



## **More Than Frybread: The Road to Healthy Eating and Physical Fitness**

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### **Introduction**

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Kayenta, Arizona is located in northeastern Arizona, 30 miles from the Utah border on the Navajo Reservation. The town of Kayenta has a population of 5,189 people, according to the 2010 census. The majority of the population (92.27%) is Native American, and the remaining population include Whites, Blacks or African American, Asian, Pacific Islander, and other races.<sup>1</sup> Kayenta is a small town, but one of the larger towns on the Navajo reservation. The small town is served by two different governments: Kayenta Chapter House, which is a division of the greater Navajo reservation government, and Kayenta Township, which is a municipal style government. It has a number of gas stations, churches, restaurants, and one shopping center to serve the community and the surrounding communities. The town also has a hospital, and a Police station. What's more, the town has several hotels and motels to serve visitors and tourists that pass through the town to get to Monument Valley or Navajo National Monument.

In Kayenta, two schools serve the community as well as the surrounding communities: Kayenta Unified School District and Kayenta Boarding School. Kayenta Boarding School is a K-8 school that is a part of the Bureau of Indian Affairs, which serves both day and dorm students.

Kayenta Unified School District (KUSD #27) is a Preschool-12 Public School that serves the Kayenta and communities within a 50-mile radius. KUSD includes four schools: ABC Pre-School, Kayenta Elementary School, Kayenta Middle School, and Monument Valley High School. Monument Valley High School is the only high school within a 50-mile radius, and often serves as a feeder school for other schools from the communities of Dennehotso, Chilchinbeto, Rough Rock, Shonto, and Kayenta Boarding School. For the school year of 2020-2021, KUSD had over 1,522 students enrolled: MVHS 562, KMS 456, KES 386, and Preschool-K 118, according to the June 9, 2021, Regular School Board Meeting. KUSD serves 94.64% Native Americans, 1.81% Hispanics, and 3.09% Multiple races, according to 2019-2020 School year data on AZ School Report Card from Arizona Department of Education.<sup>2</sup> Most of the data for the current school year have not been updated on the website due to Covid-19 Pandemic cancelling most of the state assessments for the last two school years.

Kayenta Elementary School serves students from first grade through 4<sup>th</sup> grade. According to the Arizona Department of Education's 2019-2020 School Report Card, of the 571 students enrolled, 97.72% were

registered as Native American, a majority of them were Navajo students. At the time, there were 109 fourth grade students; 95.4% were Native Americans. This year, there were about 22-24 students in each of the 6 fourth grade classrooms.<sup>3</sup>

## Rationale

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Our Navajo Nation as a whole has some of the highest prevalence for chronic disease such as diabetes, heart disease, liver sclerosis, and so on. What's more, many American Indian and Alaska Natives have the highest rate of overweight and obesity level according to the body mass index (BMI) calculation. Because of obesity, children are at a higher risk of developing chronic diseases as adults, especially those who are predisposed because of prolonged consumption of fatty, salty, processed, and unhealthy foods. Family history of certain chronic disease also increases the risk factors. What's more, sedentary lifestyle increases the risks of developing chronic disease.

Most of the health issues that are prevalent on the reservation are due to economic difficulty and limited access to health care and food sources. Historically, the Navajo communities' chief health issues were from infectious diseases. However, survival rates increased through improved sanitations, access to western medicine through Indian Health Services, early detection of diseases, and improved education. Currently, the primary health issues are chronic diseases. Chronic diseases such as diabetes, cardiovascular diseases, renal diseases, and gallbladder diseases are related to lifestyle choices. Poor access to nutritious foods, departure from traditional diets, and reduced physical activity are linked to a rise in type 2 diabetes and certain types of cancers among the Navajo.<sup>4</sup>

The goal of this unit is to increase the knowledge of students by identifying and analyzing the relationship between healthy behaviors and long-term personal health. Two key points that I want students to learn is that healthy eating and engaging in physical activity prevent chronic diseases. One way for students to understand personal health is by identifying key nutrients contained in the foods they eat, especially traditional foods. What's more, students will understand that physical activities prevent many types of diseases. Furthermore, students will use Design Thinking Innovation to improve nutritional health and physical health at home and at school.

