

The Human Body: Marvels of Physics, Chemistry, and Biology Working Together

Heart and Lungs Unit

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Introduction

“Are we a part of nature”? - Lorenzo Max, Dine Medicine Man

Lorenzo Max asked this question, he explained that we are nature. Nature is just not Yellowstone, or when we go the forest; we need to understand that what happens in our environment affects us to cause some kind of change within our DNA. He also mentioned the “Hozho” means having a positive way of thinking, having the maximum Hozho. Thinking about Hozho is part of my Navajo pedagogy. He had mentioned reading about Max Planck (Physicist) a Noble Prize in Physics winner. One of the studies he found out there was energy with division of a sperm. “Everything has energy, we all have a spirit, the spirit has energy”, Mr. Max acknowledges.

The goal is to expose students to a different type of science program more hands on modeling and also access to background knowledge to help build their interest. Many students are not aware of what goes in their bodies. They know our heart pumps blood, our bodies have muscles, we have a skeleton and our brain helps us move our muscles. All these systems work together in the circulatory system, digestive system, muscular system, nervous system and respiratory system. The students who will be involved are 8-11 year olds students. They will build each system, as I have identified parts of the body to study. Additionally, indigenous learners will be able to use their language by identifying each part with their native language for our wall of science words.

The meaning of taking care of your body while you are young will be important to their well-being of growing into their adolescence. The awareness of their body will be important and helpful to their interest of what goes on with their body. Identifying some health issues that are relevant to students as we study different parts of the human anatomy will be helpful information for all learners. Introspection will be brought to light by working collaboratively and incorporating class discussions. The students will also have to prepare a presentation when time is designated for a showcase for all families to come and see finished projects.

Demographics

Flagstaff, Arizona is at the corner of the Navajo Nation near one the four sacred Mountains, the San Francisco Peaks known as Doko'oosliid in Dine. Eva Marshall Magnet Elementary School serves Pre-5th grade students with the Flagstaff Unified School District (FUSD). The school is located in Northern Arizona in Flagstaff, Az. It is one of ten elementary schools within the Flagstaff Unified School District. Marshall is an arts and science magnet school. All our programs have embedded science within the curriculum at all grade levels. The community I work at is an enhanced science school. Our school is located near a pond and we have a community garden. Our parents are very involved with our Parent Teacher Organization, as stake holders at our school. The students at our school know that Magnet Monday is something to look forward to when entering 3rd grade. We have an extra-curricular day called Magnet Monday. This Magnet Monday is for enrichment for students to have a choice in what

type of class they would like to take. This time for one hour a week, I would like to designate this as a time to teach the human anatomy.

Our elementary school has a population of 489 students enrolled. We are a title I school having over than 50% on free or reduced lunch. According to our demographics records the three most represented groups are Hispanic 41%, White 36% and Native American 19%. Hispanic being the largest group.

Our school community is located near downtown Flagstaff, nearby is public housing. Our community is near a middle class residential area, 2 miles away is another FUSD Elementary School. We have school zones where students must attend their school within their zone. Our school accepts students who do not live within their zone, if we have availability within our school. Students who come off the reservation whether Dine or Hopi, attend our school and usually is a cultural shock for coming into an urban residential school. We also have students come from many backgrounds, as I feel our school is diverse with many nationalities. Most of the students whom attend Marshall have been enrolled since Kindergarten.

Our students in 4th grade are the only grade level required to take the Science AzMerit portion, Native Americans 36% Falls Far below and 0% Approaching, Hispanic 19% Falls Far Below and 14% Approaching, White Falls Far Below 6% Approaching is 33%. The AzMerit shows student performance reported as one of four performance levels. Students who score at Falls Far Below (minimally proficient) or Approaching (partially proficient) are likely to need support to be ready for the next grade or course. Students who score at Meets (proficient) or Exceeds (highly proficient) are likely to be ready for the next grade or course. I would like to help the group of students whom are scoring at Falls Far Below or Approaching. These students need more time and help to develop their science inquiry and methods.

This unit will be taught in a twelve week period once a day because it is part of an extracurricular opportunity in order to broaden and enrich student's academic experience. This time is sixty minutes on every Monday for one semester due to our school scheduling. Each week students will look forward to this time and be enthusiastic because it's the class they chose to participate in. The class will be limited to only twenty five students because of supplies ordered. I will not be teaching this in my regular third grade class due to human anatomy is modified for third through fifth grade Arizona standards. I want to teach this unit because, it is a new curriculum that will be developed with Dine education philosophy of using Hozho.

Rationale

Many students are unaware of the symptoms of the risk factors of the heart is not healthy due to regular physical activity. Symptoms also occur along with the lungs of having short of breathe due to your heart. Overweight students or obesity usually is not an issue, but eating unhealthy also are causes of gaining weight. 37 percent of children aged 10 to 17 years, who are overweight or obese for their age based upon body mass index in Arizona according to the

United Health Foundation data in 2016. In addition, 10.9% of Arizona youth (17 years and younger) reported having asthma, compared to a national rate of 9.2% from American Lung Association and Arizona Department of Health Services report 2016. Students will also be aware of the long term effect of not keeping your heart and lungs healthy. Overweight youth face substantial stigmatization and victimization from peers because of their weight. Negative stereotypes toward overweight peers begins early in childhood and by adolescence weight-based victimization is common (Puh, Luedicke, & Heuer, 2010)

My teaching about the Human Body could have some effect on students mental memory of learning about their own bodies could help improve their health for the future. As parents are their first teachers, we only see students seven hours a day for 180 days. Parents know their child better, their health and behaviors. In a study about breathing problems due to asthma students in school , this study has found, when parent(s)/guardian(s) with a college education was held constant, those with a 1-11th grade education did not influence the quality of life scores. However, parent(s)/guardian(s) with a 12th grade and some college education reported lower child psychosocial, child physical, and child total scores than those with a college education. It is suggested this result supports the notion that parent(s)/guardian(s) with a 12th education or more might be more knowledgeable or more involved in their child's asthma (Agrawal, 2018). The teacher could help with the involvement of the child as we take each student as our own.

