

**Nutrition Education eXtra Teachings (N.E.X.T): A Free Downloadable Interactive  
Nutrition Gamification and Literacy Curriculum Designed for Diverse Middle Schoolers**

**An Honors Thesis (HONR499)**

**By**

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**Abstract:**

As of March 2023, there are very few materials regarding nutrition education designed for middle-school-aged students that are available online for free. A literature review was conducted to understand the relationship between nutrition and children as well as review any past nutrition interventions. Social media, food insecurity, and the emergence of the COVID-19 pandemic has vastly affected how the quality, type, and amount of foods children consume. Thus, it was imperative that a free nutrition curriculum curated for this population needed to be designed. The curriculum focuses on explaining the types, functions, and sources of the six different classes of nutrients through presentations, videos, cooking activities, and review games. All lesson plans and materials can be accessed by anyone via Google Docs in efforts to reach any adults who are interested in teaching these lessons.

## **Acknowledgments**

This project has been one of the most exhausting yet rewarding things I have ever done. As someone who aspires to be a community dietitian, this project will only be the first taste of researching, designing, and building a nutrition program from scratch.

I would first like to thank my Latin teachers for instilling my passion for education at the age of eleven. Participating in their classes was a highlight of my formative years and the review games they created directly inspired the ones included in this project.

I would also like to express gratitude to my family and friends, who have given me nothing but endless support. I specifically could not have done this without my boyfriend, who troubleshooted every technical issue I had developing my lesson plans or my parents who constantly encouraged me to finish strong.

Finally, I would like to thank Dr. Jay Kandiah for being my mentor for this project. She believed in a project that was outside of her comfort zone and was still able to give me constructive feedback. Thank you for being so understanding and patient throughout this whole process.

## Process Analysis Statement

### Background:

Growing up, nutrition did not interest me at all, but the food did. I loved helping my mom bake and then eat the delicious desserts we prepared. When I started my freshman year of high school, I took Nutrition and Wellness because I thought I could easily get a good grade in that class and because I loved to eat. To my surprise, I realized that I was grasping all of the material and acing the tests, while my classmates were struggling with the basic concepts. I recognize now that my parents and grandparents fostered a solid nutritional education through casual conversations in the kitchen, at the restaurant, and around the dinner table while instilling long-lasting healthy-eating values in me. I was also actively encouraged by my parents to try cooking different dishes once my nutrition classes had ignited that passion for trying different cuisines. I was able to create food combinations that I loved without having to worry about a lack of supplies, opportunities, or ingredients. This experimentation with food also allowed me to expand my palate and thus become less picky during mealtimes. My family and friends started trying new and healthier foods, too.

Unfortunately, not all children in the United States have the same opportunities regarding food experimentations as I have. Many are limited by their financial situations, time constraints, or lack of transportation to purchase fresh meats and produce. Nutrition education can also be severely hard to find in many schools across the country. For example, my school district (Southwest Allen County Schools) required students to take Home Economics at one middle school but did not even offer that class or a comparable one at my middle school. The Nutrition and Wellness class I took in high school was an optional elective and barely advertised. How can we decrease obesity and nutrition-related disease rates in this country when so many children are

not even given the education necessary to make balanced nutritional choices? Once I decided that I want to be a community dietitian after completing a combined graduate program and dietetic internship, I knew that my undergraduate honors thesis should focus on increasing nutrition literacy in students.

Creativity has always been one of my strengths, and I have been able to utilize that skill in various ways throughout my time at the Honors College. However, in all my coursework so far, I have not gotten to showcase that talent in the form of designing and developing educational materials. Initially, I was a little concerned about the viability of this thesis. I had proposed developing this nutrition education plan to a different professor who declined, because she felt that she was better suited for research and was not the right fit for such a creative project. Thankfully, Dr. Jay Kandiah agreed to be my advisor for this project, and she has really advocated for me to do a project that reflects my passion to educate American youth about the importance of healthy eating and the lifelong benefits that good dietary habits contribute to emotional, mental, and physical health.