## Content

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### **Chronic Disease in the Unites States**

According to CDC, Six in ten Americans live with at least one chronic disease, like heart disease and stroke, cancer, or diabetes. These and other chronic diseases are the leading causes of death and disability in America, and they are also a leading driver of health care costs.<sup>5</sup> The key risk factors that lead to chronic diseases are unhealthy diets, alcohol, smoking, and lack of physical activities. In the United States, 95,000 deaths are attributed to excessive alcohol use each year. Working age between 20-64 account for deaths due to excessive alcohol use. Excessive alcohol use includes binge drinking, heavy drinking, and any alcohol use

by pregnant women or anyone younger than 21.<sup>6</sup> Bing drinking is responsible for half the deaths. Long term excessive alcohol use can lead to chronic diseases and other health problems. Health problems include learning disorder or problems, memory, and mental health. Chronic health diseases caused by long term alcohol use includes high blood pressure, heart disease, stroke, liver disease, and cancer.

Lack of physical activity is another risk factor for chronic disease. Only 1 in 4 US adults and 1 in 5 high school students meet the recommended physical activity guidelines.<sup>7</sup> Physical inactivity can contribute to the risk of chronic diseases like heart disease, type 2 diabetes, cancer, and obesity. Not getting enough physical activity can lead to heart disease—even for people who have no other risk factors.<sup>8</sup> What’s more, the possibility of contributing to developing other heart disease factors such as obesity, high blood pressure, high cholesterol, or type 2 diabetes. The risks for type 2 diabetes increases when a person does not get enough physical activities. Physical activity helps control blood sugar (glucose), weight, and blood pressure and helps raise “good” cholesterol and lower “bad” cholesterol.<sup>9</sup> Cancer risks associated with bladder, breast, colon, uterus, esophagus, kidney, lungs, and stomach can be lowered by getting the recommended number of minutes of physical activities.

Poor nutrition also attributes to chronic diseases. Iron deficiency is prevalent in 14% of school age children and 16% of pregnant women. Mental and behavioral delays in children are linked to having low levels of iron during pregnancy and early childhood. Ensuring that iodine levels are high enough during pregnancy also helps a growing baby have the best brain development possible. Also, less than 1 in 10 people eat enough fruits and vegetables. Unfortunately, diets in the United States are high in added sugars, sodium, and saturated fats. Harmful effects lead to overweight and obesity. In the United States, 19% of young people aged 2 to 19 years and 40% of adults have obesity, which can put them at risk for heart disease, type 2 diabetes, and some cancers.<sup>10</sup> Poor nutrition also leads to heart diseases and stroke. High blood pressures and high blood cholesterol are the leading causes of heart disease. What’s more, too much sodium in your diet can increase blood pressure, which leads to the risk for heart disease and stroke. Americans consume 3,400 mg of sodium a day of the 2,300 recommended amounts of the CDC Guidelines. Furthermore, people who are overweight or have obesity are at increased risk of type 2 diabetes compared to those at a normal weight because, over time, their bodies become less able to use the insulin they make.<sup>11</sup> The alarming part is that more than 1 in 3 US adults have prediabetes, and 8 in 10 adults don’t realize they have diabetes. Overweight and obesity are linked to at least 13 types of cancer, including endometrial (uterine) cancer, breast cancer in postmenopausal women, and colorectal cancer.<sup>12</sup>

Tobacco use is the leading cause of preventable disease, disability, and death in the United States.<sup>13</sup> According to the CDC, about 34 million US adults smoke cigarettes, and 58 million nonsmokers are exposed to second hand smoke. What’s more, nearly 200 young people under the age of 18 become daily smokers out of the 1,600 who try their first cigarette every day. Annually, cigarette smoking causes more than 480,000 deaths. Furthermore, 41,000 deaths are related to second hand smoke and an additional number are living with a serious smoking-related illness. Cigarette smoking and secondhand smoke affects every organ in the body and can lead to cancer, heart disease, stroke, lung disease, cause type 2 diabetes, and other health conditions. Children who are exposed to secondhand smoke are at increased risk of SIDS, impaired lung function, acute respiratory infections, middle ear disease, and more frequent and severe asthma attacks.<sup>14</sup> Lung cancer attribute for 90% of cancers related to smoking, and 20-30% for nonsmokers who are exposed to secondhand smoke. Furthermore, cigarette smoking is a major cause of heart disease and stroke. One in every 4 deaths from heart disease and stroke are from cigarette smoking. Smoking raises triglycerides and lowers high-density lipoproteins (HDL), makes blood sticky and more likely to cause clots, and damages blood

