AN EVALUATION OF FIVE LESSONS FROM DISCOVER MYPLATE—AN INQUIRY-BASED NUTRITION EDUCATION CURRICULUM FOR KINDERGARTEN STUDENTS

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BY
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ABSTRACT

THESIS: An Evaluation of Five Lessons from Discover MyPlate—An Inquiry-Based Nutrition Education Curriculum for Kindergarten Students

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Discover MyPlate, a nutrition education curriculum for kindergarten students, was published by the United States Department of Agriculture (USDA) in June 2014. This study measured the impact of five 30-minute nutrition education lessons from Discover MyPlate on the nutrition knowledge, attitudes, and healthy eating behaviors of kindergarten students in a rural, Midwestern school district. Students were given a pre-assessment survey that measured specific constructs from Discover MyPlate. The lessons were taught in two of four kindergarten classes (treatment group); the remaining two classes served as the control group. After the intervention, all kindergarten students were given the post-assessment and their parents were asked to complete a survey to measure perceived changes in their child’s eating patterns in the previous month. Results indicated treatment group students were significantly more likely to acknowledge what is a food group (p<0.001), state the number of food groups (p<0.001), give the names of each food group (p<0.001), identify the MyPlate logo (p<0.001), and assign foods to their corresponding food group (p<0.001). No significant differences were noted between the control and treatment groups regarding the parents’ observations of any changes in their child’s eating behaviors. Overall, Discover MyPlate was effective for teaching children about healthy eating, but, no evidence was obtained to indicate eating behaviors were immediately affected.
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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSTRACT</td>
<td>ii</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>iii</td>
</tr>
<tr>
<td>TABLE OF CONTENTS</td>
<td>iv</td>
</tr>
<tr>
<td>CHAPTER 1: INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Problem</td>
<td>2</td>
</tr>
<tr>
<td>Purpose</td>
<td>3</td>
</tr>
<tr>
<td>Research Questions</td>
<td>3</td>
</tr>
<tr>
<td>Rationale</td>
<td>4</td>
</tr>
<tr>
<td>Assumptions</td>
<td>5</td>
</tr>
<tr>
<td>Definitions</td>
<td>5</td>
</tr>
<tr>
<td>Summary</td>
<td>6</td>
</tr>
<tr>
<td>CHAPTER 2: REVIEW OF LITERATURE</td>
<td>8</td>
</tr>
<tr>
<td>Introduction</td>
<td>8</td>
</tr>
<tr>
<td>Standards for Children</td>
<td>9</td>
</tr>
<tr>
<td>MyPlate: A Nutrition Icon</td>
<td>9</td>
</tr>
<tr>
<td>The Need for Fruits and Vegetables</td>
<td>10</td>
</tr>
<tr>
<td>Limit Excess Fat and Sugar</td>
<td>10</td>
</tr>
<tr>
<td>Start with a Healthy Breakfast</td>
<td>11</td>
</tr>
<tr>
<td>Increase Physical Activity</td>
<td>12</td>
</tr>
<tr>
<td>Key Messages</td>
<td>12</td>
</tr>
</tbody>
</table>
# Contents

Student Assessment Instrument .................................................................................. 34

Parent Assessment Instrument .................................................................................. 34

Pilot Study and Validity of the Instrument ................................................................. 35

Training of Assistants ............................................................................................... 36

Curriculum ................................................................................................................ 36

Discover MyPlate Lessons in Detail ......................................................................... 37

Methods ..................................................................................................................... 39

Data Entry and Coding ............................................................................................... 41

Data Analysis ............................................................................................................. 42

Summary .................................................................................................................... 42

CHAPTER 4: RESULTS ............................................................................................... 43

Subjects ..................................................................................................................... 43

RQ #1: Child Assessment ......................................................................................... 44

Knowledge about MyPlate ....................................................................................... 44

   MyPlate Food Groups ......................................................................................... 44

   MyPlate Logo .................................................................................................... 47

   Identifying Food Groups ................................................................................... 48

   Naming a Colorful Fruit and Vegetable ............................................................ 49

Fruit and Vegetable Consumption ........................................................................... 50

   Fruit ................................................................................................................... 50

   Vegetables ......................................................................................................... 51

Attitude Toward Healthy Foods .............................................................................. 51
<table>
<thead>
<tr>
<th>Kiwi</th>
<th>51</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrots</td>
<td>52</td>
</tr>
<tr>
<td>Broccoli</td>
<td>53</td>
</tr>
<tr>
<td>Ability to Select Healthy Foods</td>
<td>54</td>
</tr>
<tr>
<td>Soda</td>
<td>54</td>
</tr>
<tr>
<td>Whole Grain Cereal</td>
<td>55</td>
</tr>
<tr>
<td>Potato Chips</td>
<td>55</td>
</tr>
<tr>
<td>Fruits and Vegetables</td>
<td>56</td>
</tr>
<tr>
<td>RQ #2: Parent Survey</td>
<td>57</td>
</tr>
<tr>
<td>Eating Behaviors of Child</td>
<td>58</td>
</tr>
<tr>
<td>Usual Preferences of Child toward Eating Fruits and Vegetables</td>
<td>59</td>
</tr>
<tr>
<td>Attitude Toward Fruits and Vegetables</td>
<td>59</td>
</tr>
<tr>
<td>Trying New Fruits and Vegetables</td>
<td>60</td>
</tr>
<tr>
<td>Summary</td>
<td>61</td>
</tr>
</tbody>
</table>

CHAPTER 5: DISCUSSION...........................................................................62

| RQ #1: Child Assessment                                             | 62 |
| Knowledge about MyPlate                                             | 62 |
| Behavior of Fruit and Vegetable Consumption                        | 65 |
| Attitude Toward Healthy Foods                                       | 66 |
| Ability to Select Healthy Foods                                     | 67 |
| RQ #2: Parent Assessment                                            | 69 |
| Eating Behaviors of Children                                       | 69 |
Usual Preferences and Attitude Changes for Fruits and Vegetables ..........70
Trying New Fruits and Vegetables ..........................................................70
Summary ..................................................................................................71

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS ................................72
Conclusions ............................................................................................72
Strengths ...................................................................................................73
Limitations ..................................................................................................74
Recommendations for Future Research ......................................................74

REFERENCES ...........................................................................................76

LIST OF APPENDICES .............................................................................82
Appendix A: Institutional Review Board Documents .................................82
   A-1: IRB Approval Letter ........................................................................83
   A-2: CITI Completion Certificate ............................................................85
Appendix B: Letters of Information and Permission ...................................86
   B-1: Letter of Synopsis/Goals .................................................................87
   B-2: Letter of Request and Permission ....................................................88
   B-3: Letter of Information .....................................................................89
   B-4: Parent Survey Letter .....................................................................90
Appendix C: Survey Instruments ..............................................................91
   C-1: Child Assessment ...........................................................................92
   C-2: Parent Assessment .........................................................................93
Appendix D: Lesson Material .................................................................94
<table>
<thead>
<tr>
<th>Paragraph</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-1: Lesson 1 ..............................................................95</td>
</tr>
<tr>
<td>D-2: Lesson 2 ..............................................................98</td>
</tr>
<tr>
<td>D-3: Lesson 3 .............................................................101</td>
</tr>
<tr>
<td>D-4: Lesson 4 .............................................................105</td>
</tr>
<tr>
<td>D-5: Lesson 5 .............................................................108</td>
</tr>
<tr>
<td>D-6: Extra Activities Checklist .............................................110</td>
</tr>
<tr>
<td>Appendix E: Supplemental Materials ........................................111</td>
</tr>
<tr>
<td>E-1: SuperTracker Child 4-8 years old .....................................112</td>
</tr>
<tr>
<td>E-2: Discover MyPlate Assessment Manual .................................114</td>
</tr>
<tr>
<td>Table</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
</tbody>
</table>
CHAPTER 1

INTRODUCTION

According to the 2011-2012 National Health and Nutrition Examination Survey (NHANES), slightly less than one out of ten (8.4%) children between the ages of 2- to 5-years are obese, with the rate of obesity increasing as a child ages (Ogden, Carroll, Kit, & Flegal, 2014). The prevalence rate rises significantly among children ages 6 to 11 years (17.7%; p<0.01) and 12 to 19 years of age (20.5%; p<0.001) (Ogden et al., 2014). Overall, obesity affects an estimated 16.9% of children between the ages of 2 to 19 years, nearly a three-fold increase from the rate of 5.5% in 1980 (Fryar, Carroll, & Ogden, 2012).

In most cases, obesity is caused by an energy imbalance associated with an excessive intake of calories, particularly sugar and fat, and less than optimal amounts of physical activity (Ogata & Hayes, 2014). This is true for children, who are over-consuming calories from fat and sugary foods and under-consuming vegetables and fruits (USDA, USDHHS, 2010). Obesity is linked to negative cardiovascular factors, diabetes, psychosocial disorders, and many other health problems. The negative health consequences and risks associated with obesity in children call for nutrition and dietary interventions starting at a young age (Birch & Ventura, 2009).

Schools are recognized as a critical setting where students can learn how to adopt a healthy lifestyle through education and intervention strategies that include both nutrition and
Several nutrition education curricula have been developed for elementary aged-students in an attempt to teach children about the importance of healthy eating (Ogata & Hayes, 2014). Discover MyPlate, a curriculum for kindergarten students, was published in June of 2014 by the United States Department of Agriculture (USDA) (White, Barrett, Bishop, Jirka, & Pijai, 2014). The curriculum includes six nutrition education lessons that focus on MyPlate, the government’s depiction of what should comprise a healthy diet (USDA, 2015). The curriculum incorporates a variety of learning styles and activities to promote the adoption of healthy lifestyles in kindergarten students. Although formative research was completed during the development process to assess how the messaging resonated with students and teachers, resources were not available to conduct a complete evaluation (Team Nutrition, personal communication, August 21, 2014).

This study evaluated the effectiveness of five lessons from the Discover MyPlate kindergarten curriculum on the consumption of fruits and vegetables and improving the students’ attitudes toward healthy eating and physical activity. Discover MyPlate was implemented and evaluated in a rural public school setting using a quasi-experimental research design. Outcomes of this study will be reported to the United States Department of Agriculture (USDA) Team Nutrition as a formal program evaluation of the Discover MyPlate curriculum.

**Problem**

The prevalence of childhood obesity has tripled in the past 30 years (Ogden et al., 2014), in part due to the consumption of excess calories from diets high in fat and sugar and low in fruits and vegetables (Katz, 2011). Establishing healthy eating and physical activity patterns at an early age has been shown to lower the risk of obesity and the concomitant obesity-related
diseases (Ogata & Hayes, 2014). The school setting plays an important role in developing an overall healthy lifestyle for children (Benjamin, 2010).

The intervention school corporation had received a three-year Carol White PEP grant to increase physical activity and nutrition education throughout their school corporation. During the third of the grant, Ball State University received a sub-grant from the school corporation to provide nutrition education. Concomitantly, Team Nutrition published a robust nutrition education curriculum for kindergarten students, Discover MyPlate, that had not yet been formally evaluated. Thus, in an effort to meet the requirements of the grant, the Discover MyPlate curriculum was taught to kindergarten students in the target school using a quasi-experimental design, which allowed this researcher to evaluate the effect of the curriculum on the nutrition knowledge, attitudes, and behaviors of the students.

**Purpose**

The purpose of this study was to measure the impact of five 30-minute nutrition education lessons from the Discover MyPlate curriculum on the nutrition knowledge, attitudes and healthy eating behaviors of kindergarten students in a rural, Midwestern school district.

**Research Questions**

The following research questions were examined in this study:

RQ#1. Among kindergarten students, is the Discover MyPlate curriculum associated with:

a) An improved knowledge about MyPlate?

(1) Ability to name the five MyPlate food groups.

(2) Ability to identify the MyPlate logo.

(3) Ability to identify foods within a food group.
(4) An ability to name at least one colorful fruit.

(5) An ability to name at least one colorful vegetable.

b) An increased consumption of fruits and vegetables?

c) A more positive attitude toward healthy foods?

d) An ability to identify healthy foods that can fuel their body for play?

RQ#2. Do the parents of the kindergarten students who participated in the Discover MyPlate curriculum:

a) Perceive their children have improved their overall eating behaviors?

b) Report their children usually like eating fruit and vegetables?

c) Perceive their children have a more positive attitude toward eating fruits and vegetables?

d) Report their children have tried eating a new fruit or vegetable recently?

Rationale

Unhealthy food and eating patterns are greatly associated with the risk of becoming obese, and pediatric obesity prevention and treatment should focus on dietary intervention efforts (Hoelscher, Kirk, Ritchie, & Cunningham-Sabo, 2013). Perhaps the best avenue for obesity prevention with dietary intervention is through schools, where success of nutrition programs has been shown (Franks et al., 2007). Many children can be reached through school lunches and classroom education (American Dietetic Association, 2010).

Kindergarten is a natural entry-point to initiate nutrition education. In 2011, the Current Population Survey (CPS) administered by the United States Census Bureau estimated that 77% of age-eligible children in the United States attended full-day kindergarten, an increase from 37% in 1987 and 8% in 1967 (Davis & Bauman, 2013). Focusing on nutrition in the first year of
a child’s public school experience will set a precedent for concern of health throughout the child’s educational experience (Katz, 2009).

The USDA’s kindergarten curriculum, *Discover MyPlate*, was implemented and evaluated in a rural, Midwestern school district. Children in rural areas overall have been shown to have poorer diet quality and higher prevalence of obesity (Serrano, 2012; Tovar et al., 2012). Based on a recent analysis of this specific school district, there is a 46% prevalence of overweight and obesity across the corporation, which far exceeds the national average (Brant, 2014, p. 3). This specific school district has a need for dietary interventions and nutrition education and thus a need for successful implementation of *Discover MyPlate*.

**Assumptions**

The researcher made the following assumptions in the implementation of the study and in the interpretation of the data:

1. The information from the *Discover MyPlate* lessons was delivered accurately and consistently to each of the four Kindergarten classrooms.
2. The kindergarten students were present for the majority of the *Discover MyPlate* lessons.
3. The data collection methods and instruments were appropriate measures of target assessments.
4. The children told the truth when they answered each question, rather than telling the researchers what they thought the researcher wanted to hear.
5. The students who participate in this educational project are representative of other kindergarten children living in rural communities.
Definitions

For the purpose of this study, the following definitions will be used:

1. **Nutrition Education**: communication of nutrition-related information, through lessons and activities within a curriculum, in efforts to instruct groups of individuals about a healthy lifestyle and dietary behavior (Martin, 2004)

2. **Inquiry-Based**: A style of learning where students take active participation in asking questions, formulating ideas, answering open-ended questions, and investigating new solutions to solving a problem (White et al., 2014).

3. **Educational Standards**: verbal statements of goals or outcomes for education to measure markers of a child’s knowledge that indicate their level in an academic realm (Baker & O'Neil, 2002)

4. **Overweight**: a measure of Body Mass Index (BMI) that indicates a child’s weight is at or above the 85th percentile according to age and sex (Johnson, 2008)

5. **Obesity**: a measure of BMI that indicates a child’s weight is at or above the 95th percentile according to age and sex (Bassuk & Manson, 2008)

6. **Early Childhood**: the stage of development from birth to 8 years old (Farrell & DiBello, 2009)

7. **Intervention**: an action or outside process that interrupts the normal in order to evoke change of behavior or cognition (Leaver, 2012)

Summary

Risks and consequences of obesity continue to be a threat to children today and the adults of the future. Children who develop poor dietary patterns in early years of growth and development are likely to continue them, resulting in poor quality of health as adults. To prevent
obesity and the obesity-related diseases, educational efforts often target children, especially in the school setting. This evaluation of the Discover MyPlate curriculum tested the effectiveness of nutrition and physical activity lessons on Kindergarten students’ knowledge, attitudes, and behaviors. The results of this study will provide constructive feedback for Team Nutrition and a familiar educational resource for kindergarten teachers at the implementation school for future nutrition curricula within the classroom.
CHAPTER 2

REVIEW OF LITERATURE

The purpose of this study was to measure the impact of five 30-minute nutrition education lessons from the Discover MyPlate curriculum on nutrition knowledge, attitudes, and healthy eating behaviors of kindergarten students in a Midwestern, rural school district. This chapter presents a review of the literature that describes the diets of children, childhood obesity, nutrition education at the elementary school level, and effective nutrition education programs.

Introduction

With conflicting messages about food and nutrition reaching children, nutrition education programs are needed to teach children and influence their dietary intake (Ogata & Hayes, 2014). Children in the first decade of life are particularly susceptible to forming life-long dietary habits, making early childhood a natural time to conduct nutrition education interventions (Birch & Ventura, 2009). Discover MyPlate, an immersive curriculum developed by the United States Department of Agriculture (USDA), was written with the intent of teaching kindergarten students about the importance of healthy eating (White et al., 2014).

Despite national dietary recommendations (USDA, 2015), children’s diets are often lacking in fruits and vegetables and frequently high in dietary fat and added sugar (USDA, USDHHS, 2010). Excess calorie intake and reduced physical activity are factors associated with
childhood obesity (Katz, 2011). Childhood obesity rates have increased from 5.5% in 1980 to 16.9% in 2010 (Fryar, Carroll, & Ogden, 2012; Ogden, Carroll, Kit, & Flegal, 2012). Obesity and poor diet quality are associated with many health consequences including high blood pressure, diabetes, and cardiovascular disease (Daniels, 2006). In order to improve the diets of children, combat obesity, and prevent its negative impact, schools, specifically elementary schools, are key locations for nutrition education (Turner & Chaloupka, 2012). However, schools lack consistent regulations in this area and are in need of nutrition intervention (Lueke, 2011). By reviewing past nutrition programs in schools, insight can be gained about evaluating Discover MyPlate, the current program targeted for Kindergarten students in school.

Standards for Children

According to the U.S. Department of Agriculture, U.S. Department of Health and Human Services (USDA, USDHHS), children ages 4-8 years old need an estimated 1,200-1,400 calories per day (USDA, USDHHS, 2010). These children’s’ portions should be smaller than adult portions, with a recommended daily intake of 5 oz. grain, 1½ cups vegetables, 1½ cups fruit, 2½ cups dairy, and 4 oz. protein. (Supertracker.USDA.gov, 2015; Appendix E-1).

MyPlate: A Nutrition Icon

In order to promote intake of the five food groups (i.e., grains, vegetables, fruit, dairy, and protein), the nutrition icon, MyPlate, was released in 2011 by the First Lady, Michelle Obama, and USDA Secretary, Tom Vilsack. MyPlate, a depiction of how to build a healthy meal, serves to remind people to eat from all five food groups (USDA, 2015). Various initiatives that promote MyPlate (e.g., Discover MyPlate; Serving Up MyPlate; MyPlate Kids’ Place) ultimately reflect recommendations from the 2010 Dietary Guidelines for Americans, the USDA

Implications from a survey about MyPlate usage suggest explaining the purpose and application of MyPlate, as well as building on familiarity of MyPyramid, in order to reach new user groups (Wansink & Kranz, 2013). Post (2013) acknowledged the role of social media in publicizing MyPlate. Pinterest, Facebook, and Twitter, for example, have MyPlate tips and nutrition promotion messages for consumers, such as, “Enjoy Your Food, but Eat Less”; “Make Half of Your Plate Fruits and Vegetables”; “Drink Water Instead of Sugary Drinks”; and “Be Active Your Way” (Post, 2013).

The Need for Fruits and Vegetables

Fruits and vegetables, essential for optimal nutritional status, and are repeatedly recommended for improving health among Americans. As such, increasing one’s consumption of fruits and vegetables is a major theme of MyPlate and nutrition education initiatives for children (USDA, USDHHS, 2010; White, 2014). Fruits and vegetables are rich sources of under-consumed nutrients in the diets of many Americans (e.g., folate, potassium, dietary fiber, vitamin A, C, and K), are associated with a reduced risk of many chronic diseases, and are a lower-calorie food option (USDA, USDHHS, 2010). MyPlate urges individuals to make half of their plate fruits and vegetables, a concept emphasized in the Discover MyPlate curriculum for kindergarten children (White et al., 2014).

