pears and slice them into fourths. Leave the peel on the fruits. (Be sure to keep the sharp knife out of children's reach.)
- Gather children at a table for the activity. Show children an apple and a pear. Help children identify each fruit. Identify the peel on the fruit, and talk about its color. Show children the bowls of fruit slices, and tell them that this is what the fruits look like when they are cut up. Find suggested phrases below.

    - "Have you ever seen this? It's an apple. What color is this apple? Did you know that apples can be different colors? Some are red, and some are green, and some are yellow." (repeat with pear)
    - "There's a special part f the apple on the outside called the peel. The peel helps protect the apple and keep the inside juicy. The peel also has vitamins in it that will help keep our bodies healthy."
- Show children MyPyramid for Kids. Remind children that there are different food groups, and that it is important to eat lots of different kinds of foods. Help children recognize that fruits are one kind of food that helps keep our bodies healthy.
- Ask children if they have ever eaten applesauce. Talk about what applesauce looks like and tastes like. Tell the children that today they will help make applesauce for a special snack.
- Have all children wash their hands well. (For cleanliness, children should wear vinyl food service gloves during this activity.) Give each child a paper plate, a metal table knife, and a slice of apple and pear. Encourage each child to cut the fruit into small pieces. When children are finished, have them pour the fruit pieces into the bowl of the blender.
- Show children the measuring spoon. Identify it as a measuring spoon, and explain to children that it helps us measure out exactly the right amount of food for the recipe. Compare the teaspoon and tablespoon and ask children which one is larger. Show children how to measure a level tablespoon of sugar, and how to pack the brown sugar into the tablespoon to measure it. Give children measuring tablespoons and small bowls of sugar or brown sugar. Encourage them to practice measuring.
- Have one child add 1 tablespoon of sugar to the blender bowl. Have another child add 2 tablespoons of water, and another child add 2 tablespoons of packed brown sugar. Have another child add 1 teaspoon o nutmeg. Have another child give the cinnamon shaker four shakes into the blender bowl, counting aloud with the class.
- Put the lid tightly on the blender and blend until the fruit reaches the consistency of applesauce. You may need to stop the blender and stir the fruits with a wooden spoon to ensure that all of the fruit gets blended. Ask children to describe what happens to the fruit when the blender is turned on. Find suggested phrases below.
    - "What do you think will happen when we turn on the blender? The fruit will get blended up, so it looks like applesauce instead of pieces of apple. The blender has a blade in the bottom that blends up the fruit."

    - "What is happening while the blender is running? We need to stop it now to mix it. When we mix it with a spoon, we are making sure all the fruit gets down to the bottom so the blade can blend it up."
    - "What does it look like now? (Use words like thick, chunky or smooth, to describe the texture.) The peel makes it colorful. What colors can you see in the applesauce?"
    - "What do you think the applesauce will taste like? It will probably taste sweet, because fruit is sweet and sugar is sweet" (Include texture here too.)
- Pour the applesauce into small bowls or cups. Serve immediately or refrigerate until snack time.

Recipe:

Ingredients:

- 5 or 6 large apples
- 1 or 2 pears
- 1 Tbsp. sugar
- 2 Tbsp. Water
- 2 Tbsp. packed brown sugar
- 1 tsp. nutmeg
- Cinnamon

Instructions:

- Core apples and pear. Leave peel on fruits.
- Cut fruits into small pieces. Place pieces in the bowl of a blender.
- Add sugar, water, and brown sugar to the blender bowl. Shake a small amount of cinnamon into the blender bowl.
- Cover tightly. Blend until fruits reach the consistency of applesauce.
- You may need to stop the blender and stir fruit with a wooden spoon to ensure that all fruit is blended evenly.
- Serve immediately, or store in the refrigerator until serving time.

*Message Example*

- Recording from Child
    - Hi. My name is _____ and today we made applesauce all by ourselves. It was really yummy and we got to eat it for snack.

**Wednesday**
**Pattern Party**

*Goal*: to help children explore and refine their patterning skills and to learn more about fruits.

*Objectives*:

- Children will copy and extend patterns using plastic fruit counters
- Children will compare and contrast fruits, and discuss the similarities and differences among different types of fruit.

*Materials*:

- Pattern cards (see template)
- Plastic fruit counters
- Baskets
- Party hats
- Poster with words to Pattern Party Rhyme
    - Apples and oranges are fun fruits to eat.
    - They make a healthy, yummy treat.
    - When you see fruits, repeat after me.
    - Get ready, set and 1, 2, 3
    - A healthy fruit pattern is what I see.
    - Apple, orange, apple, orange, apple, _____.