The current status of the program we acquired through a grant from Flagstaff Medical Center came to an end. The program was called FitKids. Fit Kids of Arizona worked with community partners to educate families on healthy living and raising awareness for their initiative to reduce childhood obesity in Arizona. The clinical program was available at no cost to children with an elevated body mass index information provided by Northern Arizona Healthcare. This program was in our regular scheduling of classes during the week. Now we don't have this program anymore. In discussion with other teachers we want the kids to be aware of what the effects are of not being healthy does to our bodies.

More than 12 million American children are obese- one out of every six children. Obese children have an increased risk of developing high blood pressure and high cholesterol, which are both risk factors of heart disease. They are at risk of being bullied and suffering from depression, while a healthy diet and physical activity is associated with better mental health. Obesity can also cause sleep apnea, bone and joint problems, and chronic health conditions such as asthma and type 2 diabetes. More than 200,000 youth under the age of 20 have type 2 diabetes, and many more are at risk for developing diabetes. Almost two-thirds of American youth consume a sugary beverage on any given day. 91 percent of American children have poor diets and less than half get the recommended 60 minutes of daily physical activity. A quarter of American high school students (24.7 percent) watch three or more hours of television on an average school day according to the source State of Obesity Organization. Many of our students also sit for hours playing with electronics. These risk factors are developed later in life.

We want our students to be in good health physically and mentally. Overall, results suggest that high levels of game play are related to lower levels of exercise and higher body mass (Ballard, Grey, Reilly, & Noggle, 2009). This study has given me light on what the students need to be aware of. Stated from the research Correlates of video game screen time among males: Body mass, physical activity, and other media use; Given that our participants are young adults, this is concerning, as the health and exercise habits developed in emerging adulthood are tied to exercise habits and health status as adulthood progresses (Seidell, Nooyens, & Visscher, 2005). Putting together all the factors, children are not aware of the affects within their anatomy. Just like teaching the objectives will be the awareness on why they will be learning about the human anatomy. This unit emphasizes the justification on learning the reason of these health risks.

While many schools have anti-bullying policies in place, the present findings suggest the importance of additional targeted strategies to educate students about weight bias in the school setting and the need for increased efforts by educators and school staff to intervene on behalf of overweight and obese students. Focusing on improved health as both the primary motivator and outcome for behavior change, rather than messages that emphasize “thinness” (Puh, Luedicke, Heuer, 2010). The implementation of class about the science of heart and lungs will bring to light about personal values of health. Students who learn or who become informed of what’s happening in real life situations become engaged to want to learn more about the health factors.

Content Objectives

In my research studies suggest that schools and families should work together to ensure that students adopt a range of health-promoting behaviors to realize higher achievement (Ickovics, Carroll-Scott, Peters, Schwartz, Gilstad-Hayden, & McCaslin, 2014). However, future research is needed to better understand the relationship between each individual health asset and any moderating factors that might affect academic achievement, including school and family environment. Schools are recognizing the priority academic achievement and that in the current school funding climate, health is often perceived as secondary, at best. However, results from the study of Health and Academic Achievement (2014) of and others indicate that creative approaches that integrate curricular and noncurricular school-wide efforts to promote healthy behaviors among all students are worth the investment. Examining the odds of achieving goal or above on all 3 standardized tests for each of the individual health assets, it appears that not having a television in the bedroom, being at a healthy weight and physically fit, being food secure, and eating at fast-food restaurants one time or less per week are the most important predictors of academic achievement. Further, children who drink less soda and other sweetened drinks, are emotionally healthy, have quality sleep, feel safe in their neighborhoods, and are also significantly more likely to achieve goal on standardized tests. But beyond each individual health asset, it appears that any and all additional health-promoting effort cumulatively impacts academic achievement. Individual targeted initiatives may be insufficient to promote change; therefore, we must advocate against diffusion of responsibility (eg, just taking soda machines out of schools won't impact health or grades, so why bother) and

for a more comprehensive approach (Ickovics, Carroll-Scott, Peters, Schwartz, Gilstad-Hayden, & McCaslin, 2014).

The Heart

The cardio vascular system consists of the heart, blood, and blood vessels. The respiratory system is composed of the nose, a system of airways that include the nasal cavity, pharynx, larynx, and trachea, the lungs, muscles that help move air into and out of the body, and diaphragm. These two systems will be combined with lessons only on the heart and lungs systems.

Early development of the heart is formed 18 or 19 days after fertilization. On the 20th day the heart cords develop canals at this time forming the atrium. On day 22 the pacemaker of the heart is established and waves begin, the heart is pumped in one direction only.

The basics of the heart for teachers, the average size of the heart is about 12 cm long and 9cm wide, usually weighs between 200 and 275 grams. The heart is located in the center of the thorax. The heart does not hang freely in the thorax. It hangs by the great blood vessels inside a protective sac called the pericardium (around the heart). The wall of the heart has 3 layers. When blood is pumped to the lungs and the rest of the body, it is wrung out of the ventricles like water from a wet cloth. The heart is a hollow organ that contains four chambers. Dividing the heart vertically down the middle into the right and left heart is a muscle called the septum. At the top of the heart is a chamber called atrium. Below is another chamber called the ventricle "little belly". The four heart valves allow blood to flow through the heart in only one direction; they also prevent the back flow of the blood. The heart valve consists of flap folds called cusps, which blood flows to prevent and outlet from becoming dilated when the heart contracts and forces blood through it.