vessels by increasing buildup of plaque and causing blood vessels to thicken and narrow. Cigarette smoking can cause lung disease by damaging the airways and the small air sacs (alveoli) found in the lungs. It can cause chronic obstructive pulmonary disease (COPD), which includes emphysema and chronic bronchitis.<sup>15</sup> Smokers have 30%-40% higher risk for developing diabetes. Smokers are more likely to have problems controlling blood sugar and lead to serious complications. Complications include: heart disease and kidney disease, poor blood flow in the legs and feet, retinopathy, peripheral neuropathy, and peripheral neuropathy.

### **Chronic Disease Among Native Americans**

Historical insults and injustices, perpetuated over many generations, including massacres, genocidal policies, epidemics from introduced diseases, forced relocations, removal of children through boarding school policies, and prohibition of spiritual and cultural practices (including use of Native languages)<sup>16</sup> attributed to the adversities of Native Americans and Alaskan Natives (AI/AN). Conflicts with the US government and racial discrimination have compromised the culture, traditional lifeways, and wellness of American Indians and Alaska Natives.<sup>17</sup> Limited access to health care and adequate health conditions are indicators of social and economic injustices experienced by AI/AN.

In contrast to most Americans in the United States, AI/AN have experienced higher health disparities than other ethnic groups. Lower life expectancy and the disproportionate disease burden exist because of inadequate education, disproportionate poverty, discrimination in the delivery of health services, and cultural differences.<sup>18</sup> AI/AN are experiencing increasing rates of chronic diseases such as obesity, heart disease, and type 2 diabetes. AI/AN increasingly face health challenges from lifestyle choices such as physical inactivity, poor diet, and substance abuse, and from conditions such as obesity and injury.<sup>19</sup>

The use of tobacco by Native Americans falls into two categories: first, AI/AN use tobacco traditional purposes, and second, commercial use. Tobacco used for religious, ceremonial, or medicinal purposes are not reported in the CDC report. Regardless, AI/AN youth and adults have the highest prevalence of commercial cigarette smoking among all racial or ethnic groups in the United States. Cigarette smoking varies widely by regions, with lower prevalence in the Southwest and higher prevalence in the Northern Plains and Alaska. Due to prevalent use of cigarette smoking, AI/AN have a higher risk of experiencing tobacco related diseases and death such as: cardiovascular disease, lung cancer, and diabetes. Cardiovascular diseases are the leading cause of death, Lung cancer is the leading cause of cancer deaths, and diabetes is the fourth leading cause of death among NA/AN. The risk of developing diabetes also increases for smokers by 30-40%. Despite the high rates of death related to cigarette smoking, AI/AN have the lowest rate of cigarette smoking quit attempts among all racial or ethnic groups in the United States.<sup>20</sup>

Alcohol is the most commonly used drug among AI/AN, and have the highest percentage of current heavy alcohol users compared to other racial and ethnic groups in the United States.<sup>21</sup>

American Indians and Alaska Natives have the highest prevalence of diabetes in the United States, higher than most racial and ethnic groups, and more than twice the prevalence of diabetes among non-Hispanic whites. Discrepancies in AI/AN diabetes prevalence have been documented since the 1970s. Subsequent studies demonstrated that prevalence continued to increase until recently. After increasing significantly from 2006 to 2013, diabetes prevalence for AI/AN adults in the IHS active clinical population decreased significantly from 2013 to 2017. Prevalence was 14.4% (95% CI 13.9% to 15.0%) in 2006; 15.4% (95% CI 14.8% to 16.0%) in 2013; and 14.6% (95% CI 14.1% to 15.2%) in 2017. Trends for men and women were similar to the overall population, as were those for all age groups. For all geographic regions, prevalence either decreased

significantly or leveled off in recent years<sup>22</sup>. However, the reasons for decrease it unknown but can speculate base on the relationships observed between diabetes mortality and incidents. Diabetes mortality rates have decreased for both US populations and AI/AN populations. Studies have shown that among AI/AN populations, some diabetes complications which contribute to diabetes mortality have decrease. Given the improvements in diabetes mortality and complications, it seems likely that a decrease in diabetes incidence has contributed to the decrease in prevalence in AI/AN adults.<sup>23</sup>