*Activity*:

- If there is time, create a party atmosphere and have the children create party decorations.
- Place the plastic fruits in baskets in the middle of the table, and pattern cards and party hats at each chair for individual children.
- Invite children to the Pattern Party. Encourage them to put on party hats. Tell them that patterns are things that occur over and over again. Provide some examples of patterns around the room. Find suggested phrases below.
    - "We are going to have a Pattern Party with different kinds of fruits. A pattern is something that happens over and over again. Let's look around the room to find some patterns. "
    - "There is a pattern in the material of your shirt, Johnny. The pattern is car, truck, car, truck, car, truck. What would come after the car? Yes, that's right, truck."

    - "There is a pattern in the artwork that Omar created. The pattern is circle, circle, square, circle, circle, square. What would come next? Yes, that's right, circle, circle, _____ (square)."
- Introduce the Pattern Party Rhyme and lead children in reciting it. Place a fruit pattern on the table for children to see. Say the pattern out loud as you point to the different fruits. At the end of the pattern, have children tell you what comes next. Find suggested phrases below.
    - "I have some fruit in a pattern on the table. Let's say our rhyme and then see if we can tell what comes next in the pattern." (Recite the rhyme)
    - "What fruit comes next? Yes, you're right. Banana comes next in this pattern."
- Encourage children to complete the patterns on their pattern cards. When children have mastered one pattern, give them a different pattern to complete. Children who have mastered several patterns could use blank pattern cards to create their own patterns. As children get more experienced with patterns, encourage them to complete more difficult patterns. (eg: apple, pear, orange, apple, pear, orange or apple, apple, pear, apple, apple, pear)
- As children place fruits into the pattern, talk about what the fruits look like, what they smell like, what color they are, etc. Have them compare the different fruits.

*Message Example*

- Recording from Child
    - Hi. My name is _____ and today we learned about patterns. I made my pattern with lemons and limes.

**Thursday**
**Let's Make a Healthy Fruit Salad**

*Goal*: to encourage cooperation as children to make a healthy and creative snack and to emphasize the importance of eating a variety of foods, including fruits.

*Objectives*:

- Children will identify different types of fruits and discuss their characteristics (color, shape, smell, taste, etc.)
- Children will practice fine motor skills by cutting up fruit, mixing fruits salad, and serving themselves.

*Materials*:

- 4 or 5 types of fresh fruit (bananas, strawberries, grapes, pear, apples, oranges, kiwifruit)
- Large mixing bowl
- Smaller serving bowls
- Serving spoons
- Metal table knives (not sharp)
- Vinyl food service gloves
- Individual plates or bowl
- Small measuring cup or large serving spoon

*Activity*:

- Before the activity begins, wash all fruit well. Core apples and pears and cut them into fourths. Cut the tops off strawberries. Peel kiwi fruit. Place each type of fruit in a separate small serving bowl. Canned fruit may replace fresh fruit if necessary. Use fruit in natural juice or light syrup.
- Have children wash their hands and sit in a small group around a table. Have children wear foodservice gloves for cleanliness.
- Introduce the activity by telling the children that they will be making a special snack again, perhaps for a visitor.
- Show the children each small bowl of fruit and ask them to describe it to their visitor. Find suggested phrases below.
    - "Can you tell our visitor what this fruit is called?"
    - "Those are bananas. What color are the bananas? What do bananas look like before they are cut up?"
    - "This outside part of the banana is the peel. It helps protect the banana and keep the inside soft. Let's take the peel off the banana and see what it looks like inside. What color is the inside?"

    - "Has anyone ever tasted a banana? What do bananas look like?"
    - "Fruits have lots of nutrients that keep our bodies healthy, like vitamin C."
- Give each child some pieces of fruit and a metal table knife. Encourage children to cut up the fruits into small pieces and add them to the large mixing bowl. Give some children bananas to peel and slice with their knives. Give other children oranges to peel. Show children how to separate the orange sections and add them to the bowl. Talk with the children about how the outsides of the fruits look, and what they look inside. Find suggested phrases below.
    - "You are cutting up an apple. What color is the outside of that apple? The inside looks really different, doesn't it? It's white and it has juice inside. What does the juice feel like?"
    - "This green fruit is a kiwi fruit. Has anyone ever seen a kiwi before? (Show children an unpeeled kiwi fruit.) Feel the outside. It's kind of fuzzy, isn't it? And look at how different it looks inside. If we cut this kiwi open, what do you tink the inside would look like? It would be green like this kiwi, wouldn't it? Let's cut it open and find out."
    - "This orange has a hard peel on the outside. What do you think it will look like inside? Have you ever tasted an orange?"
- Have children take turns stirring the fruit salad. Thank the children for helping and encourage them to talk about what the fruit salad looks and smells like, and how good it will taste.
- At snack time, have each child serve him/herself some of the fruit salad. Remind children that they helped create the fruit salad. Have them invite their guest to try their salad. Talk again about the different kinds of fruits in the salad, and what they taste like. Allow children to choose whether to try any fruits and which fruits to try. Allow children who are still hungry after their first portion to serve themselves more fruit salad.