One of the first decisions about this project was what demographic I wanted to focus my project on. After doing research on the internet, I noticed that I could barely find any nutrition resources for middle school-aged students. Aside from a few standalone worksheets, I could only find curriculums and workbooks that were locked behind a paywall for this age group. I also reflected on how my public school district did not provide any type of mandatory nutrition education. Then I realized that the early teenage years would be a great time to provide this type of education because 11–14-year-olds are capable of understanding more complex concepts as well as being able to fully participate in grocery shopping, cooking experiments, and influencing their parents and peers. This age group is also young enough that their palates and eating habits

are still malleable and thus can still be changed for the better. After thinking through the advantages and corresponding challenges of focusing on various age groups, I concluded that the most meaningful project for me would be to create a nutrition curriculum for middle schoolers.

In order to create a successful program, I started by doing some extensive background research and documenting why this project needs to exist. First, I studied multiple factors that influence nutrition choices for this age group. After vetting countless resources, I settled on investigating the relationship between children's nutrition choices and various influences such as the COVID-19 pandemic, social media, and household income levels. I also included a section in my paper that highlights various nutrition interventions that had been implemented in the United States, as well as around the world. To my surprise, many of these supplemental nutrition curricula were designed by researchers with the intent of studying their effects on students and did not have the results ready for publication as of February 2023. I also noticed that there were very few United States-based studies, and many of them emphasized other components, such as gardening or culinary skills, rather than prioritizing nutrition education. Finally, I could not find any nutrition intervention programs that were curated solely for middle-school students. I only found interventions for elementary school students or a broad range of children aged 18 and under. My research helped me realize that there was indeed a huge lack of materials readily available and designed specifically for middle-school-aged students.

**Construction:**

The first step in developing my educational curriculum was research. I started by reviewing the Indiana Department of Academic Standards Course Framework for Nutrition and Wellness (2014). There, I found that one of their guidelines was to discuss the six different types of nutrients, which consist of carbohydrates, protein, fat, water, vitamins, and minerals. I noticed

that the supplemental nutrition interventions that I found in the research stage that originated in the United States tended to focus on the MyPlate model instead of structuring their content based on the different classes of nutrients. I then decided that I wanted to create six different lesson plans that were dedicated to each different type of nutrient.

My next step was to create the general structure of each lesson plan. I determined that each plan would include three main components: 1) a ready-to-use presentation, 2) a fun-to-do activity, and 3) an easy-to-learn game. The presentations not only introduce each lesson but also effectively convey key information about the subject matter i.e. the nutrient. These are slides that can be used as provided or modified if desired. The second component is an interactive activity. The vast majority of these activities are cooking collaborations in order to provide a variety of examples of the different nutrients being showcased in that particular lesson. Ideally, students complete the activities at school with their classmates, but these activities can also be completed independently at home. The final component of each lesson is a review game designed to reinforce the content the students just learned and to review various topics from previous weeks.

If the curriculum is used in the traditional school setting, timing matters. Therefore, all three components are designed to fit within a one-hour time slot per lesson consistently. Additionally, I created an instructor's guide that includes step-by-step directions for the activity and rules for the review game, along with their rationale, key points to emphasize, and some other commentary. In order to accommodate those working with limited resources, I also included a list of potential substitutions of ingredients for the cooking collaborations as well as possible alternative materials that are less expensive or easier to find for the review games.

My first lesson plan serves as an introduction to the rest of the curriculum. The beginning of the presentation discusses introductory concepts as well such as addressing why nutrition is so

important and the difference between macronutrients and micronutrients. Initially, I had planned to dedicate part of this lesson plan to my first nutrition class, which was carbohydrates. However, while I was researching, I decided that the water and vitamin portions of the curriculum did not warrant their own one-hour session as there is limited information to discuss these topics. Thus, I combined the water content with the lesson plan focused on vitamins. After conducting background research, I felt inspired to dedicate the second part of the first lesson plan to the concept of mindful eating.