Obesity is growing at an alarming rate in Native communities. Furthermore, obesity is a potential risk for diabetes, cardiovascular disease, and other chronic disease. Amongst AI/AN, 38% have been identified as obese compared to 29% of Whites. What's more, NA/AN are 50% more likely to have obesity than non-Hispanic White adults. <sup>24</sup> People who are overweight or obese are more likely to develop high blood pressure, LDL cholesterol, and high levels of blood fats. The risks are greater for acquiring diabetes, heart disease, and stroke. <sup>25</sup> Overweight and obesity are defined by a weight that is higher than what is considered healthy for a given height using a screening tool called the body mass index (BMI). BMI is a person's weight divided by the height. A BMI ranges less than 18.5 is considered underweight. BMI ranges greater than 18.5, but less than 25 is considered healthy weight. BMI ranges greater than 25, but less than 30 is considered overweight. A BMI ranges greater than 30 is defined as obese.

The prevalence of overweight and obesity among children in the US has increased at an alarming rate in the last couple of decades, especially among Native American children. Obesity in young AI/AN has higher risk of developing diabetes and/or other chronic diseases. In 2015, the prevalence of overweight and obesity in AI/AN children aged 2 to 19 was 18.5% and 29.7%, respectively.<sup>26</sup> Unlike charts that are used on adults to determine BMI, a special chart was revised in 2000 by Center for Disease Control and Prevention Growth Chart to assess size and growth in infants, children, and adolescents. CDC growth chart for infants is sex-specific that considers weight-to-age, recumbent length-for-age, head circumference for-age, and for recumbent length. Chart for children and adolescent includes weight-for-age, and body mass index (BMI) for age curves. The revised growth curve for the United States was developed with data collected by National Center for Health Statistics (NCHS) in five cross sectional, nationally representative health examination survey. The data was eventually used to determine a final percentile curve that allowed computation of additional percentiles and z-scores. BMI-for age charts represent a new tool that can be used by health care providers for the early identification of children who are at risk for becoming overweight at older ages.<sup>27</sup>

AI/AN have a higher incident of obesity than overweight, whereas US children have a higher incident of overweight than obesity. Furthermore, boys have a higher occurrence of obesity than girls. In a 2015 study using data from the Indian Health Services National Data Warehouse (NDW), AI/AN children had prevalence of 18.5% overweight (BMI greater than the 85<sup>th</sup> percentile but less than the 95<sup>th</sup> percentile) and 29.7% obese (BMI greater than 95<sup>th</sup> percentile). Compared to younger children, children 12-19 years of age had a higher prevalence of overweight and obesity. Children 12-19 had the highest prevalence of unhealthy weight with 19.7% overweight and 33.8% obese. What's more, 16.1% are identified as class 2 obesity, which is defined as have BMI greater than 120% of the 95<sup>th</sup> percentile, and 6.3% are class 3 obesity, which is BMI greater than 140% of the 95<sup>th</sup> percentile. Children whose age ranges from 6-11 had BMI range with 17.9% overweight, 31.7%obese, 31.0% class 2 obese, and 4.4% class 3 obese.