*Message Example*

- Recording from Child
    - Hi. My name is _____ and today we made snack again. We made fruit salad. I put in the bananas!

**Friday**
**Fruit Salad Foot Races**

*Goal*: to encourage children's developing gross motor skills and to help children become familiar with a variety of fun physical activities while learning about healthy snacks.

*Objectives*:

- Children will use their gross motor skills to run races.
- Children will recognize the importance of physical activity to keep their bodies healthy.
- Children will identify different types of foods and will recognize that eating a variety of foods is important for good health.
- Children will recognize that drinking water helps keep them healthy.

*Materials*:

- Plastic fruits
- Team tote bags
- Some sort of mark of a starting point (line, flag, piece of playground equipment)

*Activity*:

- Prior to bringing the students outside, spread a variety of plastic fruit models in the playing area.
- Divide the class into two teams.
- Have the children gather behind their starting point and tell them that they are going to work together to collect fruits that make a healthy fruit salad.
- Encourage team members to run out one at a time, pick up a fruit, say "I found a ____!" and place in their bag.
- When one child has finished, the next child may go out and collect a fruit. (relay style)
- When all the fruits are collected, talk with the children about what fruits they found, what the fruits look and taste like, and what their favorite fruits are.
- Include water and a fruit salad (cocktail in natural juices or light syrup, or homemade) for snack.

*Message Example*

- Recording from Child
    - Hi. My name is _____ and today we ran outside collecting fruits. Our team had the banana and kiwi in our basket.

# Week Four
# Plate It! It’s Mealtime

**Monday**
**Taste the Food Rainbow!**

*Goal*: to describe foods fitting each color of the rainbow

*Objectives*:

- Children will identify various fruits and vegetables.
- Children will identify the colors of the rainbow.

*Materials*:

- Rainbow poster
- Food models

*Activity*:

- Ask the children if they have ever seen a rainbow. If they have, tell them to describe what they saw.
- Talk to children about the various colors of the rainbow. See if they can identify the colors.
- Remind them that they have learned about many fruits and vegetables recently. Have the children identify fruits and vegetables that match each color of the rainbow.

*Message Example*

- Recording from Child
    - Hi. My name is _____ and today we learned about rainbows and all the colors. Plums are purple and mangoes are orange!

**Tuesday**
**Placemat Art**

*Goal*: to help children recognize the importance of eating a variety of different foods.

*Objectives*:

- Children will decorate a placemat with pictures of various foods.
- Children will practice reasoning skills by selecting pictures for their placemats.
- Children will practice fine motor skills by cutting out and gluing pictures.

*Materials*:

- Magazines with pictures of a wide variety of foods in different groups.
- Construction paper
- Markers or crayons
- Glue sticks
- Clear contact paper
- Sample set ups (placemat, plate, cup, napkin, silverware)
- MyPyramid for Kids poster

*Activity*:

- Introduce children to the idea of a placemat. Explain that placemats protect the table and give us a place to put our plates, cups, napkins and flatware. Use the placemats and tableware to demonstrate the use of a placemat. Encourage children to practice setting plates, cups, napkins and flatware on the placemats.
- Remind children that there are different food groups. Show children MyPyramid for Kids. Explain the different foods in each category and remind them that it is important to eat lots of different kinds of foods. You might say "Remember that to be healthy we need to eat foods from all of the food groups: grains, vegetables, fruits, milk, and meat and beans." Explain to the children that they will make a placemat will pictures of different foods, so they can remember to eat a variety of foods.
- Give each child a piece of construction paper. Place magazines, markers, and glue on the art table. Help children choose and cut out pictures. If cutting is difficult for your group, have some pictures pre cut for children to select and glue, and encourage drawing.
- Encourage the children to decorate their placemats in any way they choose. Children could also draw pictures of their favorite healthy foods on their placemats, or perhaps a new food they have learned about. Help children write their names on the placemats.

- Cover the placemats with clear contact paper. Place each child's placemat on the table before daily meals or snacks in the future. Encourage children to name the foods on their placemats and talk about what they smell and taste like.
- To include math, have them count how many food groups there are and how many foods are on their placemats.

*Message Example*

- Recording from Child
    - Hi. My name is _____ and today we made placemats. Mine has a sandwich and a peach on it and I get to use it every day now!