Limit Excess Fat and Sugar

Another theme of MyPlate is to limit fats, processed foods, and sugar sweetened beverages for better calorie balance and weight management (USDA, USDHHS, 2010). According to Katz (2011), humans are prone to excessive energy intake due to availability and
marketing of energy dense and nutrient deficient foods. High-fat processed foods and sugar-sweetened beverages (SSB) are two categories recognized contributing the greatest amount of excess calories (Katz, 2011). Kaliebe (2014) recommended increasing the consumption of minimally processed whole-foods and decreasing consumption of nutrient-poor highly processed foods that typically contain added chemicals, little dietary fiber, few naturally occurring nutrients and excess sugar, fat, and salt, all of which can have negative health implications and contribute to obesity.

Start with a Healthy Breakfast

The 2010 Dietary Guidelines for Americans and MyPlate also support healthy breakfast consumption (USDA, USDHHS, 2010). Breakfast is vaguely defined in research and its definition should be more consistent to match policy and nutrition-education efforts. One proposed definition for breakfast is “Breakfast is the first meal of the day that breaks the fast after the longest period of sleep and is consumed within 2 to 3 hours of waking; it is comprised of food or beverage from at least one food group, and may be consumed at any location” (O’Neil, Byrd-Bredbenner, Hayes, Jana, Klinger, & Stephenson-Martin, 2014, p. S9).

Recommendations for breakfast foods include protein foods, whole grains, and fruits/vegetables; breakfast should make up 15-30% of daily energy intake, depending on snacking habits (O’Neil et al., 2014). Consuming nutrient-dense foods at breakfast promotes energy balance, weight management and increased intake of vitamins and minerals (USDA, USDHHS, 2010). Discover MyPlate devotes a lesson of the curriculum to teaching kindergarten students about breakfast (White et al., 2014).
Increase Physical Activity

Although MyPlate and the 2010 Dietary Guidelines for Americans focus on nutrition through dietary intake, physical activity is also consistently addressed as part of nutrition standards (USDA, 2015; USDA, USDHHS, 2010). It is recommended that children have 60 minutes of physical activity everyday (USDA, 2015). Ciotto and Fede (2014) suggests increasing access to physical activity during the school day and creating opportunities for children to be active before and after school in order to meet recommendations, combat obesity, and experience the many health benefits of physical activity (Ciotto & Fede, 2014).

Key Messages

After conducting in-depth observational studies and focus groups, Kapsak, Edge, White, Childs, and Geiger (2013) developed key “behavior-directed” messages for parents regarding childhood nutrition. These messages include: (1) Pay attention to calorie intake from foods and beverages at each meal and snack, recognizing that calories impact weight; (2) Be more physically active together as a family; (3) Balance dietary intake with your family’s level of activity; (4) Be aware of portions and reduce food/beverage amounts at a given meal or snack; (5) Serve your family nutrient-rich foods and beverages often; and (6) Manage higher calorie choices in a way that does not affect your family’s weight.

These key messages and dietary guidelines depicted in MyPlate give standards for proper nutrition through recommendations for nutrient intake (fruits, vegetables, calorie-dense foods, and sugar-sweetened beverages), breakfast, and physical activity. Comparisons can be made between these recommendations and the current intake and activity patterns of children to better understand the need for nutrition interventions.
Current Intake and Activity Patterns

Children and adolescents aged 2-18 years have an average intake of 2,027 calories daily (USDA, USDHHS, 2010). Top sources of these calories in descending order are grain-based desserts, pizza, soda/energy/sports drinks, yeast breads, and chicken/chicken mixed dishes (USDA & USDHHS, 2010). A further look into specific intake of fruits and vegetables, sugary and processed foods, and breakfast, as well as physical activity levels, will show some of the changes that need to be made in children’s diets to align more with current standards.

Fruits and Vegetables

Using 24-hour dietary recall interviews from the National Health and Nutrition Examination Survey 2009-2010, Nielson, Rossen, Harris, and Ogden (2014) examined the percentage of youth who consumed fruits and vegetables. For all categories of fruit (i.e., any, citrus/melons/berries, other fruit, and fruit juice), consumption decreased with increasing age. For “any” fruit, consumption on a given day decreased from 91.7% (age 2-5) to 82.0% (age 6-11) to 66.3% (age 12-19). Similarly, for “citrus/melons/berries”, consumption decreased from 37.2% to 35.7% to 21.8% for the previously stated age groups. With regard to vegetables, a very low percentage of children in all age groups consumed dark green vegetables on a given day (11.5%). While this data does not show percentage of youth who eat the recommended amount of fruits and vegetables, it does indicate a downward trend in fruit consumption as children get older and a deficit in dark green vegetable consumption (Nielsen et al., 2014). Nonetheless, fruit intake among children 4 years of age and older, and vegetable intake among children 2 years of age and older, falls below the recommended level (USDA, USDHHS, 2010).

While fruit and vegetable consumption remains below recommendations among children, fruit and vegetable levels have been shown to increase for elementary children at schools that
restricted snacking and availability of unhealthy snacks (candy, cookies, and other snack not considered “low-fat”; Gonzalez, Jones & Frongillo, 2009). Taking this action is a step toward better nutrition as these schools have seen a positive impact from restricting snacking. Unfortunately fruits and vegetables still compete with the marketing and availability of unhealthful food products (Katz, 2011).

**Processed Foods and Sugar-Sweetened Beverages**

The most readily consumed food sources, contributing to 7.2% of calories in the American diet, are cake, cookies, quick bread, pastries, and pie, many of which are processed and contain high fat and sugar content (Huth, Fulgoni Iii, Keast, Park, & Auestad, 2013). The majority of sugar intake in children comes from sugar-sweetened beverages (SSB) (Martin-Calvo et al., 2014). Sweets and SSB contain high fructose corn syrup, providing more than two-fifths of the total caloric sweeteners consumed by Americans (Bray, Nielsen, & Popkin, 2004, p. 540). Based on 2003-2006 NHANES data, soft drinks alone contributed to 5.4 percent of the typical American’s total caloric intake and they are in the top five for highest calorie consumption in the average American diet (Huth et al., 2013). Since SSBs constitute a large amount of daily calories for children and add no nutritional value to the body, they are worth eliminating in pursuit of obesity epidemic interventions (Kass, Hecht, Paul, & Birnbach, 2014).

Ford, Slining, and Popkin (2013) examined the food consumption in 10,647 children between the ages of 2-6 years over a twenty-year span from 1989-2008. Five nationally representative surveys were used to assess dietary behavior over time (i.e., Continuing Survey of Food Intake in Individuals 1989-1991 and 1994-1998 and the What We Eat In America, National Health and Nutrition Examination Surveys 2003-2004, 2005-2006, and 2007-2008). These surveys used in-person interviews to obtain 24-hour dietary recalls. Their results indicated a
decline in diet quality among young children. Specific increases were noted in the consumption of savory and sweet snacks, such as pizza/calzones, fruit, mixed Mexican dishes, fruit juice, sweet snacks/candy, and cheese (p<0.01) (Ford, Slining, & Popkin, 2013).

**Breakfast**

Deshmakh-Taskar et al. (2010) used the NHANES 1999-2006 data to examine the effect of breakfast skipping and type of breakfast consumption (i.e., ready to eat cereal consumption or other breakfast consumption) on nutrient intake and anthropometric measures. Approximately 20% of children (aged 9-13 years) skipped breakfast, with the number rising to 31.5% for adolescents (aged 14-18 years). Those who skipped breakfast had higher total fat and cholesterol; lower total carbohydrate, dietary fiber and nutrient intake; and higher prevalence of obesity (P<0.05).

Skipping breakfast has previously been associated with overweight (O’Neil, Nicklas & Fulgoni, 2014; Rampersaud, Pereia, Girard, Adams, & Metzl, 2005). Average calorie consumption for children who consume breakfast ranged from 275 to 669 calories with milk, cereal, and various breads being commonly consumed by this population (Rampersaud et al., 2005). Children who consumed a high-quality breakfast, defined as including a whole-grain, fruit or fruit juice, and low-fat milk product, were shown to have higher intake of bread, fruit, vegetables, milk and fruit juice and lower intake of SSBs than children who consumed low-quality breakfast. The quality of breakfast for children decreased with age (p<0.01; Monteagudo et al., 2013). Overall, nutrition education efforts should focus on encouraging the consumption of breakfast and promoting breakfast foods with high quality nutritious value (Deshmakh-Taskar et al. 2010; Monteagudo et al., 2013; Rampersaud et al., 2004).
Physical Activity

Dr. David Katz (2011) attributes much of childhood obesity to the modern environment in which we live; one, not only of debilitating diet quality, but also, of increased technology and decreased physical activity. Kaliebe (2014) recognized the impact of a quickly evolving technological culture and parental concerns on physical activity levels in children. This technology culture supports children’s tendencies to overuse electronics and media, which include viewing television, playing video games, and indulging in social networking and telephone use. These activities engage the child or adolescent and stimulate the brain with pleasure, causing excessive sedentary time in a child’s day and thus decreasing physical activity levels (Kaliebe, 2014).

Kerkez, Tural, and Akcinar (2013) surveyed parents of kindergarten students to identify if they had any concerns about physical activity and their child’s health. The results indicated 75% of the parents were “concerned” or “partially concerned” about their child getting sick due to participating in physical activities.

Brussoni and Olsen (2013) conducted a qualitative study to explore overprotective characteristics of fathers with children aged 2-7 years. A theme arose indicating many fathers described themselves as “overprotective,” limiting their child’s access to small physical risks to prevent minor injuries. Although not directly related to physical activity, these findings likely influence the exercise ability of their children, which, in turn, can impact their body weight and physical fitness levels (Brussoni & Olsen, 2013).

An evidence-based summary concluded that school-based physical-activity programs alone might be successful in increasing time spent for physical activity and reducing screen time (Grade 1, Hoelscher et al., 2013). Discover MyPlate has a central focus of the five food groups,
but one lesson is devoted to the benefits physical activity and healthy foods that “fuel your body so you can play” (White, 2014).

**Summary**

Recent research has indicated children are deficient in fruit and vegetable intake and disproportionate in calorie consumption from unhealthful foods compared to current standards. Skipping breakfast increases with age, as quality of breakfast decreases with age; both are seen as negative trends in nutrition from young childhood to adolescents. Also, stimulation from technology and parent overprotection may be contributing to children’s lack in sufficient daily physical activity. The intake and activity patterns of children have been linked to an increase in childhood obesity, which merits intervention and nutrition education among children.

**Childhood Obesity**

**Prevalence Rates**

According to the National Health and Nutrition Examination Survey data, the prevalence of obesity in children 6-11 years of age in the United States has tripled from 6.5% in 1980 to the current rate of 18% (Ogden et al., 2014). Most dietary intake patterns are established in early childhood (Birch & Ventura, 2009). Increased caloric intake from foods of higher sugar or fat content has significantly influenced obesity among young children (Ford, Slining, & Popkin, 2013).

Cunningham, Kramer, and Narayan (2014) evaluated data from the Early Childhood Longitudinal Study, a cohort that followed over 9000 students from kindergarten through eighth grade, to assess the incidence of overweight and obesity. The sample was representative of all kindergarten children from 1998-1999 in the United States. In this cohort, the overweight and
obesity prevalence for kindergarten children 12.4% when the children were in kindergarten and increased to 20.8% by the time the students were in eighth grade. The largest increase in the rate of obesity was seen between first and third grade when the rate rose from 13.0% to 18.6%. The authors concluded that overweight kindergarten children were four times more likely than their normal weight counterparts to become obese by the age of 14 years.

Factors of Obesity

Increased calorie consumption and decreased physical activity affect energy balance and can lead to weight gain and further elevate childhood obesity rates (Katz, 2011). Martin-Calvo et al. (2014) assessed children 5.5-18.8 years of age and their parents to determine the quantity and frequency of their SSB consumption using food frequency questionnaires and interviews. This case-control study used 174 matched pairs of children based on sex and age to compare data of overweight or obese children and adolescents to their normal weight counterparts. The results indicated a positive correlation between consumption of SSB and body fat mass percentage, with body fat mass increasing by 4.8% (OR = 3.46; CI 1.24, 9.62; p=0.01) among those consuming four or more servings of SSB per week. Overall, calorie dense foods and beverages that have high availability and palatability are at the forefront of childhood obesity (Huth et al., 2013).

Research studies indicate technology and media continue to impact overweight and obesity. Wijtzes et al. (2014) examined the impact of sedentary lifestyle and physical activity on body composition for six-year-old children. The authors found a significant inverse association between sport participation and BMI (p<0.05) regardless of socio-demographic status and family lifestyle. Other significant findings included an association between two or more hours of television per day and an increased BMI and body fat, one or more hour of computer gaming per
day and an increased BMI, and child outdoor play and active transport with a decreased BMI. These results, however, did not account for family lifestyle patterns or demographic factors.

Although decreased physical activity has been shown to contribute to obesity in children, Katz (2011) believes dietary intake and excess calorie consumption may have a greater effect on body weight. While energy balance requires efforts on both the intake and output sides, physical activity is not a practical means of this due to the amount of time it takes to burn even a small number of calories. Therefore, according to Katz (2011), to combat childhood obesity, improving dietary patterns is more essential than physical activity.

**Health Effects of Childhood Obesity**

Childhood obesity has a significantly negative effect on factors affecting cardiovascular health (Mangner et al., 2014). For example, insulin resistance and hypertension have been linked to excessive consumption of dietary fat in overweight children (Zimmermann & Aeberli, 2008). Left ventricular thickness and mass have also been shown to be higher in obese children (Mangner et al., 2014).

Tapp et al. (2014) conducted a prospective cohort study of 2809 children 7-15 years of age to examine the effects of BMI and fat mass on cardiovascular factors. In May of 1985, these students completed the Australian School Health and Fitness Survey and had their blood pressure, blood lipids, and several measures of fitness recorded. Between May 2004 and May 2006, over 85% of the former subjects (n=2,410), now 26-36 years old, were re-measured. Of these, 181 had complete data with acceptable echocardiography images. From childhood to adulthood, BMI, waist circumference, and skin fold thickness were all significantly associated (p<0.001) with increased mean left ventricular mass index as an adult, a significant indicator for cardiovascular disease risk.
Similarly, overweight and obese adolescents tend to have increased left ventricular thickness and hypertrophy, causing their heart to work harder. This has been shown to mildly decrease myocardial function in obese adolescents (Chinali et al., 2006). Increased blood pressure, low-density lipoprotein cholesterol, and glucose metabolism, with decreased high-density lipoprotein cholesterol have been identified in obese children, affecting cardiac function, hypertension, and diabetes related issues (Mangner et al., 2014). Depression has also been mentioned as a psychosocial disorder of increased prevalence for obese children and adolescence (Daniels, 2006).

Many effects of childhood obesity are carried into adulthood (Daniels, 2006). The long-term consequences of obesity in children often lead to increased risk of health disparities, including hypertension, atherosclerosis, dyslipidemia, asthma, obstructive sleep apnea, nonalcoholic fatty liver disease, gastroesophageal reflux, and a disorder of the hip growth plate. These health disparities are major components of cardiovascular disease, metabolic syndrome, type 2 diabetes, pulmonary problems, and digestive disorders (Daniels, 2006).

Summary

The spike in prevalence of childhood obesity from 1980 to present is commonly associated with the increasingly sedentary lifestyles and the improper diets of children. Measures of weight and fat mass in children have been linked with countless negative effects on one’s health during childhood and later into adulthood. Since overweight and obesity prevalence has been seen to increase most between late-childhood to early adolescence, starting intervention efforts early in childhood is a strategic preventative approach.
Nutrition Education at the Elementary School Level

Role of Schools in Nutrition Education

The role of schools in nutrition education is one of ambiguity (Ogata & Hayes, 2014). While parents and early feeding practices greatly affect a child’s eating behavior, formal education in the schools can also play a significant role in establishing these behaviors (Turner & Chaloupka, 2012). If parents lack concern, time, or knowledge about nutrition, they are likely unable to play a crucial role in the nutrition education of their child (Lueke, 2011). Because of this, nutrition education may have to rely on sources outside the home (e.g., schools, after school programs) to influence healthy behavior in children (Lueke, 2011).

According to Lueke (2011, p. 215), schools have “continuous and intensive contact” with children, influencing both a child’s knowledge and development. Turner and Chaloupka (2012, p. 1380) recognized schools as a “key setting” to promote children’s health, with the practices and programs of a school directly affecting the dietary behavior and weight status of a child. Based on the amount of time spent in the school setting, including meals consumed, it is evident that the school can significantly influence a child’s health. Even if it is as simple as a concern, or lack of concern, toward nutrition and physical activity, a child’s attitudes toward health will likely be shaped by the schools’ actions (Katz, 2009).

Current Nutrition Education in Elementary Schools and Classrooms

In 2006, by mandate of the Child Nutrition and Women, Infant, and Children Reauthorization Act, any school participating in the National School Lunch Program was required to create a Local Wellness Policy (LWP) ("Child Nutrition and WIC Reauthorization Act of 2004," 2004). One requirement of the LWP is the inclusion of school-specific goals for nutrition education and physical activity. Implementing these goals has been ineffective for
many schools (American Dietetic Association, 2010). Some issues cited as being problematic include lack of funding, time, priority, and resources and a need for more nutrition educators and support staff to see goals met (American Dietetic Association, 2010; Lueke, 2011).

Along with the difficulties of implementing wellness goals for improving nutrition education, there are few required nutrition education core competencies at various grade levels, leaving schools to either create their own competencies or to have none at all (Lueke, 2011). Unfortunately, schools lack national nutrition education standards, as they are not included in the No Child Left Behind Act of 2001 (American Dietetic Association, 2010; Lueke, 2011). To counteract this omission, the Academy on Nutrition and Dietetics recommends the following standards be made for wellness in schools: 1) minimum number of hours for nutrition education in the classroom, 2) inclusion of experiential learning (e.g., cooking or gardening), and 3) quality of dining experience (American Dietetic Association, 2010).

Watts, Pinero, Alter, & Lancaster (2012), following the framework of the General Systems Theory, surveyed elementary school teachers about nutrition education in the classroom in 11 counties in New York. Contact was made by a postal mail request sent to each elementary principal. Of the 90 schools contacted, 18 principals (20%) responded and agreed to distribute the survey during a faculty meeting. Elementary schools participating were from urban (n=7), suburban (n=5) and rural (n=6) districts. With 139 surveys returned (24%), 83% of teachers acknowledged they taught some nutrition education (9.0 ± 10.5 hours) per academic year. Rural elementary teachers averaged 4.2 ± 3.9 hours of nutrition education in the classroom per year, significantly less than the 12.4 ± 12.5 hours per year taught by suburban teachers (p=0.006).
Similarly, a study in Wells County, Indiana, revealed that slightly more than three-quarters (77.6%; n=42) of the elementary teachers including nutrition in their curriculum; of these, 83% reported including less than 10 hours of nutrition education per year (Knox, 2005).

The No Kid Hungry Center for Best Practices (2015) recommends a minimum of 50 hours of nutrition education in order to cause effective changes in health and behavior. Other proponents of effective nutrition education programs include coherent curricula, family involvement and professional development of existing school staff (No Kid Hungry Center for Best Practices, 2015).

The Academy of Nutrition and Dietetics recognized the 2010 Healthy, Hunger-Free Kids Act (HHFKA) by the USDA as the national movement for nutrition in schools (Ogata & Hayes, 2014). The HHFKA provides access to healthy food and funding for nutrition assistance in the school. Some programs and funding resources highlighted by the academy include Action for Healthy Kids, Alliance for a Healthier Generation, Chefs Move to School, Fuel Up To Play 60, and Healthier US School Challenge (Ogata & Hayes, 2014).