However, the trend of overweight and obesity of AI/AN between 2006 through 2015, either show a decrease or slight increase in prevalence, which is consistent with trends with national studies of children the same age. Decrease of prevalence of overweight was observed for children in the 2-5 age group from 19.3% in 2006 to

17.5% in 2015 and prevalence of obesity from 23.2% in 2010 to 20.7% in 2015. Children in the 6-11 age group observed a slight decrease of prevalence of overweight from 18.6% in 2006 to 17.9% in 2015, and obesity prevalence increased slightly from 31.5% in 2006 to 31.7% in 2015. Finally, children in the age group from 12-19 showed a slight decrease in overweight prevalence from 20.2% in 2006 to 19.7 in 2015, and slight increase in obesity prevalence from 31.3% in 2006 to 33.8% in 2015.<sup>28</sup>

### **Food Desert on the Navajo Reservation**

Obesity rates in AI/AN children are major health threats, yet an effective method to address the issue remains elusive.<sup>29</sup> Programs that promote healthy eating that address cultural and socioeconomic differences. Programs that promote culture, families, and communities are needed. For school age children, prevention of chronic disease and infectious comes in the form of promoting physical activities and healthy eating.

Food is one of the basic needs and essential for living, yet it is the most harmful threat to the health of Navajo families, especially children. Several factors that affect healthy dietary choices, including the gradual abandonment of traditional Navajo diets and lifestyle,<sup>30</sup> as well as increased consumption of “junk food” and “fast” food.<sup>31</sup> The ratio of convenient stores and fast food restaurant to grocery stores have huge impact on the health and diets of many Native Americans especially on the Navajo Reservations. Almost every community has a gas station and a small convenient store. The convenient stores often offer processed foods, canned foods, and mostly unhealthy foods including heat up pizzas, burritos, inexpensive fountain drinks, refrigerators full of sugar drinks, aisles of assorted chips, and assorted candies. Sometimes, they offer overpriced and poor-quality fruits and vegetables. What’s more, a town like Kayenta has one grocery store compared to 4 dine in restaurants and 7 fast food restaurants. Similar ratios can be observed in major towns on the reservation such as Tuba City, Window Rock, Chinle, Shiprock, and Ganado. Fast food restaurants are convenient for tired parents and grandparents who work long hours to support their families. What’s more, almost every child prefers to eat fast food than eat home-cooked meals.

Food Desert also plays an important role in the increase of chronic disease. Unfortunately, many Navajos live far away from the nearest Navajo Shopping Center. Food insecurity rates on the Navajo Nation are the highest reported to date in the USA and are likely due to the extremely high rates of poverty and unemployment. <sup>32</sup> A total of 13 grocery stores, several Bashas Dine Market and two Lowes’ Shop and Save, serve the entire Navajo Reservation, an area comparable to the size of West Virginia. These markets are the only place on the Navajo Reservation where Navajos go to buy fresh meat, fresh produce, low fat dairy, whole grain foods, and other groceries. Grocery stores and small retailers on Navajo Nation have limited variety and quantities of fruits and vegetables. What’s more, the stores offer mostly highly processed foods with low nutritional value, and at higher prices than off-reservation stores.<sup>33</sup> Stores on Navajo Nation stock few varieties and quantities of fruits and vegetables. Also, more than half of the families on the reservation prefer to travel over 200 miles round-trip to off-reservation stores in border towns like Cortez, CO, Page, AZ, Flagstaff, AZ, Gallup, NM, and Farmington, NM to buy groceries.

### **More Than Frybread**

The relationship that the Dine people have with food can be traced back to the origins of Dine existence.<sup>34</sup> Dine or Navajos believe that plant beings were placed on this earth to provide sustenance. Dine Fundamental Laws guided Dine to interact with food sources with respect, and obligation to preserve, and protection. Navajos also believe that the holy people taught them how to plant, nurture, prepare, eat, and store cultivated crops such as corn. According to Navajo Oral History and teachings, Navajos would be safe and healthy until

the day that we forgot our seeds, our farms, and our agriculture. We would be afflicted by diseases and hardship. Our Dine Teachings also stressed the concept of T'óó Bikiinígo, which means to take just enough or eat just enough to sustain your hunger. In other words, consume only what is necessary for survival.

Because Navajos lived strictly following the Dine Fundamental Laws in relations to food, food-insecurity was not an issue for Navajo people because they were self-sufficient and followed a subsistent lifestyle. Navajos raised their own crops, including several corn, beans, squash, melons, peaches, apricots, and others. What's more, Navajos gathered wild plants such as yucca fruits, sumac berries, wild celeries, wild oats, acorn, berries, wild tea, and other plans. Their meat source came from rabbits, prairie dogs, and deer.