**Wednesday**
**Tasha's Lunchbox Adventure: Part One**

*Goal*: to introduce children to the concept of eating a variety of foods

*Objectives*:

- Children will recognize the importance of eating a variety of foods from the different food groups

*Materials*:

- Cards with foods printed on them or food models
- Brown paper lunch bag filled with the components of a healthy meal for example (sandwich, broccoli, carrots, 100% fruit juice, fruit cocktail desert)
- MyPyramid for Kids poster

*Activity*:

- To set an example, before the session begins, pack a lunchbox with food momdesl that could represent a healthy lunch (eg: sliced turkey, whole wheat bread, fruit and carrot sticks). Have a variety of other food cards available for children to pack in the lunchbox as the activity progresses.
- Explain that there are lots of things we can do to keep our bodies healthy. Help children recognize that eating a variety of different foods, especially fruits and vegetables, is one way to keep our bodies healthy.
- Show children MyPyramid for Kids, and explain that the bars on the pyramid represent different kinds of foods. Emphasize the width of the fruit and vegetables bars. Point to the different bars and identify the corresponding food groups. Encourage children to list examples of each type of food. Find suggested phrases below.
    - "There are lots of different kinds of foods that keep us healthy. This pyramid has bars that tell us what kinds of foods to eat to stay healthy. It's important for us to eat foods from all of the different bars."
    - "What color is this bar? It's orange. The orange bar is for grains. Grains are foods like bread and rice and crackers. Can you think of some foods that are in the grain group?" (Repeat for other food groups.)
- Show children the lunchbox. Tell them that a friend named Tasha has packed her lunchbox with foods she likes to eat. Find suggested phrases below.
    - "I have a friend named Tasha. She has packed this lunchbox, and wanted us to look at what's in it."
    - "Let's open Tasha's lunchbox and see what she has packed for lunch."

- Open the lunchbox and have a different child pull each food, one at a time. Have children help identify the different foods, and talk about what they smell and taste like. Help children identify the category of each food using MyPyramid for Kids. Empty the lunchbox completely.

*Message Example*

- Recording from Child
    - Hi. My name is _____ and today we learned about the foods in different food groups that can be in lunch. They all smell different.

**Thursday**
**Tasha's Lunchbox Adventure Part Two**

*Goal*: to introduce children to the concept of eating a variety of foods and including fruits and vegetables in their diets

*Objectives*:

- Children will sort foods into different food groups (ie: identify the fruits and vegetables) and separate them
- Children will pack their own lunches with more nutrient dense foods than foods with empty calories.
- Children will share their lunch choices with the class.

*Materials*:

- Brown paper lunch bag
- Cards with foods printed on them or food models
- MyPyramid for Kids poster

*Activity*:

- Ask the children to remember yesterday's activity. Remind them of the large MyPyramid for Kids poster.
- Explain to the class that they are going to help pack Tasha's lunch for tomorrow. Tell the children that Tasha has eating this same lunch every day for a long time and wants to try some different foods. Ask one child to choose a component of Tasha's lunch (one main dish, a fruit, a vegetable, dessert and a drink). Talk about each one and what it might taste like. Do this until her lunch is packed. Find suggested phrases below.
    - "Tasha's lunchbox is empty now. She's been eating the same foods every day and wants to try some new things. What can we pack in her lunchbox for tomorrow sos she'll have some different foods to try?"
    - "Can you pick out a drink for Tasha? You have chosen milk. Do you think Tasha will like the milk?"
    - "I think Tasha would like some fruit in her lunch tomorrow. Can you pick out a fruit? You chose an orange. What does an orange smell like? What does it taste like?"
- Thank the children for helping to pack Tasha's lunch.

*Message Example*

- Recording from Child

- Hi. My name is _____ and today we helped pick out a lunch. I thought we should have put grapes in it, but the class voted for cherries.

**Friday**
**Scavenger Hunt**

*Goal*: to identify foods found on a scavenger hunt

*Objectives*:

- Children will find foods hidden slightly around the play area.

*Materials*:

- Food models
- Brown Paper Bags

*Activity*:

- Scatter various food models around the play area.
- Tell the children that they will search the play area for foods.
- Each child can find one item
- Once each child has found one food, have them identify their food and describe it.

*Message Example*

- Recording from Child
    - Hi. My name is _____ and today we did a scavenger hunt. I found the corn in the corner of the slide and put it in my group's meal.

# Week Five
# How I Take Care of Me

**Monday**
**The Snack Shack (Part One)**

*Goal*: to reinforce the concept that eating a variety of foods is important for good health.

*Objectives*:

- Children will practice self-concept and social skills as they act out the roles of customer, cashier and cook.
- Children will choose a variety of healthy snacks from the options offered.

*Materials*:

- Plastic fruits and vegetables
- Food picture cards
- Posterboard for menu
- Magazines
- Glue sticks
- Scissors
- MyPyramid for Kids poster

*Activity*:

- Discuss with the class the components of running a snack shop. (Menu, food, prices, etc.)
- Have the class develop a menu for their very own shop. Encourage decorating poster with the options they come up with to sell at their shop.
- Tell them to pick foods that they would like to eat, as they will create their restaurant later in the week.
- Encourage a theme for the menu to creatively name their food items.
- Have the students cut out pictures of their menu items and draw pictures of them to paste onto the posterboard which will act as the menu for Thursday.
- Write the names of the foods underneath the corresponding pictures.