Mindful eating is a great strategy that can be utilized to combat potentially harmful fad diets and relentless junk food campaigns that are constantly being advertised on social media. Instead of a cooking collaboration for the first activity, I designed a mindful eating activity that focuses on helping students understand their feelings and emotions while eating by utilizing their five senses and documenting their observations as they eat a single piece of candy. The review game I selected for this plan is a variant of Connect 4 where teams get to strategically place a sticky note on the board for each question they answer correctly in hopes of placing four in a row. The free response format for the questions worked well for this game as this content had the least amount of complex concepts compared to the other lessons.

My second lesson plan focused on discussing the first type of nutrients: carbohydrates. Creating this presentation allowed me to create a similar format for each of the subsequent lesson plans. Each of the following five presentations typically starts with defining how the class of nutrients benefits the body. Various subtypes of each nutrient are thoroughly discussed. Then, the presentation typically ends by discussing examples of food sources that contain in that session's nutrients alongside the appropriate portion size for each example. For the first cooking collaboration for this curriculum, I chose Apple Cinnamon No-Bake Bites, because the recipe

represents all three types of carbohydrates. This recipe also works well for this lesson plan because they need only a few common kitchen tools and or ingredients to make them. Like many of the forthcoming activities, the Flyswatter review game was one I played in my middle-school Latin class and absolutely loved. Nevertheless, I did adapt the concept a bit by allowing for multiple answers to be considered correct since nutrition concepts tend to have more than one right answer, unlike vocabulary questions which typically only have one right answer.

For the protein lesson, I followed a very similar structure to the presentation on carbohydrates. However, I really wanted to emphasize that protein has so many more functions in comparison to other macronutrients so I dedicated more time to address that. I chose chocolate hummus and black bean dip as my cooking collaboration activity. I thought having plant-based dips that are both savory and sweet options would teach kids that meat is not the only option for getting lots of protein. I selected my review game for this chapter based on how much time would be left after completing the cooking collaboration. The review game Trashketball was another one of my favorites and was chosen based on its flexibility. The game can end whenever the instructor chooses so they can cut questions if they are running low on time due to the cooking activity taking longer than expected or can extend the game by asking review questions based on earlier modules.

The lesson on fat was the one I knew I needed to handle with the most tact and grace. There are so many social media accounts that love to villainize all types of fat as bad, which is simply not the case. Because I researched how much influence social media has on this age group, I knew that this needed to be addressed separately from just mentioning the different types of fat. I also ensured that it was emphasized that having small amounts of saturated fats every now and then will not hurt but that consuming large quantities of these fats increases the

risk of developing health conditions. For the cooking collaboration, I designed a create-your-own guacamole activity not only because avocados are a great source of healthy fat i.e., monounsaturated fat, but also because this activity gives kids more autonomy to choose what ingredients they want to add to their individual serving of guacamole. This activity not only allows for more focus on taste experimentation rather than culinary skills but is also quite adaptable, as instructors can use almost any vegetables, fruits, or spices they have on hand as potential mix-in ingredients. Because the cooking collaboration takes very little time to make and serve, I created a question trail as the review component for this section. Unlike the other review games, this one is an independent activity that can be completed at each student's own pace. This game is also a tremendous mid-way assessment tool to evaluate which students are really understanding the material and see which ones might need a little more explanation and review.

The fifth lesson plan focuses on discussing the importance of water and vitamins. This presentation strays a bit more from the format of the last three lesson plans due to discussing two different nutrients, one of which has no other forms. The cooking collaboration designed for this week is to create-your-own bell pepper pizza. Depending on the toppings chosen, pizza is the perfect vessel for various vitamins. Using bell peppers as the "crust" adds a great source of water along with vitamin C (United States Department of Agriculture [USDA], n.d.). The review game for this week is based on my favorite review game from middle school and is called the pig game. Battling others to color the pig with the correct vocabulary word was a highlight of my Latin class. I created my own version based on one of my favorite animals; the humble snail. Because there are so many different vitamins to know, this lesson lends itself best to the format of this game.