The great vessels of the heart are the largest arteries and veins of heart form the beginnings of the pulmonary and systemic circulations. The vessels carry oxygen blood from the heart to the lungs, this is the pulmonary arteries. The artery carrying highly oxygenated blood away from the heart is the aorta. The heart muscles needs more oxygen than any organ except the brain. To obtain this oxygen, the heart must have a generous supply of blood. Like other organs, the heart receives its supply of blood. Like other organs, the heart receives its blood supply from arterial branches that arise from the aorta. The flow of blood that supplies the heart tissue itself is the coronary circulation.

The effects of aging of the heart usually does not decrease in size with age, its pumping efficiency is reduced because some muscle and valve tissues are replaced by fibrous tissue. Blood pressure is usually raised, and the heart rate does not compensate as well in response to stress as it used to. Hardening of arteries, usually occurs when the heart walls become less elastic and the heart must work harder to pump the same amount of blood. As a result, the heart becomes enlarged, reaching its maximum limit resulting in heart failure.

The Lungs

The trachea or windpipe is an open tube from the larynx to the lungs. Dust particles and microorganisms that are not caught in the nose and pharynx may be trapped in the trachea and carried up to the pharynx by the cilia to be swallowed or spit out. The trachea branches into the right and left bronchi, the primary bronchi that enter the right and left lungs. The whole system inside the lung looks so much like an upside down tree that it is commonly called the respiratory tree. Bronchi have cartilage and mucous glands in their walls. The bronchioles, which are small tubes that branch into smaller tubes. Alveoli are the functional units of the lungs. Alveoli are clustered in bunches like grapes and provide enough surface area to allow ample gas exchange.

The alveoli are the sites of the gas exchange with the blood by diffusion. Diffusion is a random amount of spreading molecules, always moving whether in a solid state. There are so many capillaries that at any instant almost a liter of blood is being processed in the lungs. Capillaries are small red blood cells that flow through, giving each cell maximum exposure to the alveolar walls. The lungs are on the right of the heart. The heart takes up more space on the left side. The two lungs are not symmetrical. The left one is thinner and longer than the one on the right.

The respiratory tree is supplied with blood by the pulmonary and bronchial circulations. The pulmonary circuit begins in the right ventricle and ends in the left atrium. The bronchial circulation consists of the blood supply to tissues of the lung's air conducting passageways. The bronchial blood supply comes from the bronchial arteries. Since the blood delivered to the alveoli comes from the right ventricle of the heart, it is low in oxygen.

Mechanics of Breathing

The layer of air covering the surface of earth exerts a pressure about 1 atmosphere at sea level. Most air we breathe in is nitrogen and has no importance in normal respiration. The atmospheric gases in respiration are oxygen and carbon dioxide. Breathing also called pulmonary ventilation, allowing us to inhale and exhale.

An important relationship between pressure and volume of gas is Robert Boyle a seventeenth century Irish chemist. Boyle's law predicts that when a gas is compressed half its volume, its pressure doubles. An example, when muscles in the rib cage and abdomen cause lung volume to expand during inhalation, pressure in the lungs falls below that of the atmosphere, and air flows from the air of higher pressure to enter the respiratory tree. In a similar way, air leaves the lungs when air pressure in the lungs becomes greater than that of the atmosphere by compression of the thoracic wall and abdomen. The concept that decreasing volume of a gas increases its pressure, and vice versa, is important of understanding the respiratory phenomena (Carola, Harley, & Noback, 1992).

Working Together

The heart and lungs work together to make sure the body has the oxygen rich blood it needs to function properly. The right side of the heart picks up the oxygen poor blood from the body and moves it to the lungs for cleaning and re-oxygenating. Known as the pulmonary loop. The left side of the heart, once the blood is re-oxygenated the left side of the heart moves the blood throughout the body, so that every part receives the oxygen it needs. Known as the systemic loop. Oxygen helps make energy within our cells. Take a look at Figure A in student assessment plan.

When Things Go Wrong

Childhood obesity (BMI \geq 95th percentile) is associated with low income, but interpretation of the data has been difficult because of confounding factors such as race and ethnicity. Importantly, obesity and Cardio Vascular Disease risk factors associated with obesity have been linked to early atherosclerosis in pathological studies of the coronary arteries and aorta in adolescents and young adults (Kelly, Barlow, Rao, Inge, Hayman, Steinberger, & Daniels, 2013). The study of Cardio Vascular Disease will help understand a better lifestyle approach and awareness of body type. The students will be more self-conscious.

Many students who come to school all have want to be healthy and feel their best. In schools we also get many other factors that educators deal with. Youths exposed to early life stress and growth stunting may be at greater risk of developing heart disease and metabolic disorders independent of BMI. Diet may play a large role in mediating the relationship between early life adversity, growth restriction, and later risks to cardiovascular and metabolic health. It is not yet clear how these youths' diets may impact their current or future health. The study of Weight-Based Victimization toward Overweight Adolescents suggested that one third of youth aged 12 to 19 years in the United States has low levels of cardiorespiratory fitness. Low cardiorespiratory fitness, a strong and independent risk factor for cardiovascular disease, is known to track from adolescence to adulthood. Further, it has been shown that low cardiorespiratory fitness in adolescence predicts adult body fatness large-artery stiffness, poor lipid profiles, and low physical activity levels. Accordingly, because highly active youth tend to manifest higher levels of cardiorespiratory fitness, several expert panels have recommended that physicians counsel pediatric and adolescent patients and their parents about the importance of meeting current physical activity guidelines. Identifying youth who are at elevated risk for low cardiovascular fitness is important because fitness testing is impractical in most clinical settings. The findings of this study suggest that youth who have high BMI, low levels of physical activity, and high levels of sedentary behavior are likely to have low cardiorespiratory fitness (Puhl, Luedicke, & Heuer, 2011).

