

Forest and Climate Change

Nahadzaan bikaá'ii Lah anahooniil doo Tsin Tah: Nihima nahasdzaan doo La'
“Naahadloodah”

Climate Change and the Forest: There is no Planet “B”

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2021

Author Note:

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Introduction

This curriculum unit will focus on science subjects that will introduce, create an understanding for, and enlighten my students about climate change and forests. My topic will discuss how local and worldwide forests affect climate change. This topic will scaffold from learning about what climate change is to creating a presentation that explains how to help mitigate climate change and help forestry. As an introduction, students will read about the history of the forests with a focus on the Navajo Nation forests. They will learn who, what, when, where and how they are being maintained through their own research. After they learn about the forests, they will learn how the forest affects the climate and what the changing climate has done to the local community. After learning about the effects, they will think about what they can do to help make positive changes to their community and the world. With all the research that has been gathered, students will create a science project that will show how they can create an environment that will be beneficial to their community. The projects could be about solar/wind energy or information about the weather and climate.

Context

Demographic Information

Chinle, Arizona is a small town located in the central part of Navajo Nation. The estimated population is 4,879 people (*Census Profile: Chinle, AZ*, n.d.). Chinle is a tourist town located near the Canyon DeChelly National Monument. Every day, travelers from all over the world come to this small town to see the famous Canyon DeChelly. Chinle has businesses and community services such as hotels, restaurants, convenience stores with gas stations, a grocery store, a bank, a police station, a hospital, apartments, an office of the Arizona Department of Transportation, and local public schools.

In Chinle, there are five state public schools. There are also two bordering communities that Chinle Unified School District oversees, which are also public state schools. This year, Chinle Unified School District opened their seventh school called Hozho Academy for online schooling due to COVID19. The elementary schools in our district are Mesa View Elementary, Chinle Elementary and Canyon DeChelly Elementary. There is one junior high school and one high school. The district also has two other schools located in nearby towns. These schools are in Many Farms and Tsaile and educate kindergarten to eighth grade students. While each school population, estimated at 3,600 students, includes children of different nationalities, a majority of them are Navajo (*Chinle Unified School District #24*, n.d.). Students attend Chinle Unified School District from neighboring communities like Many Farms, Tsaile, Lukachukai, Wheatfields, Nazlini, Cottonwood, and Blue Gap. We have students who get up as early as five in the morning to come to school and stay on campus until six in the evening to participate in sports and other afterschool programs. School buses travel over 6,200 miles each day on their routes to pick up and deliver students safely to and from schools (*Chinle Unified School District #24*, n.d.).

As previously mentioned, Chinle is a tourist town surrounded by sandstone canyons of the national monument, Canyon DeChelly. According to a soil survey done by the United States

Department of Agriculture, Chinle soil is composed of different layers which is called the Chinle Formation and parts of the forest here are petrified. There are buttes, hills and mesas that contain the Chinle Formation soil. Erosion has sculpted and shaped the landforms in Chinle.

In Navajo, Chinle is called Ch'inili, meaning, "Water flowing out." There is a water flow that comes out from Canyon DeChelly and from another community called Naazlini, which means "Water Flowing Here and There."

The vegetation in Chinle consists of sage, tumbleweed, and cottonwood trees. The cottonwood comes from the Canyon DeChelly area. There are not many trees in Chinle due to the soil quality. In the area where the residents live, the soil is mostly clay, making it hard for many things to grow. Part of this curriculum will challenge students to think about how they can make the soil in their communities better.

I have taught at Canyon DeChelly Elementary for eleven years as a Navajo Studies/Culture teacher for kindergarten to sixth grade. We still use the same eight-unit curriculum as we did when I began teaching. Every year prior to the changes made by the pandemic, we were given the chance to collaborate with other Navajo culture and language teachers in the district to add and discuss changes we would like to make to the curricula. The eight units in the curriculum touch on Navajo traditional clans, the Navajo hogan, Navajo traditional clothing, Navajo rug weaving, Navajo winter stories and recreation, Navajo traditional food, Navajo arts and crafts, and Navajo history and government. Each of these units have distinct, formative assessments that were created by the teachers. The students are given a pre and post-test that aligns with the units. In each of the units, individual teachers are able to create new resources for their students.

Our students at Chinle Unified School District are a mixture of different nationalities. About 90% are full or part Navajo. Our students are raised in a mixture of cultures and are most influenced by Western society. As the Navajo culture teacher, I have found that a handful of students in each class are being taught Navajo language and culture at home. Students who understand and do well in this content come from homes where the language and culture are practiced. I have students who seek to learn more and thrive in the language and culture lessons.

I have found that we have students who have different learning styles which causes our teachers to teach in differentiated styles. The school district has adopted the Beyond Textbook, which gives resources that fall outside of a normal textbook instruction style. We are also encouraged to create resources that will meet the Arizona Standards. There are no textbook style resources for teaching the Navajo culture, which gives me the opportunity to teach the Navajo culture in the ways I see fit.