However, Navajo diets were impacted tremendously during the period of Indian Removal Act of 1830 under President Andrew Jackson. The Indian Removal Act encouraged the removal of American Indians, including Navajo, who stood in the way of white settlement. Kit Carson was enlisted to round up and remove Navajos from their lands using the scorched-earth tactics. Most of the farms were decimated, orchards of peaches were cut down, and other food sources that Navajos depended on were destroyed by fire. Starving Navajos started depending on the US government for food provisions. Once the Navajos were relocated to Fort Sumner, they were introduced to provisions that had poor nutritional content and insufficient rations which included flour, coffee, lard, sugar, salt, and bacon.<sup>35</sup> The Navajos adopted the provisions into their diets, and brought it back with them to the reservation. Many Navajos returned to farming, but also continued to rely on food rations they adopted at Fort Sumner.

Today, more and more people have moved away from the traditional foods. Frybread, tortillas, potatoes, mutton continue as staples to the Navajo diet. However, by the 1980's soda and sweetened drinks, store bought breads, processed meats like spams, bologna, and corned beef become common in most households.<sup>36</sup> Unfortunately, unhealthy diets have led to many chronic diseases on the Navajo Reservation.

## **Food Pyramid**

More and more programs promoting wellness and leading a healthy life have been introduced on the Navajo reservation. One of the most common resource used to teach about nutritional daily intake is the U.S. Food Guide Pyramid. What's more, the pyramid also stresses the recommended daily proportions and portions of different food groups.

Although more Navajos are consuming less traditional foods, more and more are returning to the lifestyle that once sustained our ancestors to combat chronic disease. Some Navajos are beginning to grow their own food in small gardens or on farms as a way to reconnect with traditional practices. Many of the tradition foods unfortunately are not on the U.S. Food Guide pyramid. Fortunately, Penn State Nutrition Center (1993) and other entities have developed Food Guides Pyramid including cultural foods specifically for Navajo people. The food includes; unique traditional foods like kneel-down bread, blue corn bread, blue corn mush, sumac berries, and other traditional foods grown or harvested in the wild. The foods also include the most common foods that Navajos have adopted into their diets including macaroni, white bread, and some fruits and vegetables. It also includes fruits and vegetables that can be grown on a garden such as tomatoes, green beans, and cantaloupe.<sup>37</sup>

## **Physical Activity**

Inactivity in children and adults is a major health threat. The risk for developing chronic disease increases when children to not participate in physical activity. Furthermore, the risk for developing mental illnesses

escalate.

“Move More and Sit Less” is the message that the CDC is using to encourage people to move. The benefits of physical activity for adults include being healthier, less likely to develop chronic diseases, and less likely to develop cancer than inactive adults. It also reduces anxiety and depression, and improves sleep. According to the CDC website, physical activity is anything that gets the body moving. In order for adults to improve their mental and physical health, they need to do two types of activities: aerobic activity and muscle strengthening 150 minutes a week.

Childhood and adolescence are critical periods for developing movement skills, learning healthy habits, and establishing a firm foundation for lifelong health and well-being.<sup>38</sup> The benefits of regular physical activities include health and fitness, cardiorespiratory fitness, stronger muscles, lower body fat, and stronger bones. Physical activity also improves cognition, and cognitive functions of memory, precession speed, and attention. Also, it improves academic functions.

Children who are 3-5 years of age should do physical activity by engaging in active play and structured activities. The benefits include enhancing growth and development. However, the amount of time for physical activity is not specified for this age group. The recommended amount of physical activity for students who are between the ages of 6-17, is 60 or more minutes per day. The recommended physical activity includes aerobic activities, and age appropriate muscle and bone strengthening activities.