The heart and lung lessons will be based on scholarly research and my positive way of engaging students. Implications for school health is to use targeted strategies to educate students about weight bias in the school setting and the need for increased efforts by educators and school staff to intervene on behalf of overweight and obese students (Puhl, Luedicke, & Heuer, 2011).

The efforts that are recognized are to have the students to connect to real life situations of that could happen in these body parts. The implementation of school-based programs will be to promote and learn healthy life style behavior. The students will be able to make connections through diagrams and 3D models to represent, the link between the heart and lungs connect together with certain tubes that go in and out of the heart. The teaching of anatomy is usually structured around 'scientific models', which serve as the 'backbone' (structuring axis) organizing teaching aims, content and assessment criteria (Lizana, Merino, Bassaber, Henriquez, Vega-Fernandez, & Binignat, 2015). The students would be able make models and come with a presentation at the end of every part and answer the real life situations that could happen with keeping each body part healthy with role playing. Through the years, we have effectively used role playing as a learning activity to reinforce the understanding of the structure and function of human organs and their roles in the homeostasis of the human body. We have done so after discovering that while most students have no problem identifying an organ system, many have difficulty applying the definition of an organ to identify and differentiate between organs within the human body (Cherif, Jedlicka, Al-Arabi, Aron, & Verma, 2010) . Furthermore, among those students who have no problem identifying a human organ, it seems that many of them have difficulty identifying the different functions of the organs. The heart will be the beginning of the lesson being able to identify all the parts, making a heart model, and being able to present the process of blood flow in and out of the heart with technology using the ipad and camera app with the drawing feature. The augmented reality to teach the human heart anatomy and blood flow: from the research result, it showed that the virtual technology helped in disseminating and promoting the learning which caused the learning to be easier and also quicker to understand (Nuanmeesre, S., Kadmateekarun, P., & Poomhiran, L., 2019).

The unit about lungs, students will gets some background information and analyze that the lungs and heart are attached together. The lungs help you breathe in oxygen and your chest expands when you inhale. The gist of your heart is sort of like a pump, or two pumps in one. The right side of your heart receives blood from the body and pumps it to the lungs. The left side of the heart does the exact opposite: It receives blood from the lungs and pumps it out to the body. Students will initially just explain the flow of oxygen and blood flow direction through the heart. How does the oxygen go through the heart? This will be a focus question for students throughout the lesson to be interpreted in their own words as an informal assessment of understanding. The end result, for students will also make a basic model of the lungs and also describe the process either through a video on the ipads, using diagrams downloaded.

Learning about the lungs will help some students with asthma with well managed treatments can do some physical activity to help strengthen for better lung function. When asthma is appropriately managed, not only is it safe for students with asthma to participate in physical activity, it is strongly recommended. In a review of the effects of physical conditioning on children and adolescents with asthma, many studies reported improved aerobic fitness after training (Journal of Community Health, 2006 . In the same review, some studies found a reduced severity in exercise-induced asthma, although most found no change in the occurrence

or degree of exercise-induced asthma suggesting no increased risk of asthma attacks or episodes because of increased physical activity. Being physically active and maintaining a healthy body weight may actually reduce asthma symptoms and help control the disease. The findings in this report are subject to at least three limitations. First, these data apply only to adolescents who attend high school. Nationwide, among persons aged 16–17 years, approximately 5% are not enrolled in a high school program and have not completed high school. Second, the data in this report are based on self-report and the extent of underreporting or over reporting of height, weight, and physical activity levels cannot be determined. Asthma status was not confirmed by medical records and asthma episode or attack was not defined. Third, the data in this report are from a cross-sectional survey and thus only associations and not causes and effects can be determined. Physically active youth are more likely to have stronger bones, be of normal weight, and, if hypertensive, show reductions in blood pressure. Physical activity should be encouraged and understand the basics of keeping healthy and understand or to become aware of risks that happen when the lungs are not healthy (Fulton, Jones, Mannino, Merkle, & Wheeler, 2006).

Knowing the risks could help to get involved with a school community. Learning the science of of keeping a healthy heart and lungs will reduce some risks. The United Health Foundation shares their data collected about childhood obesity what it is associated with physical, social and psychological health issues including: Bone and joint problems, asthma and sleep apnea, Cardiovascular disease in adulthood caused by: high cholesterol and/or high blood pressure, Type 2 diabetes, poor self-esteem, social isolation and depression.

Teaching Strategies

This unit about the heart and lungs will be taught in a Universal Design Learning strategy for all learners. Technology will be used daily. The unit will require participation, answering inquiry based questions aloud, project research, technology use and group presentations. Students will be able to express their ideas, listening to other ideas and work collaboratively as team, working towards a common goal. Background information will be given by videos, and reading for understanding to gain information will be required. Students will also be handed questions about understanding of what they are doing and where they are at in their project and what information will be needed from the teacher for guidance. One day will be teacher lecture for 30 minutes about information that students need to start project before design. Group presentations will need to be practiced for project grading from students with oral presentation and project design rubric. Students will be problem solving in the collaborative groups. In class we will also go over science words at the end of the hour for closure. During this time students can also use their own science words in a different language. Also one positive word for the end of the class they did or said will be written on sticky tabs for an exit ticket. This could be one they learned, this will be feedback for teacher. Included will be a possible speaker about what they learned at the end of the lessons. Students will work with science sentence prompts template used to help with language and add more science vocabulary. Inquiry based learning

will be used with the help of the focus question to help with what he or she wants to know. Differentiation in content delivery will be provided for each unit. The use of technology apps will be used to help develop presentations.