**Effective Nutrition Education Programs at the Elementary Level**

Burke, Meyer, Kay, Allensworth, and Gazmararian (2014) measured effectiveness of HealthMPowers, a health education program built upon evidence-based guidelines from the Center for Disease Control and Prevention (CDC). HealthMPowers examines change in knowledge and behavior, body composition, fitness levels, and school health environment. This data was not originally collected for research, but rather to evaluate the efficacy of HealthMPowers over three stages of implementation, after the first and second years, and at the end of the third year after implementation was complete. The researchers analyzed data from 39,272 students and 2,604 staff members from 40 Georgia schools. Results showed a positive
increase in nutrition knowledge (p<0.01), as well as improved fitness level at all grades using PACER (Progressive Aerobic Cardiovascular Endurance Run) test (p<0.01). Pre- and post- BMI measurements, converted to z-scores, significantly decreased for the elementary boys and girls who were overweight or obese at baseline (p<0.01). A limitation of this program evaluation was the lack of a control group; as such, no true comparison could be made between the educational intervention and no intervention.

Prelip, Kinsler, Chan Le, Erausquin, and Slusser (2012) conducted an evaluation of a multi-component nutrition education program in large school systems serving low-income children. The interventions consisted of four components that aimed to improve young children’s fruit and vegetable consumption. The components included: 1) Los Angeles Unified School District (LAUSD) activities (e.g., nutrition-themed theatrical performances, bringing in chefs and farmers, and incorporating nutrition into physical education and art classes); 2) standard nutrition curriculum (e.g., Harvest of the Month program, 5-A-Day Power Play!, and Dairy Council of California); 3) training teachers to teach nutrition curriculum in the classroom; and 4) parent nutrition education via workshops about food groups, vitamins and minerals, food labels, meal planning, and healthful decisions. For this quasi-experimental research design, a control group and two intervention groups (InterventionD and Intervention) were used to compare results. The InterventionD group received all four components of nutrition education, where the Intervention group received only two components (LAUSD activities and teacher training). A total of 399 students 4th-5th grade were assessed pre- and post-intervention. The evaluative instrument was a five-part student questionnaire to assess 1) fruit and vegetable frequencies, 2) knowledge of food groups, 3) attitudes toward fruit and vegetable (F/V) consumption, 4) parent/teacher influence, and 5) demographics. Results indicated significant
improvements in knowledge about food groups and the benefits of F/V (p<0.05) and attitude and belief toward the consumption of F/V (p<0.01) in the Intervention D group. Although there was no significant increase in the consumption of F/V, the authors hypothesized that the increase in knowledge and the shift in attitudes toward F/V that were observed could be linked to future behavior change in children (Prelip et al., 2012).

Falter et al. (2011) evaluated a service-learning program that aimed to teach children about nutrition. The program used visual aids, videos, games, homework sheets, and food tasting experiences to teach topics such as food groups, serving sizes, portions, food label reading, healthy snacking, diabetes basics, and grocery shopping over four 30-minutes sessions, once per week. Participants included 468 students in kindergarten through third grade from three schools selected by a Sarasota County School District registered dietitian based on their low socio-economic status. Pre- and post-tests, made available from MyPyramid.gov, used 30 questions to assess children’s knowledge about each food group (i.e., grains, vegetables, fruits, dairy, protein). At the completion of the program, each grade showed a significant improvement in food group knowledge based on total post-test scores (p<0.05).

Hu et al. (2010) conducted an experiment to assess changes in the nutrition behavior and knowledge of children 4-6 years of age. After excluding incomplete data, there were 1237 students in the intervention group and 831 students in the control group. Response rate for the intervention and control groups were very high (98.8% and 97.7%, respectively). The intervention was a flexible kindergarten curriculum given monthly for 10 months during the 2001-2002 school year. For each intervention, at least 8 lessons were delivered to students and their parents. Intervention lessons contained nutrition themed books, nutrition pamphlets for parents, and two series of promotional pictures; in contrast, the control group lessons included
non-nutrition-related general storybooks, pamphlets, and pictures. A series of researcher-developed, self-administered questionnaires were used as assessment tools for students and parents, including a food frequency questionnaire, questions about unhealthy and healthy lifestyle behaviors for children, and 20 questions for parent nutrition knowledge. After the intervention lessons, certain unhealthy behaviors (i.e., unhealthy snacks, monotonous diet, adult assistance during meals, playing before dinner, and watching television during dinner) decreased for the intervention group and stayed relatively the same or increased for the control group. These findings were statistically different between groups (p<0.05). Healthy behaviors that improved significantly (p<0.05) for the intervention compared to control group were: eating breakfast, taking part in outdoor activities, and helping with household duties. However, other unhealthy and healthy behaviors that did not change were consumption of Western-style high-energy food, preference for salty foods, eating candy before meals, eating candy before bed, eating at the table, and eating a fixed quantity at a particular time. Overall, the authors concluded that kindergarten-based nutrition education improves lifestyle behaviors of children aged 4-6 years and improves the parents’ attitudes about eating habits for their children and themselves.

Wood, Wolff, Bianco-Simeral, & Goto (2011) used the Sierra Cascade Nutrition and Activity Consortium (SCNAC), a network for a Healthy California Harvest of the Month program, in an effort to promote nutrition and increase elementary students’ preferences to consumption of a variety of fruits and vegetables through taste tasting. Students in kindergarten through sixth grade tasted a different fruit or vegetable each month throughout the school year and participated in an activity associated to the tasting item. Teachers were provided information for strategies to incorporate nutrition education in the classroom. Other materials included a flyer about the farmer who provided the tasting produce and storybooks to reinforce
nutrition message. Teacher evaluations were used to assess perception change in student’s attitudes and behaviors toward nutrition. Ninety-three percent of the teachers reported to conducting taste tests at least five times per year. High implementing teachers (>15 SCNAC activities per year) perceived their students were more receptive to eating fruits (p=0.001) and vegetables (p=0.003), and less interested in soda (p=0.043) compared to low implementing teachers (<15 SCNAC activities per year). It should be noted that this data, assessed via a Likert scale, measured the teachers’ perceptions of the impact of the program on their students’ attitudes and behaviors and does not reflect actual behavioral (dietary) change.

Williams (2014) evaluated a nutrition education program for preschoolers in New York City. Child-care centers were paired based on size, region, and type of care center. For each pair, one center was randomly assigned as a control group and the other as an intervention group. For the intervention group, a registered dietitian nutritionist (RDN) provided weekly lessons and activities chosen from the SNAP education program. Six, 30-minute lessons were taught to low-income preschool children and parents. Mail and telephone survey approach was utilized to collect baseline and follow-up data. Daycare teachers sent home a participation request with survey for follow-up collection. The survey included information about consumption of, request for, and parental offerings of fruit, vegetable and milk at home. Results indicated the educational program had a significant impact on fat-free or low-fat milk consumption, vegetable consumption, and child-initiated vegetable snacking (p<0.05); no effect was found for fruit consumption or combined fruit and vegetable consumption.

Matvienko (2007) tested nutrition behavior of children in kindergarten and first grade, ages six and seven (n=70). Each child was to choose 2 of the 7 snack items and 1 of the 3 beverage items. Snacks and beverages included items of high nutritional value (apples, whole-
grain crackers, cheese, carrots, skim milk, and water) and items of low nutritional value (fruit chews, refined-grain crackers, potato chips, and a fruit drink). Baseline scores were taken for number of high nutritional value snacks/beverages chosen by each student. The intervention group was given four nutrition lessons, while the comparison group had none. After the intervention, the repeated snack choices activity showed the intervention group had significant improvement on choosing high nutritional value snacks over the comparison group (p=0.023). This indicates that children’s snack choice behaviors were positively associated with the nutrition education interventions. Results indicate this may be an effective way to assess preference and consumption behaviors of children 6-7 years of age.

Katz, O’Connell, Njike, Yeh, and Nawaz (2008) conducted a meta-analysis of strategies to manage weight, prevent unnecessary weight gain, and promote nutrition and physical activity interventions in a school setting for children 3-18 years of age. Nineteen studies were included with a total of 13,029 students. Intervention strategies observed included nutrition, physical activity, parent component, family, specialized behavior, environmental interventions or a combination of any of these. All types of interventions included in this meta-analysis were associated with significant reductions in students’ weight (p<0.05). Concordantly, an evidence-based summary of multi-component interventions for nutrition and physical activity within schools concludes that these may be effective for improving adiposity measures (Hoelscher et al., 2013).

Many multi-component nutrition programs have been evaluated in the past few years. Those discussed above give insight to results of nutrition promotion efforts for elementary children. The research and meta-analysis indicate nutrition programs have been successful in
improving one or more of the following: knowledge, attitude, behavior, weight status, and fitness levels.

**Survey Instruments**

As a foundation for the assessments used for this thesis, while many research studies were examined, two studies included relevant instruments that were adapted for use in this study. Calfas, Sallis, and Nader (1991) developed a survey to measure diet and physical activity knowledge and preferences in 4- to 8-year-old children. The instrument included 15 attractive photo pairs of foods or activities, with one identified as “healthful” and the other as “unhealthful”. The children were asked to identify which item they preferred and then, using the same photo pairs, they were asked which item was more healthful. Test-retest reliability was established through Pearson correlation calculations for food preference (r=0.79, p<0.001), food knowledge (r=0.72, p<0.001), activity preferences (r=0.22, p<0.05), and activity knowledge (r=0.43, p<0.001). Validity of child preferences was established through comparing actual choices of food and activities to each child’s stated preferences. Percent agreement was 66% (x²=8.4, p<0.001). Validity of child knowledge was established through improved children’s knowledge scores when given the same survey after a brief nutrition intervention (t=1.94, p<0.05).

Friesen-Schroeder, Ferguson, and Wray (1994) created a curriculum based on the “5 a Day – For Better Health” program developed by the National Cancer Institute to encourage fruit and vegetable consumption of Americans. The curriculum was taught to over 7,000 kindergarten through sixth-grade students in Marion County, Indiana. The authors designed a child pre-/post-test and parent survey to evaluate the effectiveness of the curriculum. The child survey used three faces with expressions of “yuck”, “ok”, and “yum” to ask children how they feel about
eating fruits and vegetables. It also asked questions to assess frequency of fruit and vegetable consumption and if the child tried eating a new fruit/vegetable recently. The parent survey asked about the child’s general preferences for fruits and vegetables, if the parent has seen a change (positive or negative) in their child’s attitude toward fruits and vegetables, and if the child has tried eating a new fruit or vegetable recently.

Neither formal data nor test-retest reliability statistics were found for the instruments used in Friesen-Schroeder et al., (1994). However, some of the questions and formatting fit with the objectives of this program evaluation. With permission from the primary author, the parent survey was very closely replicated for this study. Components of the student survey were also adapted to assess the participants of Discover MyPlate.

Summary

MyPlate and the 2010 Dietary Guidelines for Americans are the two most common nutrition standards used throughout the United States to teach individuals about nutrition. However, the poor diet quality of children is shown through daily intakes low in fruits and vegetables and high in SSBs and processed foods. Excess energy intake in a child’s diet and decreased physical activity hinder children’s health status and weight. With childhood obesity rates being elevated tri-fold from 1980, effective nutrition interventions are needed. Nutrition and physical education in the schools could greatly impact childhood obesity prevention over time. Health of school-aged students and the nutrition environment within the school have been evidence that providing school-based nutrition programs are effective. A call for national coordination of nutrition education policy to be administered by each state and made effective through the local school and community has been warranted by the Academy of Nutrition and Dietetics, formerly the American Dietetic Association. Future actions of change in elementary
schools and healthful nutrition programs within the classroom show promise of effective nutrition interventions, especially for young elementary students.
CHAPTER THREE

METHODOLOGY

The purpose of this study was to measure the impact of five 30-minute nutrition education lessons from the Discover MyPlate curriculum on the nutrition knowledge, attitudes and healthy eating behaviors of kindergarten students in a rural, Midwestern school district. This chapter describes the methods used to conduct the study.

Institutional Review Board

This program evaluation project was deemed as non-human subject research by the Ball State University Institutional Review Board (Appendix A-1). The researcher who conducted this analysis completed the Collaborative Institutional Training Initiative (CITI) (Appendix A-2). All students who assisted with the research collection process also completed the CITI training.

Subjects

The subjects in this study included all (n=95) full-day kindergarten students enrolled in four kindergarten classrooms in a rural Midwestern school that had a contract with Ball State University to provide nutrition education. Three of the four classrooms had 24 students; one classroom had 23 students (n=95). Two kindergarten classrooms (n=47) served as the control group and two classrooms (n=48) served as the treatment group. Based on the 2014-2015
school-year data from the Indiana Department of Education, 97.6% of the students in the target school were Caucasian (Indiana Department of Education, 2015). More than half (54.1%) of the students in the target elementary school received a free or reduced priced lunch.

**Letters of Information and Permission**

A description of the *Discover MyPlate* curriculum was emailed to the elementary school principal (Appendix B-1). Subsequently, the principal submitted a letter requesting that this curriculum be implemented in the four kindergarten classes (Appendix B-2). Because the school asked the researcher to implement and evaluate the curriculum, the Ball State University Institutional Review Board deemed this project as ‘non-human subject research’ and, as such, parental consent was not needed (Appendix A-1). At the end of the fall semester in 2014, the researcher attended a Kindergarten grade level meeting to discuss the layout and scheduling of the curriculum to be implemented during the spring semester in 2015. Two letters of information were sent home with each student; the first provided a brief overview of the school’s wellness initiative and *Discover MyPlate* program evaluation (Appendix B-3) and the second, sent after the lessons, requested the parent or guardian complete a one-page questionnaire about their child’s preferences and attitudes towards concepts covered by *Discover MyPlate* (Appendix B-4).

**Instruments**

Two surveys were used to assess the knowledge, attitudes, and behaviors of kindergarten students – one completed by the students (pre-/post-intervention) and one completed by the parents (post intervention only). Each is described separately below.
Student Assessment Instrument

The student assessment tool (Appendix C-1) was based on the instruments and methodology used by Calfas et al. (1991) and Friesen-Schroeder et al. (1994). The instrument measured the students’ knowledge about MyPlate, their attitude toward healthy foods, and their ability to select healthy versus non-healthy foods. Descriptive information (i.e., gender, teacher, and name) was collected at the beginning of the assessment for the purpose of matching pre-tests to post-tests by control or treatment group. The questions assessed the student’s ability to name the food groups, identify the MyPlate logo, assign foods to a food group, identify colorful fruits and vegetables, express how certain foods make them feel, and choose the foods that help fuel the body. This instrument was administered to each student one-on-one in the hallway outside their classroom by the researcher or a trained research assistant. The researcher and/or research assistant read each question to the student and recorded his or her answers on an iPad. The assessment was given both before the intervention (pre-test) and after the intervention (post-test).

Parent-Assessment Instrument

A parent survey, adapted from Friesen-Schroeder et al. (1994), was used to measure the parents’ perceptions of change in their child (Appendix C-2). This survey indicated parent perception of improved eating behaviors and attitude toward eating fruits and vegetables. Parents also reported the general preferences of their child to fruits and vegetables and whether or not the child tried eating a new fruit or vegetable recently. The assessment was sent home with a cover letter (Appendix B-4), signed by the student’s teacher, in each child’s homework folder. Parents were asked to return the survey within one week.
Pilot Study and Validation of the Instrument

To pilot the assessment instrument, six kindergarten students from outside the target school district completed the survey twice, one week apart. The names of the kindergarten subjects were obtained by the Children’s Director at a local church who provided the researcher with a list of kindergarten students, their parents’ names, school attending, and phone numbers. The researcher contacted each parent and obtained permission to survey their kindergarten-age child during the churches weekly children’s program.

The survey instruments used in this study were tested for content and construct validity by an early childhood specialist, an expert in the field of nutrition education, and a statistician. The final child assessment instrument was placed on Qualtrics, a computer-based survey software program. Per advice from the statistician, test-retest reliability of the survey was not crucial due to the young age of the subjects. However, the result was still analyzed for internal consistency.

Based on information gathered from the pilot study and expert feedback, changes were made to wording, pictures, and format prior to the start of the assessment phase. The following three changes were made to the original survey: 1) “I don’t know” was added to several multiple choice answers; 2) student names were added to a drop down box according to teacher; and 3) all picture files were renamed for clearer data processing. The researcher gained insight based on interactions with kindergarten students during the pilot study, which aided in the development of a training manual. For example, research assistants were specifically instructed to only repeat the question or ask the student if he/she would like to move to the next question. They were not allowed to explain or interpret the questions that could lead the students to any answers.
Training of Assistants

Prior to initiating data collection, four research assistants were recruited and trained on a prescribed protocol for using Qualtrics and assessing the kindergarten students. A mandatory training session was given at two different times, according to schedules of the assistants. At the training session, assistants received a training manual (Appendix E-2), watched videos from the pilot testing, and practiced filling out the survey on an iPad. The primary researcher provided question-by-question instruction to ensure that all assistants were trained to use the same procedure in order to collect consistent data. Each research assistant completed the mandatory CITI certificate training prior to collecting data.

Curriculum

The Discover MyPlate curriculum, written specifically for kindergarten students, was published in June 2014 by the United States Department of Agriculture (USDA) (White, Barrett, Bishop, Jirka, & Pijai, 2014). The original curriculum included six nutrition education lessons. In order to comply with stated time commitment, this researcher condensed the curriculum to five lessons that covered key objectives. In addition, some activities and aspects of the curriculum were not included in the intervention, such as story time, dramatic play, and a gardening demonstration. The five lessons used in the intervention covered the following topics: 1) The five food groups, 2) Healthy meals with MyPlate, 3) Eating the rainbow with fruits and vegetables, 4) The importance of breakfast, and 5) Physical Activity.

Each of the five 30-minute lessons engaged the child with interactive discussion and activities. Two lessons were conducted each week on two separate days of the week. The kindergarten students received a total of 2 ½ hours of nutrition education plus extra learning activities (Appendix D-6) from this Discover MyPlate curriculum evaluation. Extra learning
activities were worksheets, booklets, or handouts that the kindergarten students completed at a separate time following the lessons, either in the classroom or at home.

_Discuss MyPlate_ Lessons in Detail

Lesson 1 (Appendix D-1): Essential questions answered: “What are the names of the five food groups?” and “Which foods belong in each group?” This lesson started with a Warm Up activity about sorting objects (e.g., buttons) by color, shape, or size to demonstrate that foods can be sorted in similar ways into food groups. Using the food group poster and _Food Cards_, the teacher gave an overview of each group and the foods that belong in them. Verbal cues and steps for teaching the food groups are found in the curriculum book (White, 2014, pp. 17-18). The _Food Group Friends_ were introduced and students were asked to identify what foods are found on each character (e.g., apple, banana, blackberries on Farrah Fruit). Lastly, the lyrics and motions for the theme song “Reach for the Sky” were taught to the students. Learning activities included Emergent Readers (Protein), Student Workbook (p. 5), and Take Home Activity (“Meet MyPlate”).

Lesson 2 (Appendix D-2): Essential questions answered: “What is a healthy meal?” and “What does MyPlate remind us to do?” This lesson started by reviewing the theme song and the five food groups that make up MyPlate. The researcher reviewed the food groups with the students. Then, the students were be introduced to _MyPlate Nate and Kate_ and asked to help them create a complete MyPlate meal (“Warm Up”, p. 27). After learning about how to make a MyPlate meal, students practiced using all of the five food groups to make a snack. The “Food Group Friend” snack idea used a whole wheat sandwich thin, shredded cheddar cheese, red peppers, black beans, and tangerines. Learning activities included Emergent Readers
Lesson 3 (Appendix D-3): Essential questions answered: “What colors are fruits and vegetables?” and “Why is it important to eat different kinds of fruits and vegetables?” This lesson started with the Warm Up (p. 33). The educator asked students to name different fruits and displayed the appropriate food card. This was be repeated with vegetables. The educator pointed out the many colors of the fruits and vegetables and asked the students why it is good to eat many different colors. (Educator said, “All of the colors help your body get what it needs to be healthy”). Next, the class participated in a colors activity with the theme song. When the music is paused, a fruit/vegetable was be called out and students had to point to something that color. Then, the Extra Helpings activity (“Sorting Out ‘Sometimes’ Foods, p. 39) helped the students learn that not all colorful foods are as healthy as fruits and vegetables (e.g. candy, sugary cereal). Learning activities included Emergent Readers (Fruits), Student Workbook (p. 19), Take Home Activity (“Welcome to School Lunch”), and send home Look and Cook Activity (“Crunchy Rainbow Wrap”).