*Message Example*

- Recording from Child
    - Hi. My name is _____ and today we made menus. We put apples and peanut butter to buy at the snack shop and will get money for snacktime on Thursday.

**Tuesday**
**The Smelly Box and Feely Socks**

*Goal*: to learn about the sensory characteristics of foods

*Objectives*: Children will play detective to identify foods using only one sense at a time.

*Materials*:

- Sturdy fruits and vegetables.
- Clean socks
- Smelling Boxes (aluminum pans, with holes in them)
- Various fruit juices
- Bandanas

*Activity*:

- Review the five senses. Name a few things for each. (see colors, hear music, touch hands, etc.)
- Feely Socks
    - Place sturdy foods inside clean socks.
    - Ask the children to put their hands into the socks and identify the foods only by touch.
    - Talk with them and the class about how the foods feel. (smooth, bumpy, fuzzy, round, long, large, small)
    - If needed encourage other class mates to help guess by asking questions.
    - Try a peach, an avocado, kiwi, pear, celery, cherries, mushroom. (things with distinct shapes or textural qualities) Make sure the foods have been shown beforehand so that children are familiar with them.
- The Smelly Box
    - Hide various fruits in closed shoe boxes with slits in the lids.
    - Ask the children to identify the foods by smell alone. (Foods with stronger smells include lemons, onions, limes)
- Can You Believe Your Ears?
    - Ask the children to close their eyes and identify foods using only the sense of hearing. Good examples are snapping or crunching carrots, or cucumbers.
- Stick Your Tongue Out
    - Blindfolding students gently with bandanas, pour out samples of distinct tasting juices for them to guess. (Examples: pineapple, mango, watermelon)

*Message Example*

- Recording from Child
    - Hi. My name is _____ and today we guessed fruits and vegetables. I heard celery and smelled limes and felt a fuzzy peach!

**Wednesday**
**A-Maze-ing Fruits and Vegetables**

*Goal*: to reinforce distinguishing between healthy fruits and vegetables and junk foods.

*Objectives*:

- Children will complete a maze avoiding junk foods and collecting fruits and vegetables to get to the finish line.
- Children will use fine motor skills to draw their line through the maze.

*Materials*:

- Markers, pens, or pencils
- Provided mazes

*Activity*:

- Remind the children that they have learned about what healthy snacks are and how they provide energy to get from one place to the next.
- Pass out the sheets with mazes on them and instruct the children on how to complete a maze. Note that they may not cross any of the bold lines and have to make it to the finish line without being interrupted.
- In this case, tell them that they should collect all the healthy snacks, and avoid the bad ones. This will help their character have the energy to get from start to finish.
- Supervise them by walking around and assisting as needed.

*Message Example*

- Recording from Child
    - Hi. My name is _____ and today we did mazes. I collected all the fruits and vegetables and got all the way to the end.

**Thursday**
**The Snack Shack Part Two**

*Goal*: reinforce the concept that eating a variety of foods is important for good health

*Objectives*:

- Children will practice self-concept and social skills as they act out the roles of customer, cashier and cook.
- Children will choose a variety of healthy snacks from the options offered.

*Materials*:

- Play money
- Table to be used as an ordering counter
- Tables and chairs
- Napkins
- Plastic serving dishes
- Menu board with pictures (created on Monday)

*Activity*:

- Divide the class into two groups, one who will be "cooking" and the other which will be acting as the customers.
- Distribute the play money to the other group of children and have them order from the Snack Shack and pay for their items. Supervise the adding of prices so that the students don't overspend their money. (Make the items evenly priced and allow the children to choose two items or so, noting that if they choose three, they do not have enough money. Perhaps, an apple is $1.50, carrots and ranch is $1.50 and milk is $1. If they ask for the apple and carrots, but only have $2.50, suggest things within their price range. This can encourage the purchase of a snack and drink and prevent them from buying all snacks and no drink.)
- Once the first group is done, switch the roles of the groups.

*Message Example*

- Recording from Child
    - Hi. My name is _____ and today we got money to buy snacks. I bought radishes and ranch and milk for my snack!

**Friday**
**Healthy Foods Help Me Go, Junk Foods Make Me Slow**

*Goal*: to help children understand that fruits and vegetables are necessary components of a daily diet to help them grow and have energy to play

*Objectives*:

- Children will recognize foods as falling into the category of different groups.
- Children will understand the concept of eating healthy foods to participate in their daily activities
- Children will participate in physical activity.