This unit is designed for student centered learning in this human body unit: how does the heart and lungs work together? The unit on how the human body works is designed for all learners. The unit will be twelve weeks long. Part of the design will be the Universal Design Learning (UDL) that our district is moving in the direction of student center learning. The three key ideas for UDL-Engagement: How can I engage all students in my class? Representation: How can I present information in ways that reach all learners? Action and Expression: How can I offer purposeful options for students to show what they know? The students will also apply hands on models using focus questions to direct their learning. A focus question helps learners develop questions they will be able to answer by doing their investigation or project. All content will be delivered with a real life problem and then try to discover the answer as they are being able to describe the parts of the system of the process of the body part identified. Real life situations from the news or family health history can become relevant for student understanding of the organs. All students will work collaboratively in groups of 3-4 students. This instructional method in which students will work in small groups to accomplish a learning goal under guidance from the teacher. Learners will work and depend on each other, engage in problem solving strategies, help each be accountable and in doing so learn from each other different skill set, also develop a collaborative interpersonal skill to teach, reflect and assess the effectiveness of the group. A Presentation and showcase will be presented to parents in a showcase at the end of the semester. Schools can play an important role in these efforts by treating the importance of weight tolerance on par with racial or religious tolerance, educating students about how the media perpetuates negative weight bias and prejudice, and implementing clear policies against weight-based victimization to ensure that all students, regardless of their body weight, can experience a positive and safe climate in their classrooms and schools (Puhl, R. M., Luedicke, J., & Heuer, C. ,2011).

Mindfulness

Balance with the natural world and my cultural Dine (Navajo) identity helps my pedagogy of being positive which refers to “ Hózhó” in Dine. Hózhó is a complex wellness philosophy and belief system comprised of principles that guide one's thoughts, actions, behaviors, and speech. The teachings of Hózhó are imbedded in the Hózhóójí Nanitiin (Diné traditional teachings) given to the Diné by the holy female deity Yootłgaii Asdzáá (White Shell Woman) and the Diné holy people (sacred spiritual Navajo deities). Hózhó philosophy emphasizes that humans have the ability to be self-empowered through responsible thought, speech, and behavior. Likewise, Hózhó acknowledges that humans can self-destruct by thinking, speaking, and behaving irresponsibly. As such, the Hózhó philosophy offers key elements of the moral and behavioral conduct necessary for a long healthy life, placing an emphasis on the importance of maintaining relationships by “developing pride of one's body, mind, soul, spirit and honoring all life.” Hózhó

may be best understood by describing characteristics of a Diné individual who excels in his or her journey to achieve this revered state of being. Diné elders are the ideal role models; Diné elders have both received the ancient teachings of Hózhó and have had a lifetime of experience in working toward attaining Hózhó. People living consistently with Hózhó ideas are humble; intelligent; patient; respectful and thoughtful (demonstrated in speech, actions, relationships); soft spoken; good and attentive listeners; disciplined, hardworking, physically fit, and strong; generous; supportive, caring, and empathetic; positive in thought, speech, and behaviors; spiritual; loyal and reliable; honest; creative and artistic; peaceful and harmonious; perceptive, understanding, and wise; confident; calm; deliberate in actions; gentle yet firm; and self-controlled. Hózhó teaches that respectful thought, speech, and behavior should be nurtured and relationships in life, including those with the whole of creation in the universe, should be supportive and positive (Kahn-John Diné & Koithan, 2015).

Science Vocabulary

The class will only stay on the fundamentals of how body part work together. In further readings of student articles and websites will help with literacy. The class will also come up with a science literacy learning wall designated to add students own languages to the science term and Navajo philosophy of education. For example if the word is *heart* in English, a Hispanic student could add *el Corazon*, a Navajo student could add *ajéí* and other languages could be added. This in support of their own identity and culture. The class learning wall will help me implement parts of the Navajo education philosophy: Nitsáhákees (Thinking)- Families have a healthy start by celebrating strengths and values, think to use your intellect, Believe in yourself, imagination, critical thinking, challenge, establish learning goals; Nahat'á (Planning)- Providing each child with skills and knowledge to lead a healthy lifestyle, self reliance, strategize, preparation, motivation and providing learning opportunities; liná (Living)- empowering individuals to live in balance, harmony and beauty while being a part of strong, resilient families living with respect, bring into life, taking responsibility, respect, values, nurture, collaboration, cooperative learning and assess student learning; Sihasin (Assuring)- engaging presenters to enrich students of their knowledge in their field, wisdom, reflection, accomplishments, self-actualization, hopeful and use assessment results.

Science words will be used along with learning other world languages in science. English science words will be put on literacy science wall labeled science words and everyday words. An example would *to observe* is a science word and *to see* is an everyday word. Next to a science word will be the other language provided by the student's language. This gives the student some self pride and confidence they can use a science word in a different language. Science word can be written on a sentence strip on self made board including student's ideas.

For closure at the end of class and have a bulleting board labeled Science Vocabulary and Everyday Words. Sentence Strips will be available ready to write on with a sharpie. The teacher will ask the students what new science words they used today. Students will give the teacher to the words to write and justification on if it is a science word or everyday word. Once

we are finished writing the words for that class session. The teacher will also ask if students know another way or use their language to identify the word in their language. Teacher will write the words and look up if needed for spelling on computer.