## **Design Thinking**

Innovation and certain environments produce new ideas unique to a situation based on the occurrence of a series of shared properties and patterns. Seeing the problem of innovation from the long-zoom perspective give us new facts, rather than just metaphors. Patterns of innovations need to be recognized in schools, governments, numerous platforms, etc. so we can build an environment that allow good ideas to flourish.<sup>39</sup>

Design thinking is 5 step human-centered process that provides a solution-based approach that leads to innovations. The first step is empathizing, which basically means develop a deeper understanding of the challenge that exist in a specific environment.<sup>40</sup> The most important part is to immerse yourself in the environment through observation, engagement, and empathizing with the people to understand what they experience. Understanding the environment is also important, so you can gain a deeper understanding of the issues involved. The second step is to define the problem, which clearly articulate the problem you want to solve.<sup>41</sup> This stage involves analyzing observations, and synthesize the data collected in order to define the problem. At this stage, you generate a human-centered problem statement: What is the problem? Ideate is the third step, which is defined as brainstorm potential solutions: select and develop your solution.<sup>42</sup> This step is the time for members to “think outside the box” to come up with solutions to the problem statement. In other words, the ideate step encourages team members to free thinking. This step allows members to come up with as many solutions as they can, but eventually narrow down ideas based on data from the previous steps. The prototype step allows you to design a prototype or a series of prototypes to test all or part of your solution. <sup>43</sup> Prototype is an experimental stage that allows teams to investigate the problem-solutions generated in the previous step so the best possible solution can be identified. The final step in the design thinking is Test, but is far from completion because it allows you to engage in a continuous short-cycle innovation process continually improve your design.<sup>44</sup>



## Teaching Strategy

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### Student Talk

Student Talk is a strategy to get students to talk through concepts and practices. Student talk will be useful when they are introduced to the concept of using Design Thinking. Students will be expected to contribute to their teams by allowing them to empathize, define, and ideate, which would allow them to create a prototype, and eventually test their innovative idea.

### Reciprocal Teaching

Reciprocal Teaching is a strategy where the student becomes a teacher. In one of the activities, students will create a product that would help improve the health of their families through a nutritional education or physical activity. Students will use their product to inform first and second graders about the importance of a healthy diet or the importance of physical activities. Their product will be a result of what they learned about nutrition and physical activity. It could be in the form of a poster, a PowerPoint, or other multimedia of their choosing.

### Scientific Method

The Scientific Method is a process or method of research that identifies the problem. What's more, the students gather information about the problem. Using the information gathered, students form a hypothesis or question they want to explore. The next step, the students design an experiment to test the hypothesis. Finally, the students analyze the experiment and draw a conclusion.

## Activities

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### Design Thinking Scenario

Design thinking will be used two different ways in the classroom. The first way is to give students scenarios. With the given information, students will develop an idea to help them solve a problem. For example, in one scenario, a mom is traveling to an appointment with her four children. When she stopped to get gas at Speedway, her children hinted that they were hungry. She knows the importance of providing nutritious food and snacks for her children. However, in the store she realizes that you can either get one banana for \$0.99 or get 4 bars of candy for a dollar. What are you supposed to do?? Do you buy the \$0.99 banana, and have the students divide it four ways, or do you get the 4 bars of candy, which may not be nutritious, but will satisfy the hunger of the children?

The students will use design thinking to help them empathize with the mom. The students will discuss the problem that the mom is facing. To help the students empathize, have they seen their moms make a similar choice? Give time to the students and have them identify the challenges the mom face. Then have them discuss the problem, and clearly define what they want to solve. Have the students articulate clearly how they might help mom solve her problem. An example would be what mom would do to prevent her from buying candy instead of feeding her kids healthy food. When students get to the third step of design thinking,

Ideate, they will brainstorm as a team to come up with solutions. Some examples might be: packing a healthy snack bag for the children, assigning a child to be in charge of packing light snacks for the siblings, staying with a babysitter, and many more solutions that students come up with. Prototype is the next step in design thinking. The students will come up with prototypes to help mom and the children eat healthy food, even when mom is busy. Some examples include: create a duty chart for the students, prepack a snack bag for emergency, like when they have to leave quickly, etc. Lastly, students will be given a chance to test out their prototypes. This part will take time, because some of the students may need to test it on their family, especially if they come from a large family. Some of the students do have to travel with their moms and younger siblings, just like the lady and her kids in the scenario. They always have a chance to modify or improve their prototype as they test it out. Eventually, the students will share what they learned from this activity to inform first graders or second graders about what they can do to help mom eat healthier, even when they have to go places unexpectedly.