Lastly, the final lesson discusses minerals and serves as the conclusion to the curriculum. Just like the vitamins' presentation, the minerals portion of the presentation focuses on the micronutrients that are either consumed too much or too little by Americans. The conclusion portion of the presentation ends by teaching students how to interpret the Nutrition Facts label. The cooking collaboration for this session is another create-your-own activity of making trail mix to represent all the different types and examples of nutrients discussed throughout the curriculum. This one was also chosen because the presentation is slightly longer than the first five lesson plans and thus more time will be needed. The final review game is an adaptation of the board game Scattergories where students will work in teams to write down words that apply to the different categories. I think this format is a great way to have students review and apply content from all six lessons.

As the project progressed, I made a few alterations to my original plans. Under Dr. Kandiah's guidance, I added many more pictures to my presentations alongside choosing pictures that were very vibrant, eye-catching, and more importantly will be memorable to young teenagers. I also created a welcome letter and central outline that instructors can easily download that link to the separate folders that lead to the resources for each lesson plan. I also vetted and embedded supplemental videos into each PowerPoint that the instructors can watch for verbal guidance regarding the various tools, to learn about possible alternative teaching methods, or to locate additional resources and websites.

Accessibility is an important component of this project. I want as many people as possible to be able to learn and/or teach with this curriculum. Firstly, I designed all of the presentations to be compatible with a sixth-grade reading level. I also intend for the curriculum guides to be compatible with that same reading level in order to accommodate almost anyone,

whether that be a parent, a sibling, a scout troop leader, or even a teenage babysitter. All of these plans will be free for anyone to use. Other than the ingredients, almost every material needed is included in the download. I also included potential substitutions and alternatives for ingredients and/or equipment needed for the various activities, so that anyone would have the means and resources necessary to be able to teach from this curriculum.

### **Future Plans:**

If there is anything that my Community Nutrition class taught me this semester, it is that anything you create for the community without their input; the outcome can turn out to be more self-serving than actually helpful for the community. Thus, I reached out to Dr. Jacquie Hanoman and other leaders at the Ross Community Center here in Muncie and she was able to review my project. After my project is complete, I will send it to her so she can either incorporate it into one of the center's existing programs or forward it to interested parties. I also plan on trying to get in contact with whoever runs the website for Muncie Community Schools and see if I can include a link to this project under the "Community Programs" page. I plan to distribute my project this way because while middle school-aged children are benefactors of this project, they are not the intended instructors. Most children would not want to seek nutrition education materials for themselves. Thus, this project is catered towards caring adults who are willing to utilize these materials to help teach their children (and maybe even themselves) this very important health-conscious content. This adult could be anyone; a parent/guardian, a grandparent, an older sibling, a homeschool teacher, a scout troop leader, a daycare/after-school program worker, a babysitter, etc. We want any significant adult in a child's life to be able to access and teach this program effectively.

### **Final Thoughts:**

Overall, the process of creating this project was exhausting yet extremely rewarding. While I have created nutrition education worksheets for children previously during my practicum rotation at the Indiana Dairy Association, I have never created an entire nutrition education program before. I have gained a newfound respect for teachers of all disciplines who have to develop innovative and engaging lessons whilst adhering to all state education guidelines. I cannot fathom how hard it must be to be designing different teaching units constantly. This process also increased my empathy toward others in situations different than mine. I designed the project to be easily accessible and usable by all, regardless of means or circumstances. While I hope as a community dietitian, I will be able to influence policy to help those with limited finances or access to healthy, fresh food, this project will help them from an educational perspective. I am so excited for this project to be finalized and ready for use by diverse groups of people who desire to learn about nutrition which will improve their overall health status and possibly the prevention of diseases.