Technology

Students will use ipads for research to gather information. The information gathered will be taken handwritten in science journal. Use of the ipad students can take snapshots of information. The use of different apps will also be taught in the beginning of class, so students can practice app presentations and use an app of their choice. Students are to choose their app of their choice as a group. Students will also be able to use google slides to help develop a project together collaboratively. Each student within the group will all work on one document at once. They will be able to learn from one another as they are resilient from prior knowledge use of tablets and ipads used at home. Every time the class meets I will teach a quick app, to show students what the app can do. The first app I will teach the students to use is educreations. Each presentation app will need some direct instruction. As a teacher, the students can also be a teacher and usually know more than I do. I usually ask if any students have used other presentation apps they can also use if I have not presented it to them.

Class instruction will also be delivered through google classroom and some projects in October for more independent work. Google instruction helps the students be more students centered in their autonomous learning of their projects. The projects will be consist in three parts: Background research with notes, the design of project and oral presentation. One lesson will be taught through the use of technology using presentation app on the ipads. The students will have a choice on the presentation app to use for the end projects. Students will be able to have more freedom of designing and developing their presentation. The teacher will facilitate all groups and guide them with clarification of each groups end goal. Teachers can balance technological distance by assisting students who need help as they learn the technology required to interact with the app. Educators evaluate apps to match children's understandings of a concept and intended learning trajectories, while also considering the apps' technological appropriateness. However, students experience these apps and their affordances in different ways. The purpose of this article is to inform teachers' decisions about app implementation in the classroom through discussion of four case studies illustrating ways children interacted with the app (Tucker, Shumway, Moyer-Packenham, & Jordan, 2016).

Mixed Ability Groups

This class will be a mixed group of different grade levels. Students will be able to collaborate and discuss. The discussion will help students at a different ability learn from their peers. They learn faster with their kid friendly language. This will help diverse communication and become confident with their skills they bring to the project. This will also give students a chance to answer their own questions and not ask the teacher. Higher order thinking will engage and motivate other learners. Students get to evaluate arguments and show their own viewpoints.

Students get share their information and synthesize together. Inside these mixed ability groups technology supports the voice of the students whom don't voice aloud but would rather share a document together in google slides or docs. The groups will be given a task with an end goal. The students must work together each group member will be given a roll such, speaker, helping keep on task, timer, designer, note keeper, facilitator and project designer. This will be discussed on the first day of to give students time to choose what kind of role they would like to play within their group. Student's final projects will end with oral presentation. Students need a basic level of context in order to make sense of rigorous texts. If needed there are text to text features for students who need access.

The teacher will give the students a checklist of what needs to be on their end project. But, will not give the students what it might look like. The project is for creativity from each group. The group will fill out feedback on one positive feedback about their group engagement.

Inquiry Based Scientific Question

The teacher will pose a real question labeled as focus to direct the student's thinking to have the desire to find the answer as team. Students will also pose other questions they are curious about. The teacher will guide students to help interpret information. Students will investigate a problem, search for possible solutions, make observations, ask questions, test out ideas, and think creatively and use their intuition. Examples, "How does the heart and lungs work in system?", "Tell me how the oxygen travels starts and begins within the heart and lungs." The teachers will know if they are doing it right by not giving students the answer but helping as guide. The teacher will know if the inquiry based question is a success the students will excited and engaged on the topic.

The focus questions will be written on the board until the end of the unit. This will be used as an assessment, the students will answer to the best they can using science vocabulary.

Universal Design

The design in the lesson has mixed group abilities and along with diverse groups. All students will have a chance to succeed by learning from peers. Students will have a choice to design their last project. The lesson will be easy to understand and comprehend because all groups will bring together their skills of creativity, engineering, comprehending, writer and organization. No bad idea will be wrong as long as the task in finished with all the elements within the project. The class environment will be a safe positive environment.

Real Life

The rigor or real life situation or authentic learning is learning designed to connect what students are taught in school to real-world issues, problems, and applications; learning experiences should mirror the complexities and ambiguities of real life. Children work towards production of research, end product, and performances that have value or meaning beyond

success in school; this is learning by doing approach. According to these researchers provided, that each learning experience should have: 1- Real life relevance Activities and tasks that represent those of a professional as closely as possible. 2- An ill-defined problem Challenges that are not easily solvable, or don't have an obvious answer. There may be layers of tasks that need to be completed in order to solve the problem. 3- Sustained investigation Projects and tasks that require a significant investment of time and cannot be solved in a matter of minutes or hours. 4- Multiple sources and perspectives Resources may be theoretical or practical, and may require learners to distinguish useful information from irrelevant information. 5- Collaboration Individuals cannot achieve success alone. Projects and tasks will require social connections. 6- Reflection Learners will reflect on their own learning and make choices and set targets accordingly. 7- An interdisciplinary perspective Projects are not limited to a single subject or set of knowledge, but will make use of knowledge and skills from across subjects. 8- Integrated assessment Formative assessment is woven seamlessly into tasks and activities and used purposefully by learners and teachers alike. 9- Polished products Activities and tasks will lead to the creation of a product. 10- Multiple interpretations and outcomes. There are many possible solutions and answers to the problem. (in Lombardi, 2007). Students with real life knowledge, this foster's the interest of a project keep the connection relevant.

Research

Students will spend 40 minutes each class. The research will last 2-3 days, depends on group. Each research project, the students will gather some feedback and handouts provided by the teacher for science background information. The goal is to have different information that other students groups would not know. The goal is for groups to express interest in their topic and using the checklist to give the presentation two important point they learned that they did not know before. The organization of research is up to students on what information they want to inform the audience on. Research will be graded by rubric from their peers. The checklist will be reviewed as a class during each class session to help keep students on track with their research.

Classroom Activities

Human Anatomy and Blood Flow Lesson 1 (2 days)

Lesson Objective: Students will construct a poster model of the blood flow using technology images to demonstrate and present the circulation of blood with labeling of structure.

Dine character building: I will develop and apply critical thinking to establish relationships with the environment.