*Materials*:

- Cards of healthy food items and junk food items
- A large space for the children to run in, with an appropriate distance for a race

*Activity*:

- Red Light, Green Light is an outdoor race to include a physical activity component. Once outside, the teacher says either red light or green light to get the students from the start line to the finish line.
- If the teacher says green light, the students run toward the finish line. After a short period of time, the teacher says red light to stop the kids. The length is at the teacher's discretion, but it shouldn't be too long, or else the race may be finished too quickly.
- The teacher may alternate red light and green light, or may say red light two times in a row and if the children move, they go to sit and watch the rest to see who finishes the race.
- The first one to cross the finish line without being stopped because of moving through a red light wins.
- In this case, the green lights will be represented with fruits and vegetables, which can be held up while being said in order to be considered a green light. Junk foods will be considered the red lights, which will also be held up as they are said.

*Healthy Foods*
Apple
Asparagus
Broccoli
Cauliflower
Grapefruit

Salad
Zucchini

*Junk Foods*
Potato Chips
Chocolate Bar
Cookies
Crackers
Starburst
Hot dogs
Cereal

Message Example

- Recording from Child
    - Hi. My name is _____ and today we raced by foods. We could go at the fruits and veggies, but had to stop for the bad foods. I made it all the way to the end!

References, from which activities have been adapted.

Bales, D., M. Coleman, and C. Wallinga, *Eat Healthy, Be Active*. 2006, University of Georgia: Athens, Georgia.

Berman, C. and J. Fromer, *Teaching Children About Food*. 1991, Palo Alto, Ca: Bull Publishing Company.

Bihn, E.A., et al., *The Fun Fruit and Very Vegetable Tour*, Department of Food Science, Cornell University: Ithaca, NY.

Harrison, J.A., *Smart Kids Fight Bac!*, University of Georgia Cooperative Extension Service.

NDC. *Nutrition Lessons*. 2009 11 August 2009]; Available from: www.nutritionexplorations.org.

APPENDIX C

CHILDREN'S KNOWLEDGE EVALUATION

This activity is designed to evaluate the children's knowledge of fruits and vegetables. Preference for and consumption of fruits and vegetables will be examined using surveys and interviews with the parents and teachers respectively,

This is to mimic packing a lunch. It will be explained to the children that they will be going on a picnic and need to pack a healthy lunch to give them energy for the hiking trip. They will be asked to choose the items that include the most fruits and vegetables to put in their lunch bag. At this point, they will be presented with a brown plastic bag to fill with index cards with pictures of the items of their choosing. The cards may be read to the children along with the pictures.
They are to choose one main item, two sides, one dessert and one drink to put in their lunch bags to maximize the amounts of fruits and vegetables to get the most energy. Points will be awarded, but not made known to the child based on the items chosen. Fruit and vegetable items will get two points, while the other items will be valued at one point. Children should not be coerced or guided in any fashion when making their decisions. Researchers will total the points to score children on their knowledge of fruits and vegetables from a minimum of five to a maximum of ten.

Pepperoni Pizza

http://www.foodordersystems.com/demo/images/carbconceptspizzalarge.jpg

Ham Sandwich with Cheese, Lettuce and Tomato

https://www.stanford.edu/dept/anthropology/cgi-bin/web/files/images/GSO%20BrownBagPhoto.img_assist_custom.JPG

Supreme Pizza

http://www.tarantospizza.com/supremepizza.gif

Chicken Nuggets

http://www.recipebook.co.za/joom/images/stories/rapidrecipe/1173178107Chicken%20Nuggets%20with%20Parmesan%20Cheese

Apple

http://www.foodsubs.com/Photos/apple-braeburn.jpg

Potato Chips

http://3.bp.blogspot.com/_73Kt7qhOtFI/Rvcn6i63mqI/AAAAAAAAAcw/0swsuQP2CRQ/s320/Potato_Chips.jpg

Carrots

http://www.freeclipartnow.com/d/20539-2/baby-carrots-peeled.jpg

Broccoli

http://mommylife.net/archives/2009/05/20/broccoli.jpg

Macaroni and Cheese

http://richd.com/images/macaroni.jpg

Granola Bar

http://breakroommedia.com/images/GranolaBar.jpg


Soda

http://www.aisleone.net/wp-content/2007/07/coke.jpg

Milk

http://z.about.com/d/15minutefashion/1/0/I/0/-/-/milk.jpg

Water

http://elizabethcarroll.files.wordpress.com/2008/07/bottled-water.jpg

Fruit Juice

http://miniimpex.com/yahoo_site_admin/assets/images/Juice.14182844_std.jpg

Fruit Cocktail

http://www.thegeminiweb.com/babyboomer/wp-content/uploads/2007/02/fruit_cocktail.jpg