Lesson 4 (Appendix D-4) (adapted from Lesson 5): Essential questions answered: “How do we know when it is time to eat or when we have had enough?”, “Why does our body need food?” and “Why is it important to eat breakfast?” This lesson started with a review of the five food groups, the Food Group Friends, and the theme song. After the review, the educator went through the Warm Up (p. 48) using a balloon to demonstrate hunger and fullness and then progressed into an active game about breakfast foods. Students were reminded that food gives energy and breakfast especially helps to “recharge” the body in the morning after resting overnight. Lastly, students learned about “anytime” and “sometimes” foods for breakfast.
Learning activities included Emergent Readers (Dairy), Student Workbook (p. 25), Take Home Activity (“Be Your Best with Breakfast”), and send home Look and Cook Activity (“Fruit-a-licious Breakfast Cup”).

Lesson 5 (Appendix D-5) (adapted from Lesson 6): Essential questions answered: “Why is it important to be physically active every day?” and “What gives us the energy to be physically active?” This lesson started with the theme song where the students were encouraged to be physically active (e.g., run in place) throughout the entire song. When the song was over, the students were asked to put their hands over their hearts and feel it beating. This led into the Warm Up (p. 55). The educator explained that the body is meant to be physically active each day so that the muscles, heart, and bones are strong. Students were prompted to share how they like to be physically active just like how MyPlate Nate and Kate like to play soccer. Learning activities included Emergent Readers (Grains & A MyPlate Meal), Student Workbook (p. 26), Take Home Activity (“Move, Play, Have Fun”), and send home Look and Cook Activity (“Friendship Pocket”).

Methods

Several measures were taken in preparation for implementing this program evaluation. An IRB exemption indicating this program evaluation was not human subject research was obtained (Appendix A-1) and the participating school requested that this nutrition education program evaluation of Discover MyPlate be completed (Appendix B-2) The researcher condensed the curriculum lessons and met with the four kindergarten teachers to discuss logistics of scheduling lessons and extra activities. Survey instruments were constructed, piloted, and reviewed for validity by experts in the field. Survey modifications were made and all research
assistants were trained for consistency of data collection. Finally, parents of the kindergarten students were notified of the upcoming nutrition lessons and program evaluation.

As part of the quasi-experimental design, the two of the four classrooms were randomly selected to receive the treatment and the remaining two classrooms initially served as the controls (subsequently, these two classrooms also received the curriculum). Random sampling (i.e., drawing from a hat) was used to determine which of the four classes would serve as a control or treatment group as follows: 1) the names of the four kindergarten teachers were placed in a hat; and 2) a coin toss (heads) determined that the first two names drawn from the hat would be the treatment group.

Students in both the control (n=47) and treatment groups (n=48) were given the pre-assessment of student knowledge and attitude (Appendix C-1), after which the treatment group received instruction based on the Discover MyPlate curriculum (Appendices D-1 – D-5). Upon completion of the fifth lesson, both groups (control and treatment) were given the post-assessment (Appendix C-1). A parent survey (Appendix C-2) was sent home with a cover letter signed by the students’ classroom teacher (Appendix B-4).

On the pre- and post-assessment days, the primary researcher and four research assistants assessed the four classrooms, one student at a time. To begin the assessment, for each classroom, five kindergarten students were called out to the hallway, one for each researcher/assistant. As the researcher/assistant finished the assessment, the student returned to his/her classroom and another student was called upon by the researcher/assistant/teacher from a classroom roster. Absent students were noted and re-assessed within a few days by the primary researcher. Any complications during the assessment or miss-marks on the survey were noted
and later corrected by the primary researcher. Assistants were given the opportunity to note any observations at the conclusion of each classroom.

The control group had no nutrition education in order to provide a comparison for the findings of the treatment group. According to Plano-Clark and Creswell (2015) the control group is necessary within experimental research designs because manipulating part of the conditions helps determine if an effect in the dependent outcome variable occurred as a result of the intervention. Following the intervention for the treatment group and after data collection, the control group was taught the Discover MyPlate lessons for uniform nutrition education objectives across the kindergarten grade.

**Data Entry and Coding**

The data, captured through Qualtrics (bsu.qualtrics.com), was downloaded into SPSS v.22 for analysis (IBM Corporation). The teachers’ and students’ names were collapsed into one three-digit number to represent each student (i.e., #308 was given to the eighth student in the third teacher’s class). Because the research assistants were instructed to leave the question blank if the child could not give an answer (i.e., indicating they did not know), all missing fields were recoded as “I don’t know.” Pre- and post- variables were created for the children’s qualitative responses to “What is your favorite colorful fruit (and vegetable)?” The new variable demonstrated the child’s ability to correctly name a colorful fruit (or vegetable). Qualitative responses were coded with a “1” for “Yes, they could,” or left blank for “No, they either did not know or were incorrect”.

41
Data Analysis

All data from survey results was analyzed using SPSS v.22 statistical analysis software (IBM Corporation). The demographic information collected on the child survey was used to match the pre-assessment data with the post-assessment data by group. Frequency counts and cross-tabulation were run to obtain the percentage of survey answers between the treatment and control groups. Paired t-test, one-way analysis of variance (ANOVA), and Pearson’s Chi Square ($\chi^2$) were used depending on whether the variable was continuous or categorical. Most survey results from the child’s food knowledge and attitude survey and the parent survey were categorical in nature and, as such, non-parametric statistics and Chi Square were the primary statistic of choice. An alpha level was set at 0.05, meaning statistical significance is found when $p<0.05$.

Summary

All kindergarten students enrolled in the spring semester 2015 of the elementary school where the evaluation took place (four classes) were given a pre-assessment survey. Of these, two classes were taught five lessons from the Discover MyPlate curriculum while the remaining two served as controls. Students in the treatment group learned about the five food groups in MyPlate and how to make healthier choices. After the intervention was complete, all kindergarten students, including those who were not taught nutrition lessons, were given the post-assessment. The treatment group was given a parent survey to complete. Data from the surveys was analyzed to determine if the nutrition intervention was associated with a significant improvement in knowledge, attitude, and food consumption behaviors of the kindergarten students.
CHAPTER FOUR

RESULTS

The purpose of this study was to measure the impact of five 30-minute nutrition education lessons from the Discover MyPlate curriculum on the nutrition knowledge, attitudes and food consumption behaviors of kindergarten students in a rural, Midwestern school district. This chapter provides results from the assessments and answers to the research questions.

Subjects

Participants of this curriculum evaluation included all full-time kindergarten students enrolled in the selected school (n=95). Two of the kindergarten classrooms (n=47 students) served as the control group and two classrooms (n=48 students) served as the treatment group. Overall, 49.5% (n=47) of the students were male and 50.5% (n=48) were female (Table 1).

Table 1. Gender Distributed by Group (Control vs. Treatment) (n=95)

<table>
<thead>
<tr>
<th></th>
<th>Treatment N (%)</th>
<th>Control N (%)</th>
<th>Total N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 (52.1%)</td>
<td>21 (44.7%)</td>
<td>46 (48.4%)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23 (47.9%)</td>
<td>26 (55.3%)</td>
<td>49 (51.6%)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>48 (50.5%)</td>
<td>47 (49.7%)</td>
<td>95 (100%)</td>
<td></td>
</tr>
</tbody>
</table>
RQ #1: Child Assessment

The first series of research questions attempted to measure the impact of the Discover MyPlate curriculum on kindergarten students’ knowledge about MyPlate, their attitude toward fruits and vegetables, and their ability to select healthy foods to fuel their body for play. Results are derived from pre- and post-assessment comparisons between the treatment (N=48) and control (N=47) groups.

Knowledge about MyPlate

The first part of Research Question #1 addressed if the Discover MyPlate curriculum was associated with improved knowledge about MyPlate among the treatment group from pre- to post-assessment. Hence, the questions addressed the students’ knowledge about the MyPlate food groups.

MyPlate Food Groups

During the pre-assessment, in response to the question, “Do you know what a food group is?” 6.5% (n=3) of the students in the treatment group, and zero students in the control group, said “yes” ($X^2=3.1$, $p=0.078$, NS) (Table 2). At the post-test assessment, 79.2% (n=38) of the students in the treatment group, and 37.8% (n=17) of students in the control group, said “yes” ($X^2=16.5$, $p<0.001$) (Table 2). These results are statistically different between groups.

To correctly answer the question, “How many food groups do you think there are?”, each student was to say “five.” During the pre-test, 22.5% (n=9) of the students in the treatment group, and 10.5% (n=4) of the students in the control group, correctly stated “five” ($X^2=17.3$, $p=0.506$, NS) (Table 2). During the post-test, 95.8% (n=46) of the students in the treatment group, and 2.5% (n=1) of the students in the control group, correctly responded “five” ($X^2=81.4$, $p<0.001$) (Table 2). These results are statistically different between groups.
## Table 2. Treatment vs. Control: MyPlate Food Group Knowledge (n=95)

<table>
<thead>
<tr>
<th>Question</th>
<th>Category</th>
<th>Timing</th>
<th>$X^2$</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you know what a food group is?</td>
<td></td>
<td>Pre</td>
<td>3.1</td>
<td>0.078</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post</td>
<td>16.5</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>How many food groups do you think there are?</td>
<td></td>
<td>Pre</td>
<td>17.3</td>
<td>0.506</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post</td>
<td>81.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Can you tell me the names of the food groups?</td>
<td>Fruit</td>
<td>Pre</td>
<td>0.1</td>
<td>0.701</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post</td>
<td>13.0</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Vegetables</td>
<td>Pre</td>
<td>0.9</td>
<td>0.349</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post</td>
<td>25.3</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Protein</td>
<td>Pre</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post</td>
<td>28.0</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Dairy</td>
<td>Pre</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post</td>
<td>54.3</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Grains</td>
<td>Pre</td>
<td>1.0</td>
<td>0.302</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post</td>
<td>29.7</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Can you point to the MyPlate picture?</td>
<td></td>
<td>Pre</td>
<td>0.3</td>
<td>0.863</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post</td>
<td>53.5</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>In what food group do you think these foods belong?</td>
<td>Picture of grains</td>
<td>Pre</td>
<td>1.0</td>
<td>0.320</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post</td>
<td>30.5</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Picture of vegetables</td>
<td>Pre</td>
<td>1.4</td>
<td>0.486</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post</td>
<td>21.2</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*No student provided a correct answer.*

To answer the question, “Can you tell me the names of the food groups?” each student was to state as many of the five food groups he or she could recall. Each food group will be examined separately.

### Fruits

During the pre-test, 8.3% (n=4) of the students in the treatment group, and 10.6% (n=5) of the students in the control group, could name “fruits” as one of the MyPlate food groups.
($X^2=0.1$, $p=0.701$, NS) (Table 2). After completing the Discover MyPlate curriculum, 64.6% (n=31) of the students in the treatment group, compared to 27.7% (n=13) of the students from the control group, could name the “fruits” group ($X^2=13.0$, $p<0.001$) (Table 2). These results are statistically different between groups.

**Vegetables**

During the pre-test, only 10.4% (n=5) of the students in the treatment group, and 17.0% (n=8) of the students in the control group, could name “vegetables” as one of the food groups ($X^2=0.9$, $p=0.349$, NS) (Table 2). After completing the Discover MyPlate curriculum, 79.2% (n=38) of the students in the treatment group, compared to 27.7% (n=13) from the control group, could name the “vegetables” group ($X^2=25.3$, $p<0.001$) (Table 2). These results are statistically different between groups.

**Protein**

During the pre-test, no student from either the treatment group or the control group, could name “protein” as one of the five MyPlate food groups. After completing the Discover MyPlate curriculum, 45.8% (n=22) of the students in the treatment group, compared to zero students from the control group, could name the “protein” group ($X^2=28.0$, $p<0.001$) (Table 2). These results are statistically different between groups.

**Dairy**

During the pre-test, no student from either the treatment group or control group, could name “dairy” as one of the five MyPlate food groups. After completing the Discover MyPlate curriculum, 72.9% (n=35) of the students in the treatment group, compared to zero students from the control group, could name the “dairy” group ($X^2=54.3$, $p<0.001$) (Table 2). These results are statistically different between groups.
Grains

During the pre-test, only 2.1% (n=1) of the students in the treatment group, and none of the students in the control group, could name “grains” as one of the food groups ($X^2=1.0$, $p=0.302$, NS) (Table 2). After completing the Discover MyPlate curriculum, 47.9% (n=23) of the students in the treatment group, compared to none from the control group, could name the “grains” group ($X^2=29.7$, $p<0.001$) (Table 2). These results are statistically different between groups.

MyPlate Logo

Recognition of the MyPlate logo was assessed among kindergarten students. Students were prompted by the following statement and question: “MyPlate is a picture that reminds people what to eat every day to be healthy. Can you point to the MyPlate picture?” Three options were available – a pie chart plate, a food plate, and MyPlate. To answer this question correctly, the student had to choose the MyPlate option. During the pre-test, 8.5% (n=4) of the students in the treatment group chose the pie chart plate, 61.7% (n=29) chose the food plate, and 29.8% (n=14) chose MyPlate. Similarly, 6.4% (n=3) of the students in the control group chose the pie chart plate, 59.6% (n=28) chose the food plate, and 34.0% (n=16) chose MyPlate ($X^2=0.3$, $p=0.863$) (Table 2). There was no difference between the two groups at the pre-assessment. During the post-test, none of the students in the treatment group chose the pie chart plate, 8.3% (n=4) chose the food plate, and 91.7% (n=44) correctly chose MyPlate. In contrast, 6.4% (n=3) of the students in the control group chose the pie chart plate, 76.6% (n=36) chose the food plate, and 17.0% (n=8) chose MyPlate. These results are significantly different, with more students correctly able to select the MyPlate logo after completing the curriculum than those in the control group ($X^2=53.5$, $p<0.001$) (Table 2).
Identifying Food Groups

Two items on the assessment evaluated the students’ abilities to identify food groups. Students were shown pictures and were then asked, “In what food group do you think these foods belong? You can either say the name of the food group, or, if you don’t know, say ‘I don’t know.’” The first item had a picture of foods in the “grains” group and the second item had a picture of foods from the “vegetables” group. Both pictures were taken from the poster used in the Discover MyPlate curriculum.

Grains

During the pre-test, 97.9% (n=46) of the students in the treatment group indicated they did not know in which group the food belonged, while 2.1% (n=1) thought the food belonged in the “dairy” group. Among the control group, 100% (n=46) of the students indicated they did not know in what group the food belonged ($X^2=1.0, p=0.320, NS$) (Table 2). Upon completion of the curriculum, however, 38.3% (n=18) of the students in the treatment group correctly responded “grains,” while 46.8% (n=22) indicated they did not know, 12.8% (n=6) said “dairy,” and 2.1% (n=1) said “protein.” In the control group, no student (100%; n=41) was able to correctly name the grain food group ($X^2=30.5, p<0.001$) (Table 2). These results are statistically different between groups.

Vegetables

For the pre-test, in the treatment group 29.2% (n=14) said “vegetables” and 70.8% (n=34) did not know; in the control group, 34.1% (n=15) said “vegetables” and 63.6% (n=28) did not know and 2.3% (n=1) said “fruit”($X^2=1.4, p=0.486, NS$) (Table 2). For the post-test, 80.4% (n=37) of the students in the treatment group said “vegetables,” 10.9% (n=5) did not know, 8.7% (n=4) said “fruits.” In contrast, 45.2% (n=19) of the students in the control group
correctly indicated “vegetables” with an additional 54.8% (n=23) indicating they did not know how to correctly classify vegetables into the vegetable group ($\chi^2=21.2, p<0.001$) (Table 2). These results are statistically different between groups.

*Naming a Colorful Fruit and Vegetable*

To fulfill another objective from the *Discover MyPlate* curriculum, students were to learn about colorful fruits and vegetables. During pre- and post-assessments, students were asked, “What is your favorite colorful fruit (or vegetable)?” To answer the questions correctly, students were to state any fruit (or vegetable, depending on the question). Answers to the recoded variable “Could they name a colorful fruit (or vegetable)?” were analyzed and are reported for both colorful fruits and colorful vegetables.

*Colorful Fruit*

During the pre-test, 68.8% (n=33) of the treatment group and 38.3% (n=18) of the control group could name a colorful fruit ($\chi^2=8.9, p=0.003$) (Table 3). These results are statistically significant at baseline, with the treatment group increasingly able to name a colorful fruit. After completing the *Discover MyPlate* curriculum, 64.6% (n=31) of the treatment group and 48.9% (n=23) of the control group could name a colorful fruit ($\chi^2=2.4, p=0.124$) (Table 3). These results are not statistically significant, indicating there was no additional improvement in the ability of the students in the treatment group to name a colorful fruit after having completed the curriculum.

*Colorful Vegetable*

During the pre-test, 41.7% (n=20) of the treatment group and 40.4% (n=19) of the control group could name a colorful vegetable ($\chi^2=0.015, p=0.902$) (Table 3). These results are not statistically different. After completing the *Discover MyPlate* curriculum, 62.5% (n=30) of the
treatment group and 46.8% (n=22) of the control group could name a colorful vegetable ($\chi^2=2.4$, $p=0.124$) (Table 3). These results are not statistically different, indicating there was no additional improvement in the ability of the students in the treatment group to name a colorful vegetable after having completed the curriculum.

**Table 3. Treatment vs. Control: Fruit and Vegetable Knowledge and Consumption (n=95)**

<table>
<thead>
<tr>
<th>Question</th>
<th></th>
<th>$\chi^2$</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Favorite colorful fruit? (could name one)</td>
<td>Pre</td>
<td>8.9</td>
<td><strong>0.003</strong></td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>2.4</td>
<td>0.124</td>
</tr>
<tr>
<td>Favorite colorful vegetable? (could name one)</td>
<td>Pre</td>
<td>0.0</td>
<td>0.902</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>2.4</td>
<td>0.124</td>
</tr>
<tr>
<td>Have you eaten any fruit today?</td>
<td>Pre</td>
<td>2.1</td>
<td>0.352</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>1.9</td>
<td>0.386</td>
</tr>
<tr>
<td>Have you eaten any vegetables today?</td>
<td>Pre</td>
<td>0.4</td>
<td>0.803</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>0.7</td>
<td>0.705</td>
</tr>
</tbody>
</table>

**Fruit and Vegetable Consumption**

The second part of Research Question #1 assessed behavior of fruit and vegetable consumption directly related to knowledge of fruits and vegetables. Students were asked, “Have you eaten any fruit today,” and “Have you eaten any vegetables today?” In order to see an increased consumption of fruits and vegetables, the students needed to know if any of the foods they ate for breakfast or lunch were fruits and vegetables.

**Fruit**

During the pre-test, 43.8% (n=21) of the treatment group and 42.6% (n=20) of the control group indicated they had eaten a fruit that day ($\chi^2=2.091$, $p=0.352$, NS) (Table 3). During the
post-test, 39.6% (n=19) of the treatment group and 51.1% (n=24) of the control group reported, “Yes” ($\chi^2=1.904$, $p=0.386$) (Table 3). These results were not statistically different, indicating there was no additional increase in fruit consumption in the treatment group after having completed the curriculum.