## **Concerning Consumption of Food: A Literature Review Investigating the Factors Behind Children's Food Choices and Current Nutrition Education Interventions**

### **Introduction**

Middle school is often a trying and challenging time for young students. Students at this stage of life are now given more independence but still need parental guidance (New York City Public Schools, n.d.). One of those responsibilities is having more autonomy over their food choices. Unlike other disciplines, nutrition education is not a focus of school curriculums. According to the Centers for Disease Control and Prevention, United States “students receive less than 8 hours of required nutrition education each school year” ([CDC], 2023). This is quite concerning as healthy diets have been associated with lowering the risk of many chronic diseases (CDC, 2023). The following literature review investigates various factors that impact nutrition choices and previously implemented nutrition education interventions.

### **Rationale**

For this literature review, the researcher (AB) assessed countless research articles across research databases such as PubMed, Jstor, and ScienceDirect in an effort to find various nutrition education interventions that had been implemented across the world. These intervention-based studies were included in this literature review if their primary focus was educating about nutrition topics as opposed to honing culinary or horticultural skills. Another inclusion criterion was that all studies must have been conducted in the last ten years unless they are considered as landmark studies. Studies were also included if they were considered potential influences on the relationship between children and nutritional intake. Like the nutrition-focused studies, all studies had to have concluded in the last 10 years in order to be eligible for this review barring

being of landmark importance. The purpose of this literature review is to assess the scopes and education gaps of societal factors on nutrition education and existing nutrition interventions. The outcomes of this literature review will influence the topics and approaches of a new nutrition education curriculum that will be created by the researchers.

### **Definition of Terms**

A list of terms is provided below in efforts to provide understanding to all those who are interested in the research behind the designed nutrition curriculum.

**Centers for Disease Control and Prevention [CDC]-** The Centers for Disease Control and Prevention is a government organization that uses science and data to inform the public about health issues. The agency’s mission is “to help children stay healthy so they can grow and learn; to help families, businesses, and communities fight disease and stay strong; and to protect the public’s health.” (CDC, n.d.).

**COVID-19-** A strain of coronavirus that caused a massive shift in how humans live and interact with each other in 2020 (United Nations Children’s Fund, 2020).

**Food Insecurity-** “A household-level economic and social condition of limited or uncertain access to adequate food” (Office of Disease Prevention and Health Promotion, n.d.)

**Nutrition-** The consumption and absorption of food and other nutrients by the body (National Cancer Institute, n.d.)

**Poverty-** Not having enough funds to provide basic needs for an individual or their dependents (Gouvernement Nouveau-Brunswick, 2009)

**Social Media-** Digital platforms that allow for sharing, creating, and exchanging various ideas and visuals around the world (Tufts University, n.d.)

### **Impact of the COVID-19 Pandemic**

The COVID-19 coronavirus pandemic has drastically altered how the human race works, interacts, and functions as a society. According to the Pew Center, 89% of Americans that were interviewed reported that they have experienced at least one negative change since the beginning of the pandemic (van Kessel et al., 2021). Lack of access to food was a concern for many American households (Feeding America, 2021). While the long-term impacts of this pandemic have not been studied yet due to its recency, its nutritional effects may follow the trends of other disease outbreaks. For example, Danish children's average overall height and growth were significantly lower due to the 1918 influenza pandemic. They did not return to their pre-pandemic average until over 40 years later (Mazumder et al., 2010). As the COVID-19 pandemic starts to fade into the past, researchers need to be diligent about identifying and rectifying the long-term effects of this devastating event.

As society bunkered down during the pandemic, obesity rates in the United States skyrocketed during 2021, with “nineteen states and two territories currently [having] an obesity prevalence at or above 35%, more than doubling from 2018” (CDC, 2022b). This increase in obesity rates across the nation is even more concerning as having a higher BMI not only increases the risk of having severe symptoms of COVID-19 but being obese also triples the risk that a patient would undergo health complications that could land them in the hospital (CDC, 2022b). While the CDC has not officially reported pediatric obesity rates since 2018, one study “found the rate of body mass index (BMI) increase nearly doubled during the COVID-19 pandemic compared to a pre-pandemic period” in 432,302 children between the ages of 2 and 19

(CDC, 2022a). As the pandemic still wages on, it is imperative that something must be done to reduce obesity rates.