Rationale

The overall school curriculum prioritizes English reading and math as the main subjects of focus and other subjects like science do not get the time needed to teach students sufficiently. With this curriculum, I will be able to incorporate several standards. The Arizona State Standards of Science will be one of the main standards to be addressed. The fourth-grade students take Arizona State assessment on science. In previous years, teachers kept up with the science content

and incorporated it into the reading and math contents and the scores of those assessments were high. By implementing this into the Navajo Studies that I teach, I will help students with the science standards.

According to a *US News* article about the test scores for Chinle Unified School District,

25% of elementary students tested at or above the proficient level for reading, and 34% tested at or above that level for math. Also, 22% of middle school students tested at or above the proficient level for reading, and 30% tested at or above that level for math. And 16% of high school students tested at or above the proficient level for reading, and 24% tested at or above that level for math

(<https://www.usnews.com/education/k12/arizona/districts/chinle-unified-district-4158-105611>).

These scores and resulting percentages are from before the Covid-19 pandemic. There is no data on current test scores for science due to the pandemic. As previously stated, teachers mainly focused on reading and math during virtual, online lessons. In this upcoming school year, we would like to incorporate other subjects with reading and math. In the article, *Diné Kinship as a framework for conserving Native tree species in climate change*, researchers created different simulations that help us understand how Indigenous knowledge can help to improve modern science in sustaining natural resources and livelihoods (Yazzie et al., 2019). Explaining scenarios like this to teachers and students would help in bridging the different contents that need to be taught in the school system. The students would be getting cultural knowledge along-side learning about science, reading, and math terms.

A part of the culture of the Navajo people is to develop self-awareness, to have the ability to think things through, to make solid plans, to implement those plans and finally to re-evaluate how the process went before repeating the cycle. In Navajo we call this Nitsahakees, Nahat'a, Iina and Siihasin. In everything we do, this is our philosophy. When all combined, it is called Sa'ah Naaghai Bik'e Hozhoon, "the natural order of life and as the way of the Holy People" (Benally, 1994).

In his paper, Herbert Benally explains the philosophy of Navajo teaching as a way to live in harmony with the universe. He writes:

Because we view ourselves as Holy People, the way of *Sa'ah Naaghai Bik'eh Hozhoon* becomes our way as well. Learning then, is the internalization of the principles of *Hozhoogo Iina*, the way of happiness. By embracing these teachings of *Sa'ah Naaghai Bik'eh Hozhoon*, we evolve into our true selves. In this respect, we Navajo must be taught the Navajo way of life to become fully functioning beings. Many ceremonial prayers reaffirm this concept of harmony (Benally, 1994).

Having the knowledge of *Sa'ah Naaghai Bik'eh Hozhoon*, brings all it together, developing the proper development of the mind, giving one the skills that will enable survival, an understanding and appreciation of positive relationships and an understanding of one's home and environment.

Content Objective

In this curriculum, I would like to see my students develop an understanding of *Sa'ah Naaghai Bik'eh Hozhoon* and how it ties into helping the forest and to mitigate climate change.

According to Einbender-Velez and LeGrand's article, *Navajo Forestry Faces a Cultural Challenge*, Navajo Nation faces several challenges that deal with the Navajo Nation Forest. At the time this paper was published, the Navajo population was increasing which also increased the need for timber so that people could make traditional Navajo homes. These homes, called hogans, are an eight-sided octagonal shelter. According to Einbender-Velez's article, as the population increased and the way of life modernized, more Navajos went into the forest to cut down trees to make their homes. This also opened up previously uninhabited areas, causing the forest to be overgrazed, the degradation of lakes and streams and worsened erosion. This also affected cultural land use and resource availability. I will address findings like this with my students so they will know that these resources are an important part of their culture. I will also explain how situations can have a cause and effect.

Einbender-Velez emphasizes the necessity of having a mutual respect with nature stating, "Traditional Navajos have a deep spiritual bond with the forest and view the natural environment as parent and provider. Humans, as the children of that natural world, must respect and learn from it – or it will cease to provide for their needs" (Einbender-Velez, 1993). By providing students with the information about the importance of their environment and how to care for it, they will begin to gain respect and make their own impact by helping to make their environment better.

The ancestors of the Navajo people began their teaching at home. Many of these teachings were through storytelling and being shown how to do life skills. In this curriculum, students will use those skills to learn about their environment. They will ask their elders questions to compare and contrast the environment from the past to present. In the article, *Bringing Navajo Storytelling Practices into Schools: The Importance of Maintaining Cultural Integrity*, Eder states that the Navajo people use storytelling as a way to teach the importance principles of life and that this entails honoring relationships and having a moral responsibility to one's self and others as well to the environment (Eder, 2007). The stories that are told help the learner form a bridge between the past and the present to solve ways to better the future. Navajo teaching allows students to formulate ideas based on their own experience and perspectives.