**Vegetables**

During the pre-test, 27.1% (n=13) of the treatment group and 21.3% (n=10) of the control group reported they had eaten a vegetable that day ($\chi^2=0.440$, $p=0.803$, NS) (Table 3). During the post-test, 29.2% (n=14) of the treatment group and 23.4% (n=11) of the control group reported having eaten a vegetable that day ($\chi^2=0.698$, $p=0.705$, NS) (Table 3). These results were not statistically different, indicating there was no additional increase in vegetable consumption among the students in the treatment group after having completed the curriculum.

**Attitude toward Healthy Foods**

The third part of Research Question #1 focused on attitude changes and if the Discover MyPlate curriculum was associated with improved attitude toward healthy foods among the treatment group from pre- to post-test. Students were asked, “How does eating this fruit (or vegetable) make you feel?” One at a time, pictures of a kiwi, carrots, and broccoli were displayed along with three character faces, signifying “yuck”, “ok”, and “yum”.

**Kiwi**

For this child assessment item, students were first asked, “Have you ever eaten a kiwi before?” During the pre-test, 39.6% (n=19) of the treatment group and 44.7% (n=21) of the control group reported they had eaten a kiwi ($\chi^2=2.5$, $p=0.615$, NS) (Table 4). After completing the Discover MyPlate curriculum, 62.5% (n=30) of the treatment group and 38.3% (n=18) of the
control group indicated they had eaten a kiwi ($X^2=6.2, p=0.046$) (Table 4). These results are statistically significant, indicating the curriculum was associated with an increase in the number of students who had eaten kiwi or who could recognize a kiwi.

The students were then asked to select a face that indicated how eating a kiwi made them feel. On the pre-test, 23.4% (n=11) of the students in the treatment group selected the “yum” face, with an additional 34.0% (n=16) selecting the “ok” face, and 42.6% (n=20) selecting the “yuck” face. In the control group 48.9% (n=22) selected the “yum” face, 17.8% (n=8) selected the “ok” face, and 33.3% (n=15) selected the “yuck” face ($X^2=7.0, p=0.030$) (Table 4). These results indicate a difference in how kiwi made the students feel at baseline, with significantly more students in the control group indicating kiwi was associated with a “yum” face.

For the post-test, in the treatment group 35.4% (n=17) of the students selected the “yum” face, 31.3% (n=15) selected the “ok” face, and 33.3% (n=16) selected the “yuck” face; in the control group 38.3% (n=18) selected the “yum” face, 19.1% (n=9) selected the “ok” face, and 42.6% (n=20) selected the “yuck” face ($X^2=2.0, p=0.375, NS$) (Table 4). Although there was a 10% increase in the number of students who selected the “yum” face after the intervention, analysis of the post-test data indicate there was no difference between the control and treatment groups with regard to how eating a kiwi made them feel.

**Carrots**

The students were then asked to select a face that indicated how eating a carrot made them feel. On the pre-test, 35.4% (n=17) of the students in the treatment group selected the “yum” face, 35.4% (n=17) selected the “ok” face, and 29.2% (n=14) selected the “yuck” face; in the control group 40.4% (n=19) selected the “yum” face, 25.5% (n=12) selected the “ok” face,
and 34.0% (n=16) selected the “yuck” face ($X^2=1.1$, p=0.578, NS) (Table 4). There was no difference between the control and treatment group at the pre-test.

On the post-test, 31.3% (n=15) of the students in the treatment group selected the “yum” face, 45.8% (n=22) selected the “ok” face, and 22.9% (n=11) selected the “yuck” face, while, in the control group, 40.4% (n=19) selected the “yum” face, 23.4% (n=11) selected the “ok” face, and 36.2% (n=17) selected the “yuck” face ($X^2=5.4$, p=0.067, NS) (Table 4). There was no significant difference between the control and treatment group regarding how eating carrots made them feel.

**Broccoli**

The students were then asked to select a face that indicated how eating broccoli made them feel. On the pre-test, 39.6% (n=19) of the students in the treatment group selected the “yum” face, 14.6% (n=7) selected the “ok” face, and 45.8% (n=22) selected the “yuck” face; in the control group, 40.4% (n=19) selected the “yum” face, 17.0% (n=8) selected the “ok” face, and 42.6% (n=20) selected the “yuck” face ($X^2=1.2$, p=0.927, NS) (Table 4). There was no difference between the control and treatment group at the time of the pre-test.

On the post-test, 27.1% (n=13) of the students in the treatment group selected the “yum” face, 27.1% (n=13) selected the “ok” face, and 45.8% (n=22) selected the “yuck” face; in the control group, 34.8% (n=16) selected the “yum” face, 30.4% (n=14) selected the “ok” face, and 34.8% (n=16) selected the “yuck” face ($X^2=1.3$, p=0.535, NS) (Table 4). After implementation of the curriculum, there was no difference between the control and treatment group regarding how eating broccoli made them feel.
Table 4. Treatment vs. Control: Attitude toward Fruit and Vegetables (n=95)

<table>
<thead>
<tr>
<th>Question</th>
<th>Pre</th>
<th>Post</th>
<th>X²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have you ever eaten a kiwi before?</td>
<td></td>
<td></td>
<td>0.3</td>
<td>0.615</td>
</tr>
<tr>
<td></td>
<td>6.2</td>
<td></td>
<td></td>
<td>0.046</td>
</tr>
<tr>
<td>How does eating this make you feel? Kiwi</td>
<td>7.0</td>
<td></td>
<td></td>
<td>0.030</td>
</tr>
<tr>
<td></td>
<td>2.0</td>
<td></td>
<td></td>
<td>0.375</td>
</tr>
<tr>
<td>Carrots</td>
<td>1.1</td>
<td></td>
<td></td>
<td>0.578</td>
</tr>
<tr>
<td></td>
<td>5.4</td>
<td></td>
<td></td>
<td>0.067</td>
</tr>
<tr>
<td>Broccoli</td>
<td>0.2</td>
<td></td>
<td></td>
<td>0.927</td>
</tr>
<tr>
<td></td>
<td>1.3</td>
<td></td>
<td></td>
<td>0.535</td>
</tr>
</tbody>
</table>

Ability to Select Healthy Foods

The fourth part of Research Question #1 combined student knowledge and perception to answer which foods are considered healthy. In a series of four questions, students were asked, “Is this a healthy choice to fuel your body so you can play?” One at a time, pictures of soda, whole grain cereal, potato chips, and fruits and vegetables were displayed and student could answer “yes,” “no,” or “I don’t know.”

Soda

On the pre-test, 81.3% (n=39) of the students in the treatment group said soda was not a healthy choice to fuel their body (i.e., the correct answer), 14.6% (n=7) said “yes”, and 4.2% (n=2) said, “I don’t know”; in the control group, 87.2% (n=41) of the students said soda was not a healthy choice to fuel their body, 10.6% (n=5) said “yes,” and 2.1% (n=22) said, “I don’t know” (X²=0.7, p=0.703, NS) (Table 5). There was no difference between the control and treatment group at the time of the pre-test. On the post-test, 89.6% (n=43) of the students in the treatment group correctly said soda was not a healthy choice to fuel their body, while 10.4% (n=5) said “yes”; in the control group 89.4% (n=42) of the students said soda was not a healthy choice.
choice to fuel their body and 10.6% (n=5) said “yes” ($X^2=0.0$, $p=0.972$, NS) (Table 5). These results indicate that, after implementation of the curriculum, there was no significant difference between the control and treatment group regarding whether or not soda was a healthy choice to fuel their body. However, it must be noted that the majority of students in both groups knew soda was not a healthy food.

**Whole Grain Cereal**

On the pre-test, 60.4% (n=29) of the students in the treatment group correctly said that whole grain cereal was a healthy choice to fuel their body. An additional 31.3% (n=15) said “no” and 8.3% (n=4) said, “I don’t know.” In the control group, 68.1% (n=32) indicated whole grain cereal was a healthy choice to fuel their body. An additional 21.3% (n=10) said “no,” and 10.6% (n=5) said, “I don’t know” ($X^2=1.2$, $p=0.536$, NS) (Table 5). These results are not statistically different. On the post-test, 75.0% (n=36) of the students in the treatment group correctly said that whole grain cereal was a healthy choice to fuel their body. An additional 12.5% (n=6) said “no,” and 12.5% (n=6) said, “I don’t know.” In the control group, 66.0% (n=31) correctly said that whole grain cereal was a healthy choice to fuel their body. An additional 23.4% (n=11) said “no” and 10.6% (n=5) said, “I don’t know” ($X^2=1.9$, $p=0.382$, NS) (Table 5). These results indicate that, after implementation of the curriculum, there was no significant difference between the control and treatment group in the students’ ability to state that whole grain cereals are a healthy choice to fuel their body.

**Potato Chips**

On the pre-test, 64.6% (n=31) of the students in the treatment group correctly said that potato chips were not a healthy choice to fuel their body. An additional 31.3% (n=7) said “yes” and 4.2% (n=2) said, “I don’t know.” In the control group, 48.9% (n=23) correctly said that
potato chips were not a healthy choice to fuel their body. An additional 42.6% (n=20) said “yes” and 8.5% (n=4) said, “I don’t know” ($\chi^2=2.6$, p=0.279, NS) (Table 5). There was no significant difference between the control and treatment group.

On the post-test, 79.2% (n=38) of the students in the treatment group correctly said that potato chips were not a healthy choice to fuel their body. An additional 16.7% (n=8) said “yes” and 4.2% said, “I don’t know.” In the control group, 68.1% (n=32) of the students correctly said that potato chips were not a healthy choice to fuel their body. An additional 21.3% (n=10) said “yes” and 10.6% (n=5) said, “I don’t know” ($\chi^2=2.0$, p=0.366, NS) (Table 5). These results indicate that, after implementation of the curriculum, there was no significant difference between the control and treatment group in the students’ ability to state that potato chips are not a healthy choice to fuel their body.

Table 5. Treatment vs. Control: Ability to Select Healthy Foods (n=95)

<table>
<thead>
<tr>
<th>Question</th>
<th>Food</th>
<th>Timing</th>
<th>$\chi^2$</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is this a healthy choice to fuel your body so you can play?</td>
<td>Soda</td>
<td>Pre</td>
<td>0.7</td>
<td>0.703</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post</td>
<td>0.0</td>
<td>0.972</td>
</tr>
<tr>
<td></td>
<td>Whole Grain Cereal</td>
<td>Pre</td>
<td>1.2</td>
<td>0.536</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post</td>
<td>1.9</td>
<td>0.382</td>
</tr>
<tr>
<td></td>
<td>Chips</td>
<td>Pre</td>
<td>2.6</td>
<td>0.279</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post</td>
<td>2.0</td>
<td>0.366</td>
</tr>
<tr>
<td></td>
<td>Fruits and Vegetables</td>
<td>Pre</td>
<td>5.6</td>
<td>0.061</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post</td>
<td>2.9</td>
<td>0.236</td>
</tr>
</tbody>
</table>

Fruits and Vegetables

For the pre-test, in the treatment group 87.5% (n=42) correctly said that fruits and vegetables are a healthy choice to fuel their body. An additional 12.5% (n=6) said “no.” In the control group, 93.6% (n=44) said that fruits and vegetables are a healthy choice to fuel their
body.” while 2.1% (n=1) said “no” and 4.3% (n=2) said, “I don’t know” ($X^2=5.6$, $p=0.061$) (Table 5). There was no significant difference between the control and treatment group at baseline.

On the post-test, 89.6% (n=43) of the students in the treatment group correctly said that fruits and vegetables are a healthy choice to fuel their body, with an additional 8.3% (n=4) saying “no” and 2.1% (n=1) saying “I don’t know.” In the control group, 97.9% (n=46) correctly said that fruits and vegetables are a healthy choice to fuel their body, with an additional 2.1% (n=1) saying “no” ($X^2=2.9$, $p=0.236$, NS) (Table 5). These results indicate that, after implementation of the curriculum, there was no significant difference between the control and treatment group in the students’ ability to state that fruits and vegetables are a healthy choice to fuel their body. However, the vast majority of students were already aware of this fact prior to implementation of the curriculum.

**Research Question #2: Parent Survey**

The second series of research questions attempted to measure the impact of the *Discover MyPlate* curriculum on parent’s perception of their kindergarten student’s eating behaviors and attitude toward fruits and vegetables after having completed the *Discover MyPlate* curriculum. This research question also attempted to identify if parents observed their kindergarten student try a new fruit or vegetable after having completed the *Discover MyPlate* curriculum. Parents were asked to describe any changes observed, as well as list any new fruits or vegetables their child had tasted. Results are derived from post-intervention responses from the parent surveys. The overall response rate (RR) for the parent surveys was 52.6% (n=50); of these, 29 (RR 60.4%) were from the treatment group and 21 (RR 44.7%) were from the control group.
Eating Behaviors of Child

The parents of the kindergarten students were asked, “Have you noticed any changes in your child’s eating behaviors in the past month?” In the treatment group, 31.0% (n=9) indicated, “Yes, a positive change” and 69.0% (n=20) said “No, no change.” In the control group, 20.0% (n=4) indicated, “Yes, a positive change” and 80.0% (n=16) said “No, no change” ($X^2=0.739$, $p=0.390$, NS) (Table 6). These results indicate there was no significant difference between the control and treatment group regarding the parents’ observation of any changes in their child’s eating behaviors.

Ten parents from the treatment group (34.5%) and four parents from the control group (19.0%) described changes they had observed in their child’s eating behavior in the previous month. Three parents in the treatment group indicated their child had asked for more fruit and three parents indicated their child had asked for more vegetables. One parent commented that their child has been “asking about new fruits and veggies.” Two parents reported their child’s change in behavior related to food groups/MyPlate: “She talks about what food groups her foods belong to!” and “more aware of what is on his plate.” Two parents in the treatment group who reported no change in their child’s eating behaviors in the past month made the following comments: “He has always loved the fruits and veggies we eat!” and “She already wants healthy choices!”

Within the control group, two parents commented that their child was “trying more fruits and vegetables; asking if what he eats is a healthy choice,” and “asking for more fruit at grocery.” Two other comments from parents included: “she tells us sugar/junk food is bad for us” and “ask for healthier drinks.”
Table 6. **Treatment vs. Control: Parents’ Perceived Nutrition Changes in Their Child (n=50).**

<table>
<thead>
<tr>
<th>Question</th>
<th>$X^2$</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have you noticed any changes in your child’s eating behaviors in the past month?</td>
<td>0.7</td>
<td>0.390</td>
</tr>
<tr>
<td>Does your child usually like eating fruits?</td>
<td>0.3</td>
<td>0.561</td>
</tr>
<tr>
<td>Does your child usually like eating vegetables?</td>
<td>0.1</td>
<td>0.793</td>
</tr>
<tr>
<td>Have you noticed a change in your child’s attitude toward eating fruit?</td>
<td>0.2</td>
<td>0.668</td>
</tr>
<tr>
<td>Have you noticed a change in your child’s attitude toward eating vegetables?</td>
<td>0.1</td>
<td>0.793</td>
</tr>
<tr>
<td>Has your child tried eating a new fruit recently?</td>
<td>2.3</td>
<td>0.126</td>
</tr>
<tr>
<td>Has your child tried eating a new vegetable recently?</td>
<td>0.3</td>
<td>0.567</td>
</tr>
</tbody>
</table>

**Usual Preferences of Child toward Eating Fruits and Vegetables**

In two separate questions, parents were asked, “Does your child usually like eating fruits (vegetables)?” Results indicated that 79.3% (n=23) of the treatment group, and 85.7% (n=18) of the control group, said their child usually likes fruit. In contrast, 20.7% (n=6) of the treatment group and 14.3% (n=3) of the control group said their child did not usually like fruit ($X^2=0.338$, p=0.561, NS). There was no significant difference between the control and treatment groups.

For vegetables, 65.5% (n=19) of the treatment group, and 61.9% (n=13) of the control group, said their child usually likes vegetables. In contrast, 34.5% (n=10) of the treatment group, and 38.1% (n=8) of the control group, reported their child did not usually like vegetables ($X^2=0.069$, p=0.793) (Table 6). There was no significant difference between the control and treatment groups.

**Attitude toward Fruits and Vegetables**

In two separate questions, parents were asked, “Have you noticed change in your child’s attitude toward eating fruits (vegetables)?” Results indicated that 24.1% (n=7) of the treatment
group, and 19.0% (n=4) of the control group, had noticed a positive change in their child’s attitude toward eating fruit. In contrast, 75.9% (n=22) of the treatment group and 81.0% (n=17) of the control group indicated they had not noted any change in their attitude toward fruit ($\chi^2=0.184, p=0.668, \text{NS}$) (Table 6). There was no significant difference between the control and treatment groups.

For vegetables, 20.7% (n=6) of the treatment group, and 23.8% (n=5) of the control group, said they had observed a positive change in their child toward vegetables. In contrast, 79.3% (n=23) of the treatment group and 76.2% (n=16) of the control group said they had not observed any changes in their child’s attitude toward vegetables ($\chi^2=0.069, p=0.793, \text{NS}$) (Table 6). There was no significant difference between the control and treatment groups.

**Trying New Fruits and Vegetables**

In two separate questions, parents were asked, “Has your child tried eating a new fruit (vegetable) recently?” For fruits, 44.8% (n=13) of the treatment group and 23.8% (n=5) of the control group said their child had tried a new fruit recently, while 55.72% (n=16) of the treatment group and 76.2% (n=16) of the control group indicated their child had not tried a new fruit recently ($\chi^2=2.335, p=0.126, \text{NS}$) (Table 6). There was no significant difference between groups.

For vegetables, 17.2% (n=5) of the parents in the treatment group, and 23.8% (n=5) of the parents of children in the control group, indicated their child had tried a new vegetable recently, while 82.8% (n=24) of the treatment group and 76.2% (n=16) of the control group indicated their child had not tried a new vegetable recently ($\chi^2=0.328, p=0.567, \text{NS}$) (Table 6). There was no significant difference between the control and treatment groups.
Overall, the most frequently reported new fruits and vegetables tried by children in this study were kiwi (n=8), asparagus (n=4), blueberries (n=2), oranges (n=2), broccoli (n=2), and pineapple (n=2). Additionally, one parent of a child from the treatment group commented: “I want to add that (my child) has spoken a lot about what he has learned through MyPlate. He has always been given healthy foods at home, but now he seems to understand ‘why’ more!”

Summary

Data from 95 students and 50 parents showed a significant improvement in knowledge about MyPlate. After the five lessons from Discover MyPlate, kindergarten students were more able to acknowledge what is a food group, state the number of food groups, give the names of each food group, identify the MyPlate logo, and assign foods to their corresponding food group. Students also reported having eaten kiwi as a result of this nutrition curriculum. Kindergarten students, however, did not show improvement on ability to name a favorite colorful fruit or vegetable, consumption of fruit or vegetables, attitude toward kiwi, carrots, or broccoli, or knowledge of healthy foods. From the parents’ perceptions, students did not have significant changes in eating behaviors or attitudes toward fruits and vegetables as a result of Discover MyPlate; and this curriculum was not associated with students trying new fruits and vegetables.
CHAPTER FIVE

DISCUSSION

The purpose of this study was to measure the impact of five 30-minute nutrition education lessons from the "Discover MyPlate" curriculum on the nutrition knowledge, attitudes and food consumption behaviors of kindergarten students in a rural, Midwestern school district. This chapter describes the findings from each research question and compares the results with research previously discussed in the literature review.

RQ #1: Child Assessment

Knowledge about MyPlate

After completing the "Discover MyPlate" intervention, children in the treatment group showed significant improvement over their control group peers in most knowledge assessment questions. Treatment group students were increasingly able to acknowledge what is a food group, state the correct number of food groups, give the names of food groups, identify the MyPlate logo, and assign a food group to certain foods. When knowledge assessments from multi-component programs, like "Discover MyPlate", show improvement, the interventions and nutrition messages are impacting students (Prelip et al., 2012).