### **Social Media's Influence on Nutrition**

The pandemic has increased the amount of screen time children are being exposed to. According to a systematic review comprised of 46 studies, the research found that “screen time during the pandemic increased by 52% compared with pre-pandemic baseline estimates, which is greater than what would be expected based on age changes and time trends (Madigan et al., 2022). While advertising methods have evolved alongside, unfortunately, ways of communication, industry regulations have not. According to the New York University School of Global Public Health, the United States government is barely involved in of regulating, and monitoring of food and beverage companies as the standards set by the Children's Food and Advertising Initiative are mainly voluntary (2022). It is concerning how these loose standards of food marketing affect the food consumption of children?

Social media has radically changed how food products are marketed specifically toward the masses. In one study, 832 adolescents aged 13-17 were given pairs of advertisements from popular unhealthy food and beverage brands and were asked to identify which advertisements were solely created for the social media platform Instagram (Bragg et al., 2021). The participants were then asked to rate food advertisements that all seemingly came from Instagram. In reality, half of the advertisements originated from traditional media sources and were digitally altered to appear that they came from Instagram. The researchers discovered that teenagers tended to see “Instagram ads for unhealthy food and beverages as significantly trendier ( $P=.001$ ) and more artistic ( $P=.001$ ) than the traditional ads”. Furthermore, teenagers overall liked Instagram advertisements more (Bragg et al., 2021). Although this study did not question the participants'

reasoning for their choices, this study does bring to light that social media has become a prime way for companies to convince consumers of the younger generations to buy their unhealthy products.

Additionally, separate posts advertising of their products is not the only way for companies to market their foods to adolescents online. Many food brands and companies partner with popular social media influencers to hype up their products and convince people to purchase them. A study in the United Kingdom specifically investigated this influencer-consumer relationship by recruiting 178 children between 9 and 11 years old (Coates et al., 2019). The researchers randomly subjected each child to either healthy food advertising, unhealthy food advertising, or nonfood marketing. Each child watched a male and a female YouTube video blogger advertising designated products and was then invited to eat as much as they desired of the presented candy, chocolate, carrots, and grapes. None of the offered foods were advertised to reduce bias. The researchers discovered that children who were exposed to unhealthy food marketing consumed 26% more calories overall compared to those who were exposed to nonfood marketing and 15% more than those who were exposed to healthy food marketing. Surprisingly, the researchers could not find a statistically significant difference between the overall amount of calories consumed between the nonfood group and the healthy food marketing group. Despite these results, there is a need for nutrition-focused education that stresses the importance of ignoring the temptation of these highly-marketed unhealthy foods.

### **Low-Income Families and Their Relationship with Nutrition**

Despite being a developed country, the poverty rate in the United States was 12.8% with the poverty rate for children being 16.9% (Benson, 2022). Determining if a family is living in poverty occurs by “comparing annual income to a set of dollar values (called poverty thresholds)

that vary by family size, number of children and the age of the householder” (Benson 2022). Another major issue in this country is food insecurity, which was experienced by 28.8 million adults and 5.0 million children in 2021 (USDA, 2022). While not all of those who experience poverty are food insecure and vice versa, a study in 2014 found that there was a statistically significant association between poverty and food insecurity of households with children was found (Wight et al.). Although the intent of the researchers were to investigate whether supplemental poverty measures should be introduced; they did conclude that using the official poverty measures still yields a strong association between poverty and food insecurity.