Key Vocabulary: four chambers, right atrium, left atrium, right ventricle, left ventricle, circulation of blood, heart

Procedure/ Instruction:

Pre plan-Group the students in group 2-3 per group.

Read all objectives.

1. Plan to watch a video for how the heart works.
2. Today we will you plan to make a heart model using bloodflow using the ipad. You will find images of the heart and use it in presentation. You can use the educreations app. You will need to practice your presentation a couple of times before you press record.
3. Steps for project.
 - 1st you find an image on safari
 - 2nd you will read about the how the blood flows through the heart. Use this website <https://kidshealth.org/en/kids/heart.html>
 - 3rd use the key words for labeling
 - 4th Use the website below to find the image of the blood flow numbered as entered into the heart to and from lungs. <https://www.chss.org.uk/heart-information-and-support/about-your-heart-condition/how-the-heart-works/>
 - 5th practice the presentation, then make your final changes and record your presentation.

Closure: Focus question, How can you keep your heart healthy?

Materials: ipad able to take pictures and use a presentation app for your technology. (preferably educreations app or use the camera app and use the demonstrate button to record)

Day 3: Students will make a life size heart with playdough and use straws to make the ventricles and atrium.

Lungs (2 days)

Lesson Objective: Students will construct a poster model oxygen flow using technology images to demonstrate and present the circulation of oxygen to the heart with a labeling a diagram.

Dine character building: I will develop a positive self image.

Key Vocabulary: Larynx, trachea, plurea, lung, bronchial, aveoli, bronchus

Procedure/ Instruction:

Pre plan-Group the students in group 2-3 per group.

Read all objectives.

1. Plan to watch a video for how the lungs work.
2. Today you plan to make a make a poster of the lungs. You will need to practice your presentation. Using an oral presentation rubric.
3. Steps for project.
 - 1st you find an image on safari
 - 2nd you will read about the how the oxygen flows through the heart. Use this website

<https://kidshealth.org/en/kids/lungs.html?ref=search>

3rd use the key words for labeling

4th Draw the lungs on a poster paper.

5th practice the presentation, then make your final changes and record your presentation using the video and the camera app.

Closure: Focus question, How can you keep your heart lung?

Materials: ipad able to take pictures and use a presentation app for your technology, construction paper for poster, markers, pencils.

Day 3: Students will make the lungs with breathing into balloons. Materials need for each student: 2 straws, 2 balloons, 2 liter empty bottles, 2 liter bottle caps, 1 large balloon, 4 rubber bands. Use the video to help construct lungs. <https://youtu.be/SwOYkEt0To>

Heart and Lungs (2 days)

Lesson Objective: Students will write a 2 paragraph essay on the affects of not keeping your heart healthy and lungs.

Dine character building: I will persevere with positivity through writing.

Key Vocabulary: will vary through students work

Introduction: The students will better understand the how the blood circulates.

Procedure/ Instruction:

Pre plan-Group the students in group 2-3 per group.

Read all objectives.

1. Plan to read two kids friendly articles on Asthma and Childhood obesity.
2. Today you will log into your google classroom account.
3. Steps for project.

1st you read the articles provided.

2nd Open up google docs and start typing. Follow directions. Directions for students: ident, write 2-3 paragraphs, follow how to write introduction paragraph (intro, 3 evidence and why, conclusion), use COPS to check work, is attached under assignment in google classroom.

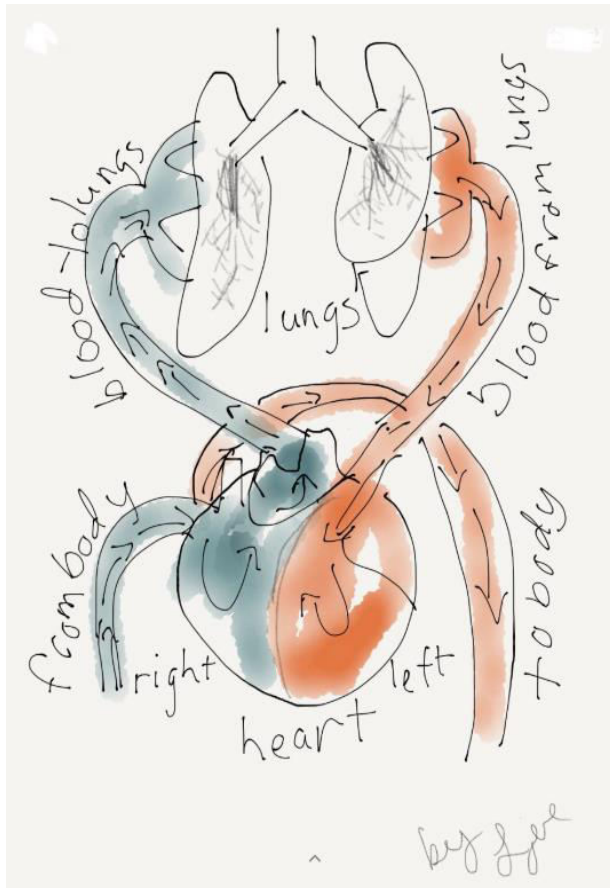
4. Make a copy and send within google classroom.

Closure: Focus question, How can you keep your heart and lung healthy?

Materials: ipad, wifi needed.

Student Assessment Plan

Assessment will consist of formal and informal tests, oral presentation rubrics, teacher rubric, self assessment and exit tickets. Students will receive a pre-test of labeling a heart and lung diagram with a short answer of the affects that could happen to the heart and lungs. This it to check student growth from beginning of the lesson to the end. The students will paying attention to the repetition of diagrams through presentations. Short answer will be upon independent research and article readings. The formal assessment will standardized on grade equivalent measures on one question on what does your heart and lungs do? The labeling for assessment will be made from student diagram from poster presentation. Example Figure A.