For the treatment group, the data showed 72.7% more students (from 6.5% to 79.2%) knew what a food group is and 73.3% more students (from 22.5% to 95.8%) knew the correct
number of food groups. In the treatment group, the greatest increase in knowledge from pre- to post-assessment among the five food groups was for “dairy” (72.9%), followed by “vegetables” (68.6%), “fruits” (56.3%), “protein” (48.5%), and “grains” (45.8%).

Before the intervention, nearly one third of the students in both the treatment (29.8%) and control groups (34.0%) were able to correctly identify the MyPlate logo. This prior knowledge of the MyPlate logo could be a result of multiple factors. Efforts from the USDA and the First Lady, Michelle Obama, have promoted nutritional standards through MyPlate and its website, www.ChooseMyPlate.gov. Technology and social media have played a role in familiarizing their messages and the MyPlate image to the general public (Post, 2013). Moreover, the school corporation that participated in this study had received a three-year Carol White PEP grant to increase physical activity and promote nutrition education and healthy eating. Nutrition interventions that occurred prior to this intervention included the placement of nutrition posters in the cafeteria and weekly nutrition tips that were placed on the schools website and sent home with students to share with their parents or guardians. Any or all of these efforts to promote nutrition through MyPlate may have contributed to the notable amount of students who could identify the MyPlate logo during the pre-assessment.

After the completion of Discover MyPlate lessons, nine out of 10 students in the treatment group (91.7%) could identify the MyPlate logo, but this number dropped to 17.0% for students in the control group. The increased ability of the students to identify the MyPlate logo for the treatment group can be attributed to the Discover MyPlate curriculum.

Many students could not assign a food group to a picture of foods in the “grains” group or “vegetable” group during the pre-test. When asked, “In what food group do you think these foods belong?,” it was common for students to point to certain foods and tell the researcher or
assistant where they belong. For example, “this belongs in the refrigerator” or “cereal belongs in a box”. This appeared to be a developmental misunderstanding of the question’s wording. In the end, the treatment group showed a knowledge increase of 38.3% for foods in the grains group and 51.2% for foods in the vegetable group. The greater increase for identifying the vegetable group may be due to one lesson of the Discover MyPlate curriculum focused specifically on fruits and vegetables.

The only section of the knowledge assessment where students did not show significant improvement after the Discover MyPlate program was in their ability to name a colorful fruit or vegetable. When asked, “What is your favorite colorful fruit (or vegetable),” children may have thought they were supposed to respond with their favorite color. Students from both the control and treatment groups, and in both pre- and post- tests, responded with colors, stating “red”, “purple”, “orange”, etc. The confusion of the question and unsuitable answers were not foreseen from the pilot testing. Also, during the pre-test, significantly more students from the treatment group than control group could name their favorite fruit. The unexplainable difference found in the pre-assessment for fruits, as well as the potential wording confusion to kindergarteners, were major contributors to this non-significance.

Overall, the Discover MyPlate curriculum had a significant effect on children’s knowledge about MyPlate. The increase in knowledge throughout this program evaluation resembles those of past program evaluations (Burke et al., 2014; Falter et al., 2011; Prelip et al., 2012). Nutrition knowledge improves with nutrition education programs, but many schools struggle to implement these programs due to lack of resources and efforts (American Dietetic Association, 2010). Although wellness policies are required for public school systems, barriers to

**Behavior of Fruit and Vegetable Consumption**

To assess behavior changes two questions asked the children to report if they have eaten any fruit (or vegetables) that day. Factors that could cause the children to incorrectly answer these questions include the lack of knowledge about what foods are fruits and vegetables and lack of memory for what they ate for breakfast and lunch. With the assumption that the students in the treatment group had knowledge about fruits and vegetables after the five Discover MyPlate lessons, though, these questions are likely an accurate assessment of the treatment group’s post-assessment fruit and vegetable consumption. Children were taught about fruits and vegetables, encouraged to choose healthy breakfast foods, and given the opportunity to taste fruits and vegetables, but these interventions did not translate to self-reported increased consumption of fruits and vegetables.

The literature indicates several nutrition education curricula have been associated with positive nutrition behavior changes (Hu et al., 2010; Matvienko, 2007; Williams et al., 2014). Hu and colleagues (2010) focused their education for students and parents and their pre- and post-assessments on several health behavior changes, some showing significant improvement and others not. Discover MyPlate promoted a broader understanding of nutrition and MyPlate, but perhaps focusing on multiple behaviors and specific improvements would have resulted in significant behavior changes.

Matvienko (2007) served bi-weekly healthy snacks over a four-week intervention period that resulted in improved snacking behaviors. Due to limited resources and time, students in this program evaluation had only two opportunities for healthful snacks. The more exposure a child
has, the more likely they will prefer healthful foods, impacting dietary intake of children
(Matvienko, 2007).

Attitude toward Healthy Foods

Results of the current program evaluation indicated the kindergarten students’ attitude
toward fruit and vegetables, (kiwi, carrots, and broccoli) did not change after the Discover
MyPlate program. At baseline, students’ attitude toward kiwi was significantly higher in the
control group. During the post-assessment, the treatment group indicated a slightly more positive
attitude toward kiwi, while there was a slight decrease in the control group. This trend suggests
the Discover MyPlate lessons were responsible for an improved attitude toward kiwi, but the
finding itself was not significant due to the significant pre-assessment difference.

Kiwi and carrots were two foods that the participants tasted during one of the Discover
MyPlate lessons. Exposure to new foods via taste tests impacts dietary preferences (Matvienko,
2007). The student’s attitude toward kiwi, carrots, and broccoli were assessed to see if exposure
to the foods impacted their attitude toward consuming that food. Wood et al. (2011) found that
elementary teachers reported an increase of receptivity toward fruits and vegetables after a
monthly intervention that included the tasting of new fruits and vegetables (Wood et al., 2011).
Similarly, Matvienko (2007) reported taste testing by students was associated with an
improvement of attitudes toward healthy snacks through actual student snack choices.
Unfortunately, there was no difference in the students’ selection of the facial expression
associated with their attitudes toward each of the foods after implementing the Discover MyPlate
curriculum.

Based on the significant rise from pre- to post-test in treatment students who reported
having eaten a kiwi before, for many students, the Discover MyPlate curriculum may have been
the first time they ever tasted a kiwi. The taste testing activity, involving kiwi, carrots and other fruits and vegetables, provided new experiences with food. One exposure, though, may not have been enough to improve attitude. Research indicates it can take up to 10-15 new food exposures for a person to show a shift in taste preferences (No Kid Hungry Center for Best Practices, 2015). Multiple tastings and longevity of implementation for school nutrition programs have a positive effect on child receptivity toward new fruits and vegetables (Wood et al., 2011). Looking forward, it is the hope that nutrition interventions and curriculum will continue in this school system to evoke even greater change. After all, a child’s attitude toward health and nutrition is more likely to improve with positive exposure to nutrition programs in schools, than without these programs (Katz, 2009). The ultimate goal is to create an atmosphere within the school that encourages nutrition.

### Ability to Select Healthy Foods

In contrast to previous studies (Burke et al., 2014; Falter et al., 2011; Prelip et al., 2012), students’ responses to the questions about whether or not soda, whole grain cereal, potato chips, or fruits and vegetables are healthy choices to fuel the body in this study indicated no significant difference post-assessment. It cannot fully be determined as to whether the inability to correctly answer these questions was associated with the curriculum or with the instrument used to assess this construct.

Despite soda and other sugar sweetened beverages making up a large part of excess calories in children (Huth et al., 2013; Martin-Calvo et al., 2014), the majority of the students in both the treatment and control group students (81.3% and 87.2% respectively) knew before the curriculum that soda was not a healthy choice during the pre-assessment. There was a slight, yet non-significant, increase in the percentage of treatment children giving the correct answer.
However, this change cannot be attributed to the Discover MyPlate curriculum because a slight increase was also seen for the control group.

The percentage of students in the treatment group who stated whole grain cereal was healthy increased from 60.4% during the pre-assessment to 75.0% during the post assessment, while the control group decreased from 68.1% to 66.0% from pre- to post-assessment. Although the percent who correctly identified whole grains as healthy increased numerically, the finding was not significant and, as such, the curriculum was not associated with an increased understanding of whole grains as a healthy food to fuel the body. Similarly, both the control (19.2%) and treatment groups (14.6%) showed an increase in the percent of students who correctly indicated that potato chips were not a healthy food to fuel the body. As such, the change cannot be attributed to the Discover MyPlate curriculum. Lastly, nearly all students already knew fruits and vegetables were healthy foods to fuel the body (87.5% treatment group; 93.6% control group). Thus, there was no change as a result of the program intervention.

As shown in this assessment, most kindergarten students already knew fruits and vegetables are healthy, but majority reported eating no fruits or vegetables on pre- and post-assessment days. This is consistent with research that demonstrates most young children are below recommended levels of fruit and vegetable intake (Nielson et al., 2014; USDA, USDHHS, 2010). Similarly, most children know soda is not a healthy choice, but children are getting most of their sugar intake from soda and other sugar-sweetened beverages (Martin-Calvo et al., 2014). It is apparent that knowledge about healthful foods is not translated to healthy eating patterns.
RQ #2: Parent Assessment

Eating Behaviors of Children

According to Burke et al. (2014), contribution from multiple points of contacts, such as in the classroom, in the cafeteria, and with other school staff, help facilitate nutrition change within the school. However, parents and families are particularly important to encourage and reinforce behavior changes in children. In this study, parent involvement in their child’s nutrition education through Discover MyPlate was measured with the parent survey. Parents were surveyed about perceptions of their child’s eating behaviors and attitudes. Parent connection makes nutrition education programs more effective for child learning and behaviors (No Child Hungry Center for Best Practices, 2015).

Although not statistically significant when compared to the control group, several positive changes were perceived by parents. Nearly one third of responding parents of children in the treatment group reported a positive change in their child’s eating behaviors in the past month, during and after Discover MyPlate intervention. Parents’ comments from the treatment group compared to the control group verified that behavior changes in their children were directly related to the Discover MyPlate curriculum. Six of the comments from parents of children in the treatment group indicated their child was asking for more fruits and/or vegetables, whereas only one parent of a child in the control group commented on their child trying more fruits and vegetables.

Also, a few comments from the treatment group parents were directly related to food group/MyPlate lessons (e.g., “She talks about what food groups her foods belong to!” and “more aware of what is on his plate”). On the contrary, additional comments from the control group parents had little to nothing to do with the Discover MyPlate lessons (e.g., “she tells us
sugar/junk food is bad for us” and “ask for healthier drinks”). These comments may be related to questions on the student assessment, but are not tied to the lessons themselves.

Usual Preferences and Attitude Changes for Fruits and Vegetables

Parents greatly affect child eating preferences and patterns (Turner & Chaloupka, 2012). In order to appropriately assess change in attitude, usual preferences were noted. A high percentage of both treatment group and control group parents stated their child already liked fruit (79.3% and 85.7% respectively). Thus, the insignificant change in improved attitude toward fruits is expected if most students already like them. For vegetables, the preferences were not as high, but still nearly two thirds already liked them for the treatment (65.5%) and control groups (61.9%). A positive change in attitude was seen for vegetables, but since this change was very similar among both the treatment and control groups, improved attitude toward vegetables was not attributed to Discover MyPlate.

Trying New Fruits and Vegetables

It can take up 10-15 exposures to a new food for a child to accept it (No Child Hungry Center for Best Practices, 2015). Therefore, nutrition efforts encourage trying new healthful foods, such as fruits and vegetables. Although no statistical significance was found between groups, there was a 21.0% difference in children who tried a new fruit, with the higher percentage noted of children in the treatment group. As mentioned previously, many children tried kiwi for the first time during one of the Discover MyPlate lessons. Children from the control group may have also had the opportunity to try kiwi and other fruits or vegetables at the local community wellness fair held at the elementary school on an evening within the timeframe of this program evaluation. Therefore, according to the parent survey, no statistical difference was seen between groups for trying new fruits or vegetables.
Summary

The *Discover MyPlate* curriculum was effective in improving knowledge among children who completed the program. Attitude and behavior changes measured through student assessments were insignificant, but parents’ reports point to *Discover MyPlate* being responsible for positive changes seen in students and an increase of students trying new fruits and vegetables. However, as consistent with previous studies, an increase in knowledge does not directly impact a behavior. Although behavior and attitude assessments from the child and parent surveys did not show significant improvement for students who completed *Discover MyPlate*, the ongoing effect of the program is yet to be seen.
CHAPTER SIX

CONCLUSIONS

The purpose of this study was to measure the impact of five 30-minute nutrition education lessons from the Discover MyPlate curriculum on the nutrition knowledge, attitudes and food consumption behaviors of kindergarten students in a rural, Midwestern school district. This chapter gives a brief summary of the results and practical applications drawn from this program evaluation as well as strengths and limitations of this study and recommendations for future research.

Conclusions

Based on assessment measures and parent comments about change perceived in their student, it can be stated that the Discover MyPlate nutrition education curriculum for kindergarten students is effective for teaching children about healthy eating. This curriculum appeared to have successfully provided kindergarten students a foundation of nutrition standards and guidelines from MyPlate. Despite no significant behavioral or attitude changes assessed from this program, the impact of Discover MyPlate on the future of these students is unknown. Perhaps with further nutrition education at the classroom level and a continued emphasis on health and wellness from the school and community, the eating habits of children in the selected school system will improve.
Discover MyPlate was an excellent and comprehensive curriculum. It is user friendly and suitable for elementary teachers, providing the education standards met through specified aspects of the curriculum. Discover MyPlate has suggestions to guide the user based on allotted time frame to teach the curriculum; there are enough activities and event suggestions to spread this curriculum throughout the entire school year. The version used for this program evaluation was condensed to fit the request of the school and feasibility of the data collection.

This curriculum is one of many nutrition education curriculums available for teaching elementary students. Strengths of Discover MyPlate include its highly current standards, newly innovative education tactics, engaging supply of education materials, and narrowed focus on a target age group (kindergarten). This curriculum, however, could be modified to reach other levels of early elementary or even preschoolers.

Overall, Discover MyPlate is a curriculum that promotes healthy eating practices for children and enhances children’s nutrition knowledge. As it was reported through the parent survey, a parent of a child that completed this program noted this positive change: “Through Discover MyPlate, my child seems to better understand why he has always been given healthy foods at home.” As knowledge about nutrition increases, interest in health flourishes, and healthful behavior changes are more likely to occur.

Strengths

As many strengths of the Discover MyPlate curriculum have already been discussed, additional strengths in this program evaluation exist. First, the school corporation where the intervention took place requested this nutrition education intervention. This was highly favorable because it allowed for enthusiastic collaboration with kindergarten teachers and complete participation from all possible subjects. Second, the presence of a control group in the research
design allowed for a more accurate evaluation of changes caused from the intervention alone. Third, the child survey instrument was piloted and validated, with changes made to the survey prior to starting data collection. Fourth, all lessons were taught by the primary researcher to provide uniformity between the two treatment classrooms.

Limitations

In addition to strengths, limitations of this program evaluation exist. First, condensing the curriculum may have lost some of the effects that the all-inclusive program could have. In spite of this, positive results were still gleaned. Second, the wording of a few child assessment questions was confusing to some students and inappropriate answers may have tainted data. Third, students were assumed to be present for majority of the lessons, and although attendance was recorded, the data in this program evaluation did not filter for the students who were not present for the majority of the lessons. While only two students fell into this category, outcomes may have differed slightly. Fourth, other community efforts to promote health and wellness may have skewed the data, causing some measures to not be statistically significant. Fifth, the location of the assessment was confined to the hallway outside of the kindergarten classrooms where other students frequently walked by, likely causing distractions to the students answering the assessment questions.

Recommendations for Future Research

For any efforts to expand this study or evaluation of the effectiveness of Discover MyPlate, the following topics of research are recommended:

1. Repeat this study with an increased number of participants, either within this school or among other elementary schools;
2. Teach the full version of the *Discover MyPlate* curriculum over a longer time span using more of the suggested activities and events. Then compare results to those found in this evaluation;

3. Revise the questions used to assess the children’s attitude toward various fruits and vegetables; and

4. Track the same students one year later, while participants are in first grade, to assess retention of information, as well as, further knowledge, attitude, and behavior changes.
REFERENCES


Brant, T. (2014). Selma Moves to Improve: Year two annual report to LPSC constituents *PEP Grant*.


APPENDIX A

INSTITUTIONAL REVIEW BOARD MATERIALS

CITI CERTIFICATE OF COMPLETION
Appendix A-1 – IRB Letter

| DATE: | January 27, 2015 |
| TO:   | Beth Elicessor, BS |
| FROM: | Ball State University IRB |
| RE:   | IRB protocol # 691620-1 |
| TITLE:| An Evaluation of Five Lessons From Discover MyPlate: An Inquiry-Based Nutrition Education Curriculum For Kindergarten Students |
| SUBMISSION TYPE: | New Project |
| ACTION: | DETERMINATION OF NOT HUMAN SUBJECTS RESEARCH |
| DECISION DATE: | January 27, 2015 |
| REVIEW TYPE: | Administrative Review |

The Institutional Review Board received the above protocol. After review and consideration, the IRB concluded that this project does not meet the definition of ‘research with human subjects’ at this time, as specified by federal regulations at 45 CFR 46.

**Research:** A systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge. *(Activities which meet this definition constitute research for purposes of this policy, whether or not they are conducted or supported under a program which is considered research for other purposes.)*

**Human Subject:** A living individual about whom an investigator (whether professional or student) conducting research obtains: (1) data through intervention or interaction with the individual or (2) identifiable private information.

Consequently, this project does not require IRB approval as submitted. The IRB accepts this information for our records and will retain it in our files. Thank you for providing the IRB with these materials for review. Please contact the Office of Research Integrity if any details of the study are to change so that the IRB may reconsider the protocol, if necessary.

If you have any questions regarding this decision or would like to respond in person, please contact the Office of Research Integrity.
Appendix A-1 – IRB Letter (page 2)

Bryan Byers, PhD/Chair
Institutional Review Board

Christopher Mangelli, JD, MS, MEd, CIIP/Director
Office of Research Integrity
Appendix A-2 – CITI Certificate of Completion

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI)
SOCIAL & BEHAVIORAL RESEARCH - BASIC/REFRESHER CURRICULUM COMPLETION REPORT
Printed on 06/27/2014

LEARNER
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10908 E. CR. 170 S.
Selma
IN 47383
USA

DEPARTMENT
Family and Consumer Sciences

EMAIL
beltessoer2@bsu.edu

INSTITUTION
Ball State University

EXPIRATION DATE
08/26/2017

SOCIAL & BEHAVIORAL RESEARCH - BASIC/REFRESHER - Choose this group to satisfy CITI training requirements for Investigators and staff involved primarily in Social/Behavioral Research with human subjects.

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For this Completion Report to be valid, the learner listed above must be affiliated with a CITI Program participating institution or be a paid Independent Learner. Falsified information and unauthorized use of the CITI Program course site is unethical, and may be considered research misconduct by your institution.

Paul Braunschweiger Ph.D.
Professor, University of Miami
Director Office of Research Education
CITI Program Course Coordinator
APPENDIX B

LETTERS OF INFORMATION AND PERMISSION
Discover MyPlate

Synopsis/Goals:

Discover MyPlate is fun and inquiry-based nutrition education that fosters the development of healthy food choices and physically active lifestyles during a critical developmental and learning period for children — kindergarten.

This program helps children become food-smart as they practice counting, reading, writing, and more. The curriculum includes fun characters and developmentally appropriate activities that engage children in:

- Exploring healthy choices from each of the MyPlate food groups
- Discovering the colorful variety of fruits and vegetables and how they grow
- Identifying feelings of hunger and fullness
- Experiencing the fun and importance of being physically active

This new curriculum was published in June of 2014 by the USDA. As part of the Selma Moves to Improve grant, Discover MyPlate will be available to all K classrooms at Selma Elementary School in the spring semester. Beth Ellcessor and Megan Harris, from Ball State University, will provide five 30-minute lessons with accompanying activities, taste testing, and materials for each classroom. The students will be asked to complete a short pre-and post-assessment; in addition, the parents will be asked to complete a short survey about their child’s eating behaviors.