There are many reasons why people do not always choose the healthiest option. This is quite apparent in families with low-income. For example, a study focused on the experiences of food-insecure pregnant women found that the most common barrier to why these future mothers in Melbourne, Australia were unsatisfied with their nutritional intake was because of astronomically high food prices at the grocery store (Zinga et al., 2022). Stateside, a study consisting of thirty-six women from central Iowa yielded similar results as several participants believed that healthy foods were too expensive at retail stores (Palmer et al., 2020). Other revelations from this focus group included insights about familial pressure. Many of the women felt they could not purchase healthy foods even if they wanted to because they could not afford to replace their groceries if their husbands and/or children refused to eat them. Another priority for this group was to ensure that the family had enough food to last the entire month. Ways to make their food supplies last longer included purchasing foods with long shelf lives, receiving food from food pantries/banks, decreasing portion sizes, or skipping meals altogether.

Compared to higher-income families, low-income families tend to make vastly different food choices. In a 2019 study, researchers studied the shopping and dietary habits of 202

participants from Chicago by analyzing their food purchases, diet, and sociodemographic data (French et al.). The researchers discovered that lower-income households “spent a significantly smaller percent of their grocery dollars on fruit ( $p < .003$ ) and vegetables ( $p < 0.001$ ), and a significantly higher percent of their grocery dollars on sugar sweetened beverages ( $p < .004$ ) and frozen desserts ( $p < 0.01$ ), compared with higher income households” (French et al., 2019). Clearly, financial restraints have a huge impact on families worldwide.

Judgement from healthcare workers is another massive barrier for families who want to seek assistance. For example, a study in Iowa found that nine out of eighty participants felt the service they received was poor and many subjects in the focus group felt that their doctor treated them differently based on their socioeconomic status (Arprey et al., 2017). While no one in the Palmer study mentioned receiving different treatment based on financial status, several participants mentioned that doctors and dietitians gave recommendations that were too overwhelming and vague (Palmer et al, 2020) . Feeling frustrated with healthcare professionals, the majority participants then turned to visual social media platform Pinterest and other various websites on the internet as their main source of nutrition related information. Based on the results from this study, it seems that nutrition education needs to be presented in a more universal approach so anyone regardless of financial status can be able to make informed food choices.

### **Different Nutrition Interventions**

In the past few years, there have been a few studies that have focused on developing and implementing nutrition interventions designed specifically to meet the needs of adolescents. For example, Takacs et al. designed a 9-month-long nutrition curriculum to be implemented in classrooms in Budaors, Hungary (2020). Before the intervention started, all participants (i.e., control and intervention groups) filled out questionnaires regarding their relationship with food

and their anthropometric measurements. While the control classrooms continued about their days as usual, students in the intervention group had weekly nutrition classes during school, took cooking classes with their families after school, and were given online materials to study. During their time in school, the children learned about the types and roles of different foods via a dietitian. They participated in games, food tastings, and cooking activities related to the nutrition content. After the study concluded, the researchers found that there on average, there was “a slight improvement in dietary knowledge and habits from baseline to post-intervention in the intervention group, but no changes were observed in the control group. However, this observation in the intervention group did not persist after summer” (Takacs et al., 2020). This study indicates the importance of emphasizing continuing nutrition education after initial education has concluded.

Researchers in Poland implemented similar measures in an effort to increase general nutritional knowledge and improve eating habits which was specifically focused on teenagers between 11 and 13 years old (Hamulka et al., 2018). This longitudinal research had two parts. The first part focused on assessing the lifestyle behaviors, dietary habits, and anthropometric measurements of 1569 students. The second part of this study focused on implementing a three-week nutrition education curriculum from the subset of 1569 students and included 460 students from the first part. This curriculum focused on types of nutrients, healthy lifestyles, food labels, food safety, and basic culinary skills. These activities were implemented via discussions, experiments, and cooking lessons. As of January 2023, the researchers have not released the statistical analysis of the outcomes of their results with the intervention provided to the 460 students.