Chocolate Pudding

http://www.snackpack.com/images/products/pudding/chocolate-image.jpg


Skittles

http://www.sugarstand.com/images/sc/sc0105c.jpg

APPENDIX D

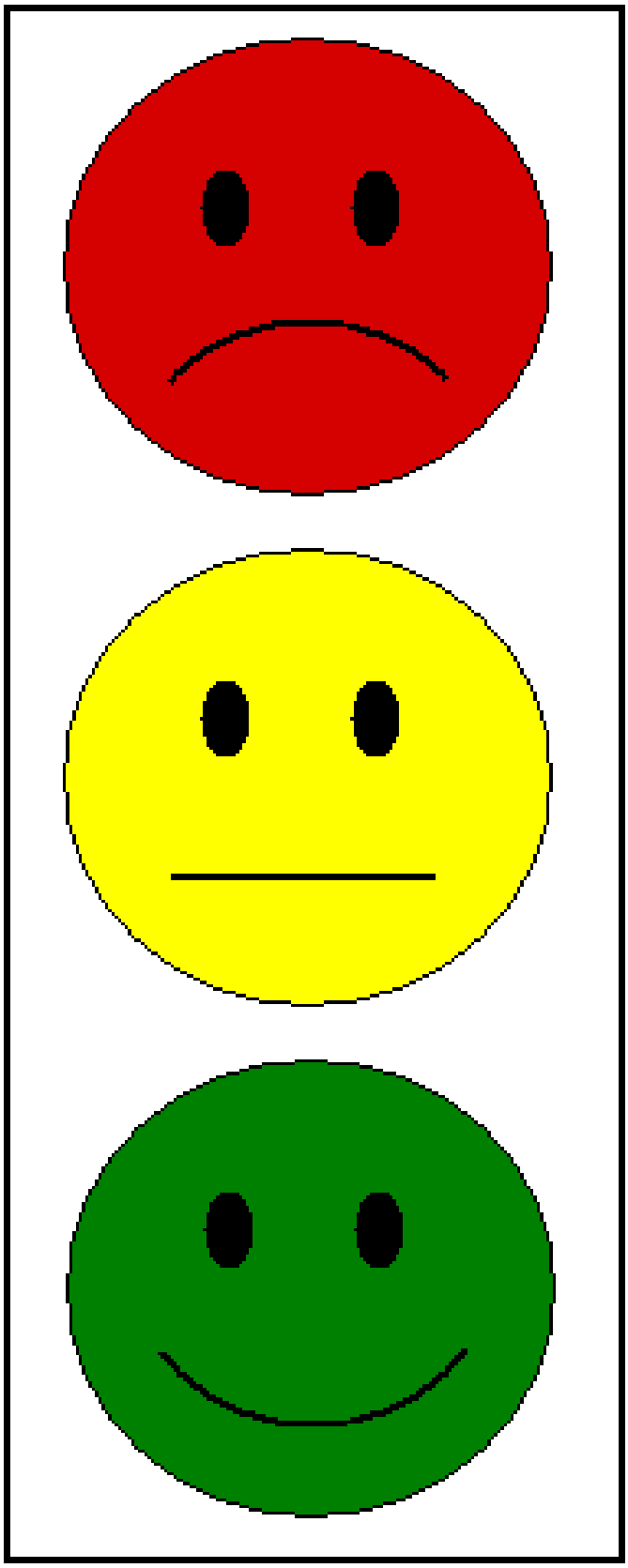
CHILDREN'S PREFERENCE EVALUATION

Children will sit down with a researcher to determine their preferences of fruits and vegetables. Children will be informed of the process and then participate.

Instructions:

The researcher will explain the process to the child before beginning the evaluation. This evaluation consists of a traffic light picture with positive, neutral and negative faces corresponding to the child's preferences. The smiley face indicates a liking of the food, a neutral face may indicate apathy or unfamiliarity, and the frowney face indicates a disliking of the food. This will be completed before and after the intervention for comparison purposes. The researcher will record the preferences into a chart for each child, provided here.

| **Food** | **Like** | **Neutral/Unfamiliar** | **Dislike** |
|---|---|---|---|
| Broccoli | | | |
| Carrots | | | |
| Cauliflower | | | |
| Blueberries | | | |
| Tomato | | | |
| Mushroom | | | |
| Cherries | | | |
| Bananas | | | |
| Asparagus | | | |
| Cantaloupe | | | |



SURVEY

# Questionnaire

***Ethnicity***:
- ☐ Caucasian
- ☐ Black
- ☐ Hispanic
- ☐ East Asian
- ☐ Indian
- ☐ Native American
- ☐ Other

***Child's Gender***:
- ☐ Male
- ☐ Female

***Age***: _____

***Marital Status***:
- ☐ Single
- ☐ Married
- ☐ Divorced

If Married:
***Age of Spouse***: _____

***Household Income***:
- ☐ ≤ $20,000
- ☐ $20,001 – $40,000
- ☐ $40,001 – $60,000
- ☐ $60,001 – $80,000
- ☐ $80,001 – $100,000
- ☐ $100,000 – $150,000
- ☐ $150,001 – $200,000
- ☐ $200,001 +

***Number of Dependent Children***: _____

Internet Usage

How often do you use the internet?