In addition, if anyone in grades 1-5 would like to have a nutrition education unit included in their class (whether one lesson or a series of lessons), all we have to do is contact Dr. Carol Friesen who will work with the senior dietetics students and Beth to help meet your needs.

Our main goal is to bring exciting nutrition education to Selma Elementary School by using the Discover MyPlate curriculum and other resources that we will be provided courtesy of the Selma Moves to improve grant without placing any burden on the classroom teacher.
Selma Elementary School
200 South East Street
Selma, IN 47383
Phone 765-282-2455
Fax 765-281-3730

December 2, 2014

To Whom It May Concern:

As a part of the wellness initiative throughout the Liberty-Perry School Corporation, we at Selma Elementary School are seeking to increase nutrition education in our classrooms. We are happy to allow Beth Ellcessor, a graduate student in Nutrition and Dietetics at Ball State University, to teach nutrition lessons to our Kindergarten classes while conducting a program evaluation on *Discover MyPlate* curriculum for kindergarten.

We look forward to this opportunity to educate our young students about healthy eating and MyPlate and to incorporate the latest nutrition material into the classroom.

Sincerely,

Name: Joel D. Mahaffey
Title: Selma Elementary School
Phone/email: 765-282-2455/mahaffey@libertyperry.org
Appendix B-3 – Letter of Information

DATE

Dear Parent/Guardian:

This spring, as part of our school system’s Wellness Initiative, all of our kindergarten classes will be learning about nutrition. Your child will be participating in a nutrition education curriculum called “Discover MyPlate.” The curriculum will include activities, worksheets, snacks, and an active song. We will use the food allergy list you provided at the beginning of the school year to ensure everyone can safely enjoy the healthy snacks. If there has been a change in your child’s food allergy status, please make sure you contact me at [email].

To your health!

Teacher’s name
Dear Parent/Guardian:

We would like to ask you a few questions to assess your child’s food consumption and attitude toward eating fruits and vegetables. Would you take a few moments to answer the questions on the enclosed survey?

Please have your child return the completed questionnaire to me by XX/XX/2015. This information will be given to our nutrition educator, a graduate student at Ball State University, to provide information for a new curriculum called Discover MyPlate. I would like to assure you that the information you provide is strictly confidential.

Thank you for your help! If you have any questions or comments, please contact me at (teacher’s email address).

Sincerely,
APPENDIX C

SURVEY INSTRUMENTS
Appendix C-1 – Child Assessment

Qualtrics Survey Questions:

1. Student’s gender
2. Student’s teacher
3. Student’s name
4. Do you know what a food group is?
5. How many food groups do you think there are?
6. Can you tell me the names of the food groups? (Click the box next to each group he/she can name.)
   - Fruits
   - Vegetables
   - Protein/Meat
   - Dairy/Milk
   - Grains/Breads
7. MyPlate is a picture that reminds people what to eat every day to be healthy. Can you point to the MyPlate picture? (student will choose from three pictures)
8. What food group do these foods belong in? (a picture of various grains)
9. What food group do these foods belong in? (a picture of various vegetables)
10. Have you eaten any fruit today? (Assessments will always be done in the afternoon.)
11. Have you eaten any vegetables today?
12. What is your favorite colorful fruit?
13. What is your favorite colorful vegetable?
14. Have you eaten a kiwi before? (picture of a kiwi)
15. How does eating this fruit make you feel? (3 faces “yuck” to “yum”)
16. How does eating this vegetable make you feel? (picture of carrots & 3 faces “yuck” to “yum”)
17. How about this vegetable? (picture of broccoli & 3 faces “yuck” to “yum”)
18. Is this a healthy choice to fuel your body so you can play? (a graphic for each food item is shown)
   - Soda
   - Whole Grain Cereal
   - Potato Chips
   - Vegetables and Fruits (broccoli, carrot, lettuce, tomato, pear, peach)
Discover MyPlate
PARENT/GUARDIAN SURVEY

Child’s Name: ________________  Teacher:

1. In the past month, have you noticed any changes in your child’s eating behaviors?
   □ No, no change
   □ Yes, a positive change (e.g., they are eating and asking for healthier foods!)
   If yes, what changes have you seen? ______________________________________

2. In general, does your child usually like eating fruits?
   □ No
   □ Yes

3. In general, does your child usually like eating vegetables?
   □ No
   □ Yes

4. In the past month, have you noticed a change in your child’s attitude toward eating fruits?
   □ No, no change
   □ Yes, a positive change (e.g., eating more fruit/asking for fruit)
   □ Yes, a negative change (e.g., not willing to eat fruit/never asking for fruit)

5. In the past month, have you noticed a change in your child’s attitude toward eating vegetables?
   □ No, no change
   □ Yes, a positive change (e.g., eating more veggies/asking for veggies or a salad)
   □ Yes, a negative change (e.g., not willing to eat veggies/never asking for veggies)

6. Has your child tried eating a NEW fruit recently?
   □ No
   □ Yes. If yes, what fruit/fruits? __________________________

7. Has your child tried eating a NEW vegetable recently?
   □ No
   □ Yes. If yes, what vegetable(s)? __________________________

Please return to your child’s kindergarten teacher by x/x/2015

Adapted from Friesen-Schroeder, Ferguson, & Wray (1994)
APPENDIX D

LESSON MATERIAL
Lesson 1: Discover MyPlate

Key Concept: The Five Food Groups

Objective(s): At the end of this lesson, students will be able to answer these key questions:
1. What are the names of the five food groups?
2. Which foods belong in each group?

Materials:
- Colorful shapes
- Rings/hula hoops for grouping
- The Five Food Groups poster
- Food Cards
- Food Group Friends profile cards
- CD player/media system & CD for “Reach for the Sky” song

Procedures:

1. Introduction – “Warm Up”
   
   SORTING ACTIVITY (5 minutes)
   - Display the poster The Five Food Groups where students can see it.
   - Gather children on the carpet in a circle. Place two hoops in the center of the circle and the colorful shape in front of you.
   - Demonstrate how the shapes can be sorted into the hoops by attribute (color, size, or shape).
   - Give children a few minutes to sort the remaining shapes.
   - Explain “Just like sorting these colorful shapes by color, size, or shape, we also sort foods into food groups. Foods in the same food group are similar in some way.”

   FOOD CARDS AND INTRODUCE FOOD GROUPS (12 minutes)
   - Spread out the Food Cards in the center of the circle.
   - Ask students to name a food that they ate this week and choose it from the cards. Tape their cards on the board or to a flip chart.

   Fruits
   - Choose two foods students chose from the Fruit group (e.g. apples, oranges).
   - Ask: “You named an apple and an orange. What food group do apples and oranges belong to?”
   - Explain that fruits come from plants and can be many colors. They often taste sweet and are eaten as a snack or even for dessert. Fruits help our bodies stay healthy and grow.
   - Ask students to smile and point to their teeth and gums.
   - Say, “Some fruits help our bodies heal cuts and scratches and help keep our teeth and gums healthy.”
Vegetables
- Choose two foods from this group and ask students what food groups their *Food Cards* belong to.
- Explain that as with fruits, there are many different colors of vegetables, such as green, orange, and red. Some vegetables, like carrots and broccoli, can be fun to crunch when they are raw.
- Ask students to pull out their “night-vision goggles” (put hands in the shape of glasses) and identify what other foods from the vegetable group they recognize from the cards or poster.
- Say, “Just like fruits, some vegetables provide bodies with what we need (vitamins) to heal cuts and scratches. Some vegetables also have a vitamin that helps us have healthy eyes and skin and to see better in the dark!”

Protein
- Choose two foods from this group and ask students what food groups their *Food Cards* belong to.
- Explain that foods in the protein group all have protein. Protein foods can come from animals, like beef comes from cows and ham comes from pigs. Some protein foods also come from plants like beans, sunflower seeds, and nuts. Protein foods help us build strong muscles. Muscles help our bodies move.
- Have students move parts of their bodies (e.g. taking a deep breath, blinking their eyes, smiling, snapping their fingers, tapping their toes, marching in place, or flexing their biceps)
- Explain that all movements, small and large, require muscles.

Dairy
- Choose two foods from this group and ask students what food groups their *Food Cards* belong to.
- Explain that most dairy foods are made from milk, like cheese and yogurt. Usually milk comes from cows, but milk can come from sheep and goats, too. Foods in the dairy group help us have strong bones and teeth. Inside our body is a skeleton, which is made up of all the bones in the body. It helps us stand up and protects our brain, lungs, heart, and other parts of our insides.

Grains
- Choose two foods from this group and ask students what food groups their *Food Cards* belong to.
- Explain that grains come from plants like rice, wheat, and oats. Wheat and some other grains are made into flour and used to make breads, crackers, and noodles. Foods in the grains group give the body many things it needs to be healthy. They provide our bodies with the energy we need to move and play!
- Have students check their pulse by placing their first and second finger on the inside of their wrists and pressing gently. Explain that their pulse is a measure of how fast their heart is beating. Next, have them do 10 jumping jacks, then measure their pulse again. What do they notice? Is it faster?
- Say, “Your heart beats faster because your body uses more energy to do jumping jacks than it does to sit still. The body needs more energy to move muscles.”
FOOD GROUP FRIENDS (5 minutes)
• Use the Food Group Friends Profile Cards to introduce students each character:
• Farrah Fruit
• Reggie Veggie
• Jane Grain
• Dean Protein
• Mary Dairy
• Talk about how the Food Group Friends are made up of food from that particular food group. They can help us remember which foods belong to which food groups.

2. Activity - “Reach for the Sky” Song (5 minutes)
• Review the lyrics of the song “Reach for the Sky” with students.
• Have students focus on remembering the chorus.
• Go over new vocabulary and movements incorporated into the song.
• Have students stand where they are in the room and play the song.
• Encourage them to sing and dance. It’s okay if they don’t get the movements right, as long as they are moving!
• Repeat the song if time permits.

Summary: (3 minutes)
• Today we’ve talked about ways different foods help us stay healthy. What are some ways we’ve mentioned? (Helping our bodies have strong bones and teeth, building muscles, having energy to move and play, healing cuts and scratches.)
• Would you want to eat just one food all day? Why not? Different foods provide our bodies with different things we need to stay healthy. We need to eat foods from all of the food groups to get what we need to feel our best.

Post-Lesson Learning Activities
Emergent Readers – Protein
Student Workbook – p. 5
Take Home Activity (Homework) – “Meet My Plate”
Lesson 2: Discover MyPlate

Key Concept: Healthy Meals Include Foods From All Five Food Groups

Objective(s): At the end of this lesson, students will be able to answer these key questions:
1. What is a healthy meal?
2. What does MyPlate remind us to do?

Materials:
- CD player/media system & CD for “Reach for the Sky” song
- The Five Food Groups poster
- Food Cards
- Food Group Friends profile cards
- MyPlate Nate and Kate profile cards
- Dry Erase board and markers
- Snack “Food Group Friend”
  - Grain: brown rice cake
  - Protein: kidney beans
  - Vegetables: red pepper slice (or green)
  - Dairy: string cheese
  - Fruit: blueberries
  - Other: hand sanitizer, plates, napkins, wet wipes, containers or bags to hold food

Look and Cook Activity “Food Group Friend”

Procedures:

1. Activity - “Reach for the Sky” Song (5 minutes)
   - Review the lyrics of the song “Reach for the Sky” with students.
   - Play and sing the song while doing the motions.

2. Introduction (10 minutes)

   REVIEW FOOD GROUPS
   - Display the Food Group Friends Profile Cards and remind students of the Five Food Group Friends and how they each represent the variety of foods we should eat from each of the five food groups.
   - Review the five food groups, each friend, and the foods that make them up.
   - Introduce MyPlate Nate and Kate
   - Show their profile card.
   - Say, “Meet MyPlate Nate and Kate. They eat healthy foods from each food group every day. They also like to run and play every day. Eating smart helps them play hard.”
• Tell students that, when we eat food from all of the food groups, we help our bodies get what they need to play, grow, and be healthy.
• Explain that foods give us “fuel” to run around and play, just like a toy that used batteries to run. Without batteries, the toy does not work. Without food, our bodies would not have the energy we need to read a book, dance around, or walk to the school bus.
• Say, “Eating the right amounts of foods from each food group helps us be our best at play, sports, and school.
• Point out the MyPlate icon on Nate and Kate’s shirts.
• Ask the students to say “MyPlate” and tell them that it reminds us to eat food from each food group.
• Explain that MyPlate Nate and Kate need help to create a complete MyPlate meal.
• Ask, “Will you all help MyPlate Nate and Kate with their MyPlate meal?”

3. Activity (7 minutes) (Take out this activity if snack is added)
• Divide students into 5 groups that correspond to each of the food groups.
• Give each student one of the Food Cards that goes in their group.
• Ask one group to name a food from the food group that they like to eat for dinner.
• Next, ask the other groups to share what foods they can bring to the meal to make it a MyPlate dinner.
• Circle the chosen foods on the poster, or draw on the board to signify creating a complete meal.
• Repeat activity as time allows

4. Snack (12 minutes)
• Have students wash their hands or use hand sanitizer before touching or eating food.
• Food Group Friend: describe to the students what you will be making. Explain that this snack will have foods from each of the five food groups.
• Draw or show a picture of what they will be making.
• First, pass out the rice cakes and string cheese. Have the students start “making hair” for their “Food Group Friend” by peeling and placing the string cheese at the top of the rice cake. Remind them that the rice cake is in the grain group and the cheese is in the dairy group.
• Next, pass out a red pepper slice, 2 blueberries, and a small spoonful of kidney beans to each student. (Have the teacher and any other classroom aids help.) Discuss what food group each food is in.
• Share with students that their “Food Group Friend” now has all five of the food groups.
• Encourage students to taste the foods and enjoy eating their food group friend.

Summary: (3 minutes)
• Today we’ve talked about how to make a MyPlate meal. We took a look at Farrah Fruit, Reggie Veggie, Jane Grain, Dean Protein, and Mary Dairy and met MyPlate Nate and Kate. Remember MyPlate Nate and Kate eat healthy foods from each food group every day. They also like to run and play every day. Eating smart helps them play hard.
• Ask, “What is a healthy meal?” It is a meal that has all 5 of the food groups.
• Look again at the MyPlate poster and ask, “What does MyPlate remind us to do?” It reminds us to eat fruits and vegetables as half of our plate.
• Send home the “Food Group Friend” Look and Cook activity sheet with each student.

Post-Lesson Learning Activities
Emergent Readers – Vegetables
Student Workbook – p. 11
Take Home Activity (Homework) – “Snack Time”
Lesson 3: Discover MyPlate

Key Concept: Fruits and Vegetables

Objective(s): At the end of this lesson, students will be able to answer these key questions:
1. What colors are fruits and vegetables?
2. Why is it important to eat different kinds of fruits and vegetables?

Materials:
- CD player/media system & CD for “Reach for the Sky” song
- The Five Food Groups poster
- Food Cards
- Colored markers (dry erase or regular)
- Dry erase board or large sheet of paper
- Super senses activity:
  - Smell: banana or pineapple slices; paper bag
  - Touch: orange or kiwi; paper bag
  - Hearing: baby carrots
  - Sight: blueberries and red peppers; clear containers
  - Taste: paper plate/napkins
- Colorful food pictures “Sometimes Foods” (Chips, Fruity Pebbles, Orange Crush, Skittles)
- Look and Cook Activity “Crunchy Rainbow Wrap”

Procedures:

1. Introduction (5 minutes)
   - Begin the lesson by asking students to name different fruits. List their responses using colored markers that correspond to the color of the fruit.
   - Repeat, having students name vegetables.
   - Point out to students that the fruits and vegetables they mentioned are lots of different colors. They could make a rainbow with all of the beautifully colored fruits and vegetables they mentioned!
   - Ask students why they think it is good to eat fruits and vegetables of different colors. *(They can make your plate/meal or snack look pretty. By eating different-colored fruits and vegetables you can help your body get what it needs to be healthy.)*

2. Activity - “Reach for the Sky” Song (5 minutes)
   - The class will participate in a colors activity with the song “Reach for the Sky” with students.
   - Play the song and when the music is paused, a fruit/vegetable will be called out and students will have to point to something in the room the same color.
3. Extra Helpings – Sorting Out “Sometimes” Foods (5 minutes)

- Lead the class in discussion.
- Colorful fruits and vegetables are great to eat at meals and snacks. You should eat them every day.
- Some candies and sweet cereals come in rainbow colors too. They are not part of the Fruit Groups or Vegetable Group.
- You cannot pick these foods from your garden to eat. They are made in a factory. They have color and often lots of sugar added to them.
- Eating too much sugar is not good for our health. Sweet and sticky foods can also cause cavities.
- Candies and sugary cereals are “Sometimes” foods. That means you should only eat them every once in a while, not every day.
- Show pictures of food and ask students which are fruits, vegetables, or “sometimes” foods.

4. Super Senses (12 minutes)

- Explore fruits and vegetables through the senses!
- Gather students in a circle on the rug. Do not let them see the food items you have brought.

**SMELL**
- Ask students to close their eyes and not call out as you walk in front of them and allow them to smell the banana or pineapple slices in a paper bag.
- See how many students are able to guess the correct fruit once everyone has had the opportunity to smell it.

**TOUCH**
- Pass around an orange or a kiwi and ask students to describe how the outside feels.
- Place the food in a “mystery bag” and allow children to reach in and feel without seeing it.

**HEARING**
- Have students close their eyes again and listen closely as you take a bite of a carrot. Can you guess which food made that sound?
- Ask students to open their eyes and see the carrot.

**SIGHT**
- Pass around some blueberries in a clear container and a red bell pepper.
- Ask students to describe the colors and what the foods look like.
- If time allows, have students describe the colors of the other foods used for this activity (e.g. banana, kiwi, carrot…etc).

**TASTE**
- Use proper food safety and check for food allergy regulations.
- Have everyone participate in tasting wash hands or use hand sanitizer before they taste food.
- Distribute paper plates/napkins and food samples (carrots, blueberries, red peppers, kiwi, and bananas).

- Ask students to share which fruits or vegetables they like to eat at snack time.
• Explain that any fruit or vegetable makes a great healthy snack and helps them do what they need to do each day – like play, listen, dance, run, blink, and think!

**Summary:** (3 minutes)
• Today we’ve talked about the many colors of fruits and vegetables.
• Name a variety of colors and ask students to name fruits and vegetables of that color. Display *The Five Food Groups* poster near the front of the room as a visual aid for this discussion.
• Hand out Look and Cook activity to send home.

**Post-Lesson Learning Activities**
Emergent Readers – Fruits
Student Workbook – p. 19
Take Home Activity (Homework) – “Welcome to School Lunch”

Colorful foods - “Sometimes Foods”
Appendix D-4 – Lesson 4

Lesson 4: Discover MyPlate
(From Lesson 5)

**Key Concept:** The Importance of Eating Breakfast

**Objective(s):** At the end of this lesson, students will be able to answer these key questions:
1. How do we know when it is time to eat or when we have had enough?
2. Why does our body need food?
3. Why is it important to eat breakfast?

**Materials:**
- CD player/media system & CD for “Reach for the Sky” song
- *The Five Food Groups* poster
- *Food Group Friends* profile cards
- Dry erase/chalk board or large sheet of paper
- Markers or chalk
- Look and Cook Activity “Fruit-a-licious Breakfast Cup”

**Procedures:**

1. Review (3 minutes)
   - Review the five food groups using *The Five Food Groups* poster and the *Food Group Friends* profile cards.

2. Activity - “Reach for the Sky” Song (2 minutes)
   - Play the song. Sing and dance.

3. Introduction (12 minutes)
   - After reviewing, begin with a discussion of feeling hungry and full. Ask students, “How do our bodies tell us that it is time to eat?