### **Food Presentation**

Native Foods, made from blue corn and wild plants, are not forgotten, despite the historical modification of the diets of Navajo people. Traditional foods like blue corn mush, blue corn dumpling, blue corn pancakes, and other foods have been passed down from one generation to another. More recently, the recipes of these foods have been published. Also, some of the food preparations have been recorded by some Navajo people. These food preparations can be found on Facebook or on YouTube. Using any form of multimedia rather than a guest speaker, students will be shown a food preparation demonstration. Students will be given a sample of the food that was demonstrated in the video. Another part of this activity is that the students will be introduced to the USDA Food Pyramid, and the Navajo Food Pyramid.

First, the student will study the Navajo Food Pyramid and identify foods they recognize. What's more, determine where the most common foods eaten in their homes are on the food pyramid.

### **Create a Physical Activity**

Lack of physical activities among children is a major health risk for developing chronic disease later in life. Students will be taught the importance of engaging in physical activities to prevent chronic disease. Once the students learn about the importance of physical activities, the students will create an exercise activity. The important thing is to make the physical activity fun so that everyone starts moving. They may design an activity they want to share with students at a lower grade level, or an activity to get their families to move. Students will be allowed to use all types of multimedia such as videos, phones if they have one to record activity, music, and so on.

### **Food Journal/ Physical Activity Journal**

Students may not be aware of all the food they eat in a day. In a food journal, the students will write down everything they eat in a day. After a week or so of the food journal, the students will analyze the foods they have eaten, are they healthy foods? How much was processed foods? How much of the foods met the daily nutritional value as stated in the Food Pyramid? How much healthy foods did they eat?

### **Study Cafeteria Food**

Students will use the scientific method and the two versions of the Food Pyramid to study the content of one or two cafeteria meals. They will analyze the foods being served to the students. Using the food pyramids,

the students will determine if the foods labeled as meeting specific nutritional guidelines actually meet the nutritional guidelines stated in the food pyramids. One way to analyze the food is to teach the students to read the nutritional value that comes on the labels of the peanut butter sandwiches, the burrito, and so on. If they learn to read the labels, they can determine what foods they are actually ingesting. For example, the Smucker's Uncrustables Peanut Butter and Grape Jelly Sandwich is often served in the cafeteria to the students. Each sandwich is 210 calories; with 9 grams of fats (2g of saturated fats), 220 mg of sodium, and 10 grams of sugar. The fats make up for 11% of the daily value, and the sugar content make up for 17% of the percent daily value. Other Nutritional Facts included are 6g of protein, 33mg of calcium, 1mg of iron, and 126 mg of potassium. First, the students may talk about the important vitamins that come from the sandwich. However, the students also need to talk about the fats, sugar, and salt. The sandwich has a high percentage of the daily value for these items. Students may use a weight scale to determine how much salt, sugar, and fats are in the sandwich. The other part of this lesson is to determine if the fats in the sandwich are good fats or bad fats. Do the fats, sugars, and salt content in the sandwich outweigh the vitamins listed in the sandwich? In the conclusion, the students can determine for themselves whether or not the sandwich is nutritious or not.

## Appendix - Arizona State Standards

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### Health Standard

The first standard focuses on nutrition and how it affects the health of the students, as well as how it affects learning. In this unit, it will help students make healthier choices. Health Standards: S1.C3.PO 2. Describe the key nutrients contained in the food groups and how these nutrients affect health and learning.<sup>45</sup>

The second health standard focuses on the importance of physical fitness to prevent adult chronic disease. Health Standards S1.C3.PO3 - Describe how physical activity impacts health and analyze how physical activity contributes to disease prevention.<sup>46</sup>

### Science Standard

Scientific Method will be used as a part of the activities. When we do the activities, the following standard will be covered: Scientists explain phenomena using evidence obtained from observations and or scientific investigations. Evidence may lead to developing models and or theories to make sense of phenomena. As new evidence is discovered, models and theories can be revised.<sup>47</sup>

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