- ☐ Never
- ☐ 1-2 times/month
- ☐ 1-2 times/week
- ☐ 3-5 times/week, but not every day
- ☐ 1-2 times/day
- ☐ 3-5 times/day
- ☐ 1-2 times/hour
- ☐ 3+ times/hour

What types of activities do you use the internet for? (Check all that apply.)

- ☐ Email
- ☐ News
- ☐ Shopping
- ☐ Information Searching
- ☐ Entertainment (YouTube, TV shows)

Cell Phone Usage

How often do you use your cell phone?

- ☐ Rarely
- ☐ A few times per day
- ☐ A few times per hour
- ☐ Extremely often, I hardly set it down

What types of activities do you use your cell phone for? (Check all that apply.)

- ☐ Phone Calls
- ☐ Texting
- ☐ Picture Taking
- ☐ Games
- ☐ Alarm
- ☐ Media Sharing (Photos and Videos)
- ☐ Internet Access
- ☐ Email
- ☐ Calendar
- ☐ Business

Do you have land line telephone service? ☐ Yes ☐ No

Fruit Intake (on average, over the past month)

How many servings of fruits do you consume per day (1/2 cup)? _____

How many servings of fruits does your preschool child consume per day (1/2 cup)?

_____

How often do you purchase fruits?

☐ I rarely buy fruits

☐ About 25% of the times I buy groceries

☐ About half the times I buy groceries

☐ About 75% of the times I buy groceries

☐ Every time I buy groceries

Rank the types of fruits you purchase according to frequency (1 being the most frequently, 3 being the least frequently)

☐ Fresh

☐ Canned

☐ Frozen

Vegetable Intake (on average, over the past month)

How many servings of vegetables do you consume per day (1/2 cup)? _____

How many servings of vegetables does your preschool child consume per day (1/2 cup)?

_____

How often do you purchase vegetables?

☐ I rarely buy vegetables

☐ About 25% of the times I buy groceries

☐ About half the times I buy groceries

☐ About 75% of the times I buy groceries

☐ Every time I buy groceries

Rank the types of vegetables you purchase according to frequency (1 being the most frequently, 3 being the least frequently)

☐ Fresh

☐ Canned

☐ Frozen

APPENDIX F

WEEKLY FOOD LOG

This is a food log, filled in on a weekly basis. Please indicate whether or not a food was purchased, which may be marked by a simple check. Next, please fill in the number of times the food was served at your home, and lastly, please write how many times your child consumed the food and how many times you ate the food yourself. Thank you.

| Food | Purchased | # of Times Served | Eaten by Child | Eaten by Parent |
|---|---|---|---|---|
| Apples | | | | |
| Asparagus | | | | |
| Banana | | | | |
| Blueberries | | | | |
| Broccoli | | | | |
| Cantaloupe | | | | |
| Carrots | | | | |
| Cauliflower | | | | |
| Celery | | | | |
| Cucumber | | | | |
| Cherries | | | | |
| Cranberries | | | | |
| Grapefruit | | | | |
| Grapes | | | | |
| Green Beans | | | | |
| Honeydew | | | | |
| Kiwi | | | | |
| Lemon | | | | |
| Mango | | | | |
| Mushrooms | | | | |
| Okra | | | | |
| Olive | | | | |
| Onion | | | | |
| Orange | | | | |
| Peas | | | | |
| Peach | | | | |
| Pineapple | | | | |
| Plum | | | | |
| Potato | | | | |
| Radish | | | | |
| Raspberries | | | | |
| Spinach | | | | |
| Strawberries | | | | |
| Tomatoes | | | | |
| Watermelon | | | | |
| Zucchini | | | | |

APPENDIX G

KITCHEN INVENTORY

This is to be a list of fruits and vegetables you have on hand kept in the house and the form in which they were purchased. Some foods may fall into more than one category. For example, you may have purchased both canned and frozen green beans. Please list each fruit and vegetable you have in your home and check the box(es) that appropriately describe the item. Thank you.

| Food | Fresh | Frozen | Canned |
|---|---|---|---|
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APPENDIX H

TEACHER INTERVIEW PROTOCOL

1. How easily was the curriculum incorporated into the daily routine?
2. Were the activities and the directions for sending messages home via technology clearly explained?
3. Did you feel that the activities were appropriate for the children?
4. Did the children enjoy the activities?
5. How well did taping the children go? Was this fun for them? Was it easily done?
6. Would you be willing to continue this idea in your classes and implement something similar again?
7. How beneficial do you feel it was?
8. Discuss any changes in the children's consumption of fruits and vegetables.
9. Do the children's preferences for fruits and vegetables seem different? Do they like them better or worse?
10. Do you have any suggestions for improvement?
11. Describe the interaction with parents, including the frequency.