**HUNGER**
- Ask the following questions to promote discussion: How do you feel when you wake up in the morning? Do you feel hungry? What does that feel like? How does your stomach feel? Does it growl? What do you think about when you feel hungry?
- Explain that when our bellies are ready to eat food, we feel hungry. Our stomachs may gurgle or make funny noises and we think about wanting to eat. It is our body’s way of telling us to start eating.

**FULLNESS**
- Ask the following questions to promote discussion: How do we know when we have had enough to eat? How do you feel after you have eaten? What does it feel like when you are
full? How does your stomach feel then? Do you still think of wanting to eat food when you feel full?

• Explain that when we have eaten enough food, our stomachs feel full. It is our body’s way of telling us to stop eating. Sometimes when we keep eating even after our stomachs feel full, it makes us feel stuffed.

• Show puffed-out cheeks to underscore the feeling. Ask whether your students have ever felt this way.

• Say, “If we eat too much, we can get a stomachache and not feel well.”

VISUAL DEMONSTRATION

• To reinforce students’ understanding of being hungry or full, draw a visual on the board or chart paper of three stomachs – empty, half full, and full.

• Use a balloon to represent the stomach at different levels of fullness.

• Say, “The deflated balloon is like an empty stomach. You feel hungry when your stomach is empty. As I blow air into the balloon it becomes more and more full, like your stomach becomes fuller after eating.”

4. Activity – Breakfast Game (10 minutes)

• Have students stand in wide rows or scattered throughout the classroom (with an arm’s length of space around them).

• One at a time, ask a student to say a food he/she ate, or likes to eat, for breakfast. If other students (or you) also ate or like to eat that food, they take one hop forward. (If you have limited room, switch to putting arms up versus down).

• After the game, remind students that breakfast and other foods give us energy, like batteries do for a toy.

• Explain that breakfast is especially important because it is the first meal we eat after we have slept for a long time. Sleep helps our bodies rest. When we wake up, we need food to help us “recharge.” That food helps us move and be active.

• Tell students that there are “anytime” and “sometimes” breakfast foods. We need to choose the best fuel for our body. Healthy foods help our body work best.

• “Anytime” foods are the healthiest. They are great choices for breakfast, like whole-grain toast, low-fat yogurt, and fruit.

• “Sometimes” foods have lots of added sugars and other things we do not need. These foods are less healthy choices at breakfast. It is okay to eat them on special occasions, but not all the time. “Sometimes” foods are like donuts, pastries, sugary cereals, and bacon.

Summary: (3 minutes)

• Today we’ve talked about hunger and fullness. How do you know when it’s time to eat? Stop eating?

• We also learned about the importance of breakfast. If this balloon were your stomach, what would it look like in the morning after you wake up? Why is it important to eat breakfast?

• What is an example of a breakfast food you should eat anytime? Only sometimes?

• Hand out Look and Cook activity to send home.
Post-Lesson Learning Activities
Emergent Readers – Dairy
Student Workbook – p. 25
Take Home Activity (Homework) – “Be Your Best With Breakfast”
Lesson 5: Discover MyPlate
(From Lesson 6)

Key Concept: Physical Activity

Objective(s): At the end of this lesson, students will be able to answer these key questions:
1. Why is it important to be physically active every day?
2. What gives us the energy to be physically active?

Materials:
CD player/media system & CD for “Reach for the Sky” song
The Five Food Groups poster
Food Group Friends profile cards
Dry erase/chalk board or large sheet of paper
Markers or chalk
Look and Cook Activity “Friendship Pocket”

Procedures:

1. Activity – “Reach for the Sky” Song (3 minutes)
   • When the song is played, students will be asked to run in place throughout the entire song.
   • At the end of the song, have students put their hands over their hearts and feel it beating.

2. Introduction (12 minutes)
   • Ask, “Do you remember what else we can do to keep our bodies healthy, in addition to making healthy choices?”
   • Display the MyPlate Nate and Kate Profile Card and remind students that Nate and Kate like to eat healthy foods from each food group every day. They also like to run and play every day. Eating smart helps them play hard.
   • Explain that our bodies are meant to move. We need to be physically active each day so that our muscles, heart, and bones are strong. Invite volunteers to share how they like to be physically active and move (for example, “I like to play soccer” or “I like to dance”). Continue the exercise until all students have had a chance to name an activity.
   • Explain that, when we are active and move, we use energy. Have students use some energy by standing up, jumping up and down in place, and wiggling their arms.
   • Tell them that, when we are physically active, we use our muscles, and our heart beats a little faster.

HEART BEAT
• Ask students to put their hands on their hearts and feel it beating
• Explain that our heart has a big job to do. It pumps blood to all the parts of the body. When we are physically active, our muscles need more blood, so the heart must work harder. It gets a workout. This is good for our bodies and helps make them stronger and healthier.

FOODS AND PHYSICAL ACTIVITY
• Ask the students how the foods they eat can make a difference in how they feel when they are physically active (for instance, when they play soccer or run around at recess).
• Give the example that, just as a toy needs the right kind of battery to make it work, and a car needs gasoline to make it go, our body needs healthy foods from the five food groups to be its best at sports and play.

3. Activity – (12 minutes)
• Divide the class into a girl’s team and boy’s team. The girl’s team will have Farrah Fruit, Mary Dairy, and Jane Grain. The boy’s team will have Reggie Veggie and Dean Protein.
• Using the Food Cards, make sure there is an equal amount of cards per team.
• A student from one team will pick one card, alternating teams for each pick. The team with that card’s food group, will have to run in place, regardless of who chooses the card. (For example, if a fruit is picked, the girls have to run in place)
• If a team picks a food card from one of their own food groups, (e.g., a boy picks a vegetable), that team gets to keep the card.
• At the end of the activity, the team with the most cards wins.

Summary: (3 minutes)
• Today we’ve talked about physical activity.
• What are some of your favorite ways to be active?
• Hand out Look and Cook activity to send home.

Post-Lesson Learning Activities
Emergent Readers – Grains & A MyPlate Meal
Student Workbook – p. 26
Take Home Activity (Homework) – “Move, Play, Have Fun”
Appendix D-6 – Extra Activities Checklist

Discover MyPlate Extra Activities
Post-Lesson Learning Activities

Lesson 1
- Emergent Readers – Protein
- Student Workbook – p. 5
- Take Home Activity (Homework) – “Meet My Plate”

Lesson 2
- Emergent Readers – Vegetables
- Student Workbook – p. 11
- Take Home Activity (Homework) – “Snack Time”

Lesson 3
- Emergent Readers – Fruits
- Student Workbook – p. 19
- Take Home Activity (Homework) – “Welcome to School Lunch”

Lesson 4
- Emergent Readers – Dairy
- Student Workbook – p. 25
- Take Home Activity (Homework) – “Be Your Best With Breakfast”

Lesson 5
- Emergent Readers – Grains & A MyPlate Meal
- Student Workbook – p. 26
- Take Home Activity (Homework) – “Move, Play, Have Fun”

110
APPENDIX E

SUPPLEMENTAL MATERIAL
Appendix E-1 – SuperTracker Child 4-8 years old

My Plan

This plan shows your daily food group targets — what and how much to eat within your Calorie allowance. Enter your meals in Food Tracker to see how you stack up. Talk with your health care provider about an eating pattern and physical activity program that is right for you.

Kid4-8’s Plan

Your plan is based on a 1400 Calorie allowance.

<table>
<thead>
<tr>
<th>Calories</th>
<th>Allowance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Calories</td>
<td>1400 per day</td>
</tr>
<tr>
<td>Food Group</td>
<td>121 per day</td>
</tr>
</tbody>
</table>

### “What counts as…”

#### Grains

- **Whole Grains**
  - 5 ounce(s) per day
  - 2 2/3 ounce(s) per day

- **1 ounce of Grains**
  - 1 slice of bread (1 ounce)
  - 1/3 cup cooked pasta, rice, or cereal
  - 1 ounce uncooked pasta or rice
  - 1 tortilla (6 inch diameter)
  - 1 pancake (5 inch diameter)
  - 1 ounce ready-to-eat cereal (about 1 cup cereal flakes)

#### Vegetables

- **Dark Green**
  - 1 cup(s) per week
  - 3 cup(s) per week

- **Red & Orange**
  - 1/2 cup(s) per week

- **Beans & Peas**
  - 1/2 cup(s) per week

- **Starchy**
  - 3/4 cup(s) per week

- **Other**
  - 2/3 cup(s) per week

- **1 cup of Vegetables**
  - 1 cup raw or cooked vegetables
  - 1 cup 100% vegetable juice
  - 2 cups leafy salad greens

#### Fruits

- **1 1/2 cup(s) per day**
  - 1 cup raw or cooked fruit
  - 1 cup 100% fruit juice
  - 1 1/2 cups dried fruit

#### Tips

- **Tips**
  - Eat at least half of all grains as whole grains.
  - Substitute whole-grain choices for refined grains in breakfast cereals, breads, crackers, rice, and pasta.
  - Check product labels – is a grain with “whole” before its name listed first on the ingredients list?

- **Tips**
  - Include vegetables in meals and in snacks. Fresh, frozen, and canned vegetables all count.
  - Add dark green, red, and orange vegetables to main and side dishes. Use dark leafy greens to make salads.
  - Beans and peas are a great source of fiber. Add beans or peas to salads, soups, side dishes, or serve as a main dish.

- **Tips**
  - Select fresh, frozen, canned, and dried fruit more often than juice; select 100% fruit juice when choosing juice.
  - Enjoy a wide variety of fruits, and maximize taste and freshness, by adapting your choices to what’s in...
## Appendix E-1 – SuperTracker Child 4-8 years old (page 2)

### Dairy
- **2 1/2 cup(s) per day**
- **1 cup of Dairy:**
  - 1 cup milk
  - 1 cup fortified soymilk (soy beverage)
  - 1 cup yogurt
  - 1 1/2 ounces natural cheese (e.g. Cheddar)
  - 2 ounces processed cheese (e.g. American)

**Tips**
- Drink fat-free (skim) or low-fat (1%) milk.
- Choose fat-free or low-fat milk or yogurt more often than cheese.
- When selecting cheese, choose low-fat or reduced-fat versions.

See more Dairy examples

### Protein Foods
- **4 ounce(s) per day**
- **Seafood:**
  - 6 ounce(s) per week
  - 1 ounce lean meat, poultry, seafood
  - 1 egg
  - 1 Tablespoon peanut butter
  - 1/2 ounce nuts or seeds
  - 1/4 cup cooked beans or peas

**Tips**
- Eat a variety of foods from the Protein Foods group each week.
- Eat seafood in place of meat or poultry twice a week.
- Select lean meat and poultry. Trim or drain fat from meat and remove poultry skin.

See more Protein Food examples

### Oils
- **4 tsp. per day**
- **1 tsp. of Oil:**
  - 1 tsp. vegetable oil (e.g. canola, corn, olive, soybean)
  - 1 1/2 tsp. mayonnaise
  - 2 tsp. tub margarine
  - 2 tsp. French dressing

**Tips**
- Choose soft margarines with zero trans fats made from liquid vegetable oil, rather than stick margarine or butter.
- Use vegetable oils (olive, canola, corn, soybean, peanut, safflower, sunflower) rather than solid fats (butter, shortening).
- Replace solid fats with oils, rather than adding oil to the diet. Oils are a concentrated source of Calories, so use oils in small amounts.

See more Oil examples

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1 Calories from food components such as added sugars and solid fats that provide little nutritional value. Empty Calories are part of Total Calories.

[Get Additional Guidance]

[Print]
Appendix E-2 – Discover MyPlate Assessment Manual

Discover MyPlate Assessment Manual
Beth Ellcessor

Training Overview: (BL 317 @ 2:00pm or 7:00pm; 30-minutes)

- Pre-Assessment Day & Time (proposed post-assessment: Wed., Mar. 11th)
- Order of classrooms for Pre-Assessment
- Research Assistants: What You Do
- Assessment Walk-Through
- General Guidelines
- Question by Question
- Videos

Pre-Assessment Day & Time:
- Wednesday, February 18th, 12:00-3:00 (Meet at BSU student center at 11:45 AM to carpool to the school)

Order of classrooms for Pre-Assessment:
1. Mrs. Coffman
2. Mrs. Garrett
3. Miss Trehearne
4. Mrs. Shreve

Research Assistant: What You Do

What is a research assistant? In order to assess 94 kindergarten students one-on-one, the researcher needs a team of trained individuals to help with the data collection process. As a research assistant, you need to be trained on how to give the assessment and how to avoid coaching the student during the assessment for the sake of validity.

What you will do: You will be a part of a research team to assess students in the current kindergarten class at Selma Elementary School. You will assess students one-on-one in the hallway as the research team progresses through each class. See p. 1 for order of the classrooms.
Assessment Walk-Through

What to use and where to be: At the start of the first class, the researcher will obtain the iPads that will be used. The website www.BSU.Qualtrics.com will be loaded on the iPads. Click the button on the bottom of the iPad, slide the screen to the right, and the survey link for the assessment will be visible. Click the link and the survey will open in another tab. Find an area in the hallway outside of the class where you will assess the student. Space yourself at least 10 feet from other researchers, to avoid unnecessary distractions.

How to begin: As the first 5 students come out of their classroom and into the hallway, the researcher will send one student to you. Greet the child with a smile and take a seat on the floor in your area. Ask the child’s name. Begin the assessment by clicking on the bubble with the appropriate gender of the student. Click the name of the teacher according to the order of classrooms for pre-assessment (i.e., Mrs. Coffman, Mrs. Garrett, Miss Trehearne, and Mrs. Shreve). Press the arrow to move to the next page. Click the drop down box to select the name of the student you are surveying. (Note: the list of names is populated based on having selected the teacher on the previous page). Once you have selected the child’s name, proceed through the survey.

*Ball State University’s Institutional Review Board (IRB) recognized this project as “not human subjects” research. Thus, collecting the names of the students is permissible. Pre- and Post-Assessments will later be matched using the student name.

After the assessment: The survey will last about 3-5 minutes; it may vary from child to child. When you have completed the assessment with that student, say “thank you” and give a high five. Stand up and walk the student up to the classroom door. Depending on the teacher’s preference, the teacher may send another student right away or the teacher may wait until all 5 students have returned to the classroom before they send out 5 more, giving you time to return once again to the www.BSU.Qualtrics.com page. Click on the link again to re-open the survey for the next student. Repeat until all students in each class have been surveyed.

• Mrs. Coffman – will send out 5 students initially; return each student to the classroom when finished; Mrs. Coffman will call the name of the next student.
• Mrs. Garrett – the first 10 minutes of her assessment will be during a “special” event; we will have to play this one by ear.
• Ms. Trehearne and Mrs. Shreve – walk the students back to the classroom; return to your “spot” and, when all five students have returned to the classroom, they will send out the next five students and Beth will distribute them to each of you.
General Guidelines:

- As a researcher, you DO NOT want to lead the student to the right answer during the assessment.
- Do NOT take this time as an opportunity to teach the student.
- You may be tempted to help the student during the assessment, BUT, to create an unbiased data collection process, follow these guidelines:
  - If the child does not understand the question, repeat the question.
  - If the child asks you a question during the assessment that pertains to the survey, say, “Let me repeat the question again” and repeat the question. This may sound cold but we MUST do it for consistency.
  - If the child asks a question during the assessment that does not pertain to the assessment, or if the child gets distracted, try to refocus the child. “Let’s keep going.” or “We need to finish these questions and then you can go back into your classroom.”
  - If the child still does not give an answer, you can say, “If you do not understand, we will go to the next question.”
  - If they cannot understand after two times of asking the question, either select “I don’t know” or leave the question blank and move to the next question.

Question by question:

**Face iPad AWAY from the student so only you can see the screen.**

1. Student’s gender
   - Male
   - Female
   (If not obvious by looking at the student or the name, you may ask, “boy or girl?”)

2. Student’s teacher
   - Mrs. Coffman
   - Mrs. Garrett
   - Miss Trehearne
   - Mrs. Shreve
   (It is encouraged to select this before the student comes out, since you will know which teacher’s classroom is currently being assessed.)
   ---Break---

3. Student’s name (drop down box)
   (Please pay special attention to select the correct name. This is very important for matching pre- & post-assessment data.)
   ---Break---
4. Do you know what a food group is?
   - Yes
   - No
   (If the student shrugs or does not answer, prompt the student to say “yes” or “no” rather than shrugging (e.g., you want a verbal response). Do you know what a food group is?” If the student says, “I don’t know”, select the “no” option. If the student does not answer after repeating the question twice, move to next question.)

5. How many food groups do you think there are?
   - ____________________ (type the number)
   (A keyboard will pop up when you click on the text box field. You may repeat the question, but if the child does not respond, move to the next question by clicking the “next page” arrow.)

6. Can you tell me the names of the food groups? (Click the box next to each group he/she can name.)
   - Fruits
   - Vegetables
   - Protein
   - Dairy
   - Grains
   (If the child says something that is not a food group, say, “Anything else?” Repeat until the child does not have anything else to say for this question.)

---Break---

**Face ipad toward the student so he/she can see the pictures**

7. MyPlate is a picture that reminds people what to eat every day to be healthy. Can you point to the MyPlate picture?
   - (Plate_PieChart picture)
   - (Plate_Food picture)
   - (MyPlate picture)

---Break---

8. (A picture of grains) What food group do you think these foods belong in? You can say the name of the food group, or if you don't know, say "I don't know".
   - Fruits
   - Vegetables
   - Protein
   - Dairy
   - Grains
   - I don’t know
   (The student will be able to see the answer options. If the student points at a answer choice – e.g., protein – repeat the last part of the question, “You can say the name of the food group, or if you don't know, say ‘I don't know’. If the student asks you to read the answer choices, say, “Let me repeat the question again” and repeat the question.)

---Break---
9. (A picture of vegetables) How about these foods? What food group do these foods belong in? You can say the name of the food group, or if you don't know, say "I don't know".
   o Fruits
   o Vegetables
   o Protein
   o Dairy
   o Grains
   o I don’t know

(From question 8)

---Break---

10. Have you eaten any fruit today?
   o Yes
   o No

(If the student shrugs or does not answer, prompt the student. “Say yes or no. Have you eaten any fruit today?” If the student says, “I don’t know”, select the “no” option. If the student does not answer after repeating the question twice, move to next question.)

11. Have you eaten any vegetables today?
   o Yes
   o No

(From question 10)

12. What is your favorite colorful fruit?
   o ____________________________

(A keyboard will pop up when you click on the text box field. Write whatever the child says or leave blank if the child does not say anything after you have stated the question twice.)

13. What is your favorite colorful vegetable?
   o ____________________________ (From #12)

---Break---

14. Have you ever eaten a kiwi before?
   o Yes
   o No
   o I don’t know

15. (Picture of a kiwi) How does eating this fruit make you feel?
   o (Yuck face picture)
   o (OK face picture)
   o (Yum face picture)

(You can say, “point to picture for how it makes you feel” if the child does not do so automatically.)

---Break---

16. (Picture of carrots) How does eating this vegetable make you feel?
17. (Picture of a bowl of broccoli) How about this vegetable?
   - (Yuck face picture)
   - (OK face picture)
   - (Yum face picture)

(Same as question 15.)

---Break---

18. (Picture of can of soda) Is this a healthy choice to fuel your body so you can play?
   - Yes
   - No
   - I don’t know

---Break---

19. (Picture of whole grain cereal) How about this food? Is this a healthy choice to fuel your body so you can play?
   - Yes
   - No
   - I don’t know

---Break---

20. (Picture of potato chips) How about this food? (Is this a healthy choice to fuel your body so you can play?)
   - Yes
   - No
   - I don’t know

---Break---

21. (Picture of fruits and vegetables) Are these foods a healthy choice to fuel your body so you can play?
   - Yes
   - No
   - I don’t know