Student self-assessment will be given for each lesson, the teacher will receive feedback throughout the lesson. The teacher can also see the students focus of their attention, revise and help students, help students track their own progress, set realistic goals, understand student positivity and identify their own skills gap. Each lesson there will be a self-assessment exit ticket, question examples, How was my positivity? How did I work in my group? Did my group work well? What did I learn today? What do I still have a question about? Students will write one goal for the following lesson.

Name _____

Date _____

Self Assessment

	Excellent	Great	Needs Work
How was my positivity?			
How did I work in my group?			
Did my group work well?			
What did I learn today?			
What do I still have a question about?			
Students will write one goal for the following lesson.			

Groups will also use a sticky tab to fill out one thing that went well for student. Students will get to post one positive thought on how what they learned as a group. This is immediate feedback through daily group activities.

During presentations students will also give feedback to their peers on presentation using a rubric. This helps students with speaking and listening skills. The groups will be given a grade on presentations with teacher's 4-3-2-1 group rubric. The teacher's 4-3-2-1 will consist of the progression of elements needed to get a 4.

<i>Oral Presentation Rubric</i>			
Student Name(s) _____			

Great eye contact	yes	no	
Very Enthusiastic about their topic	yes	no	
Speaks very clearly	yes	no	
Project was organized	yes	no	
Images went with topic	yes	no	
Overall!	Excellent	Great	OK
<i>Write one positive comment!</i>			

<i>Write one question</i>			

Name(s) _____

CATEGORY	4	3	2	1
Preparedness	Student is completely prepared and has obviously rehearsed.	Student seems pretty prepared but might have needed a couple more rehearsals.	The student is somewhat prepared, but it is clear that rehearsal was lacking.	Student does not seem at all prepared to present.
Speaks Clearly	Speaks clearly, no mistakes	Speaks clearly most of the time	Speaks clearly and Mispronounces man words.	Often mumbles or can not be understood OR mispronounces more than one word.
Vocabulary	Uses vocabulary appropriate for the audience. Extends audience vocabulary by defining words that might be new to most of the audience.	Uses vocabulary appropriate for the audience. Includes 1-2 words that might be new to most of the audience, but does not define them.	Uses vocabulary appropriate for the audience. Does not include any vocabulary that might be new to the audience.	Uses several (5 or more) words or phrases that are not understood by the audience.

Alignment with Standards

The Arizona Standards I use are aligned in my unit. I will incorporate the ELA standards for writing to be used with the expository writing the students will be assigned. The speaking and listening standards will be used with the presentations parts of the heart and lung unit. The Next Gen Standards 3-5 incorporate the grade level for student's skills for science. The Dine

standards are incorporated with the self-reflection and science vocabulary to be used with positivity.

Arizona Science Standards

Writing

3.W.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

- a. Introduce a topic and group related information together; include illustrations when useful to aiding comprehension.
- b. Develop the topic with facts, definitions, and details.
- c. Use linking words and phrases (e.g., also, another, and, more, but) to connect ideas within categories of information.
- d. Provide a concluding statement or section.

Speaking and Listening

3.SL.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly.

- a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.
- b. Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion).
- c. Ask questions to check understanding of information presented, stay on topic, and link their comments to the remarks of others.
- d. Explain their own ideas and understanding based on the discussion.

3.SL.2 Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

3.SL.3 Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.

3.SL.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.

3.SL.5 Create audio recordings of stories or poems that demonstrate fluid reading at an understandable pace; add visual displays when appropriate to emphasize or enhance certain facts or details.

3.SL.6 Speak in complete sentences when appropriate to task and situation in order to provide requested detail or clarification.

Next Gen standards

Students who demonstrate understanding can:

- 3-LS2-1. Construct an argument that some animals form groups that help members survive.
- 3-LS4-1. Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.
- 3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all
- 3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

Analyzing and Interpreting Data

Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.

Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS4-1)

Engaging in Argument from Evidence

Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).

Construct an argument with evidence, data, and/or a model. (3-LS2-1)

Construct an argument with evidence. (3-LS4-3)

Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. (3-LS4-4)

Dine standards

Pre K-3rd Diné Character Building Standards

Concept 1 I will develop and apply critical thinking to establish relationships with the environment.

Concept 3 I will have self-respect.

Resources

Teacher Background Reading- Teachers will build their back ground with more of the affects of heart and the lungs. Also add the last article to help build strategies to keep up with teaching strategies for students today.

Alonzo, A., Contreras, O., Gieszl, S., & Gouge C. (2016) The 2016 Arizona Asthma Burden Report. Retrieved from <https://azdhs.gov/documents/prevention/tobacco-chronic-disease/az-asthma-burden-report.pdf>

Ballard, M., Gray, M., Reilly, J., & Noggle, M. (2009). Correlates of video game screen time among males: Body mass, physical activity, and other media use. *Eating Behaviors*, 10(3), 161–167. <https://doi.org/10.1016/j.eatbeh.2009.05.001>

Lombardi, M., (2007), 1st ed. *Authentic Learning for the 21st Century: An Overview*, [ebook], retrieved from <https://library.educause.edu/-/media/files/library/2007/1/eli3009-pdf.pdf>

Student Reading- Students will need this to learn about how build their background knowledge and draw their diagrams. Students will not read all of scholarly articles but just two paragraphs discussing the affects of video screen time along with eating behaviors.

“Your Lungs & Respiratory System (for Kids) - KidsHealth.” *Kidshealth.Org*, 2018, kidshealth.org/en/kids/lungs.html?ref=search.

“Your Heart & Circulatory System (for Kids) - KidsHealth.” *Kidshealth.Org*, 2018, kidshealth.org/en/kids/heart.html.

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