While many interventions intend to increase nutrition knowledge in general, there are a few studies that focus on reducing specific health conditions. Research by Manios et al., emphasized the prevention of type II diabetes in families from lower socio-economic areas across Europe (Manios et al., 2018). The project was split into two components. The first component targeted all families in the region and had teachers deliver a curriculum that focused on curating a healthy lifestyle for all their students. The students participated in various activities at school and took home nutrition-related newsletters meant to be read by the whole family. The second component of this study focused on helping families deemed as high-risk for developing type II diabetes. High-risk families were identified based on their responses to the Finnish Diabetes Risk Score. The adults of these families then attended seven lifestyle counseling sessions and five group sessions at a local community center with a health professional. At the end of each session, the adults were given activities and newsletters to share with their children. Outcomes from this research and the effectiveness of the nutrition education intervention is yet to be published.

In the United States, there have been a few studies that have tested various nutrition interventions. However, they also tend to focus on teaching a skill rather than just educating about nutrition. For example, the Texas Sprouts intervention aimed to increase children's exposure to various fruits and vegetables in efforts to decrease their consumption of caloric-dense foods (Landry et al., 2021). 3302 children in third, fourth, and fifth grade from 16 different school participated in the study with 1412 children in the intervention group and 1723 children in the control group. Students in the intervention group were able to participate in "gardening, cooking, and nutrition activities" (Landry et al., 2021). The intervention was found to have had

increased vegetable intake and decreased the added sugar intake in children who participated in the intervention group compared to the children who participated in the control group.

Like in other parts of the world, The United States also has some nutrition intervention that have been proposed but have not had statistical analysis released yet. For example, the Farm Fresh Foods For Health Kids program was a healthy eating program designed to partner with agriculture clubs for families in various states such as New York, North Carolina, Vermont, and Washington (Seguin et al., 2017). Families would learn how to prepare the produce they grew and would receive various nutrition handouts. Participants would also receive complementary tools such as vegetable peelers and paring knives for them to use after the program ended. As of March 2023, there has been no digital evidence of whether this program came to fruition.

## **Conclusion**

Based on the research above, there is a clear need for supplemental nutrition education outside of the classroom. Many of the nutrition education interventions mentioned were only targeted at a general population of either children or teenagers. The curriculums based in the United States also emphasized cultivating a different skill such as gardening instead of focusing solely on how different nutrients affect the body. As of March 2023, the majority of the interventions have not released the statistical impact of their nutrition interventions. This is quite worrisome as children of different ages do not have similar generalized energy or nutritional needs. As of March 2023, the researchers could not find any comprehensive multi-week nutrition education plans designed specifically for a middle-school-aged audience that were available for free online.

**Welcome to N.E.X.T!**

To Whomever This May Concern,

Thank you for taking the time to look into Nutrition Education eXtra Teachings (N.E.X.T.). This curriculum is focused on giving a detailed and age-appropriate supplemental nutrition education to children ages 11-14.

Because Nutrition and Wellness is not a required core class in Indiana, this curriculum was created to help students learn how to make the right food choices for them.

The six lesson plans are designed around the 2017 Indiana Department of Education Academic Standards Course framework [Nutrition and Wellness Core Standard 2.3](#) (“Describe the six classes/groups of nutrients, explain their functions to meet health and nutrition requirements of individuals and families, and classify food sources”). All lesson plans were reviewed and approved by a Registered Dietitian Nutritionist. Each lesson folder linked below contains a slide presentation alongside an instructor guide. The instructor guide contains directions for a food-related activity as well as a review game. Rationales and alternatives for each activity are provided as well.

If you have any questions, please feel free to contact me at [micromacronutrition@gmail.com](mailto:micromacronutrition@gmail.com). Again, thank you so much for your interest in this project.

All the best,

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Nutrition Education eXtra Teachings Folders

- [Lesson 1: Introduction and Mindful Eating](#)
- [Lesson 2: Carbohydrates](#)
- [Lesson 3: Protein](#)
- [Lesson 4: Fat](#)
- [Lesson 5: Water and Vitamins](#)
- [Lesson 6: Minerals and Putting the Pieces Together](#)

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