Navajo children need to be educated about the environment and how they can help the Earth. According to Sheffield and Landrigan, "we summarize children's vulnerability to climate-related environmental hazards, emphasizing that the disproportionate impacts will exacerbate existing issues of environmental justice" (Sheffield & Landrigan, 2011). Children are influenced by things from the past and they need to know how they can help increase their chances at having better health by adapting to the environmental changes in the future. Sheffield and Landrigan also explain that, "the impacts of climate change on children are not evenly distributed globally, but instead occur in parts of the world already experiencing a higher relative disease burden, namely, in low-income countries" (Sheffield & Landrigan, 2011). The history of Navajo people shows extensive trauma from broken treaty promises and the attempt by the U.S. government to

assimilate by being forced to a reservation outside their homeland. Upon returning to Navajo lands, our ancestors had to abide by the new regulations in order to live on their homeland. As they began to flourish, they then had to deal with livestock reduction and with having minerals taken from their homeland. Resources like water is still taken from us while some Navajo families do not have water for their own. This makes Navajo children vulnerable to environmental hazards and increases the need for our students to be educated on climate change. Having knowledge about how to exist in harmony with the environment will be necessary for their survival and well-being.

Teaching Strategies

At Chinle Unified School District we have adopted the *Beyond Textbook* from Vail School District. With adopting *Beyond Textbook* as our curriculum, we were also guided into a program called TAP, or Teacher Advancement Placement Program, through the National Institute for Excellence in Teaching (NIET). This program taught us how to look beyond a regular textbook and to evaluate our teaching and to get support from colleagues who will guide us to present and effective instruction to our students. The resources that we learn are implemented into our course content. The evaluation has different domains that has us affirm and refine how we can strengthen our instruction so students can master the standards we teach. *Beyond Textbook* does not have resources for Navajo Culture and Language, but we have been given the opportunity to create our own resources. Through NIET, we have learned different strategies like using the Gradual Release Model, FARG, DICE, and other strategies that were field tested and can be used in our instruction. We have taken these strategies and models and have incorporated them into our content.

For this curriculum, I plan on using the Gradual Release Model (GR) to teach about climate change and forests. The Gradual Release Model has four steps of responsibility. First we do modeling (I do), second we work on co-construction (we do), third is facilitation (you do), and fourth we have independent practice (you do). This strategy transfers responsibility of the learning process from teacher to the students. The Gradual Release model has effective teaching such as small group instruction, differentiated instruction, and intervention. For this curriculum I will be using the Gradual Release Model.

In the beginning of this curriculum as part of my modeling, students will be introduced to science terms. I anticipate that they will need a refresher on the terms and concepts that are used in science. I want to introduce the terms climate change and forest at the beginning of the lesson as it is not a common topic that students are exposed to. As they begin learning about these topics, they will be encouraged to do their own research and they will take ownership of the topics. The Gradual Release Model's framework is to move from teacher knowledge to student understanding by applying that knowledge. Students will then do their research and collect information about their environment. They may work in groups. I will guide them with questions to demonstrate that they should ask questions to find the information they need. At the end, students will then present their projects to show their understanding of these topics.

When students are creating their projects, I would like them to use the scientific method. I would like them to choose either a topic or a question to identify a problem for their research and to see

where they can find solutions to that problem. I want my students to figure out the best solutions that will help with climate change and how the forest can help us. In using the scientific method, I want my students to be able to focus on the scientific evidence and not be influenced by opinions of what might be best for climate change and forests. They will have facts that will be beneficial to their findings.

Several other strategies I want my students to use is hands-on learning/context-based learning, and storytelling. Students will ask their elders about how the surrounding area used to be and how they have adapted to the environment when things changed. They will do a “Go Green” week where they will learn hands-on why environmental sustainability (what I call “going green”) is important. Students will use graphic organizers and have instructional conversations about their findings. I will provide my students with anchor charts and multimedia that will help explain what climate change is and how the forest contributes to this topic.

Classroom Activities

For this curriculum, I want to incorporate new activities for the Chinle Unified School District’s Navajo Culture curriculum on the topic “Navajo Traditional Winter Stories and Recreation” for my fifth grade students. Each of the activities will be aligned with the Chinle Unified School District’s Navajo curriculum. In this unit, I will teach my students about traditional survival skills and my goal is to make it meaningful for them. The main objective of this unit is that students will be able to identify and recognize the types of natural resources used for Diné traditional survival skills. Students will also be able to learn about the history of the Navajo People and how they survived using the environment and how they can help save the environment. Through this curriculum, I would like my students to learn that traditional values help make the environment better. Activities throughout these lessons will scaffold on each other with each activity having a sub-objective to the main objective.

Navajo traditional teachings are passed from generation to generation. One of the biggest traditional values is having kinship, K’e. K’e. In Navajo culture this means having a relationship with not just people, but with animals and the environment. This involves having respect for all living things. These traditional teachings were verbally taught and this gives these lessons a unique tone. These teachings are meant to teach Navajo children how to develop the principles needed to live well. This unit will remind students to express those principles.

The objective of the first activity is for students to develop and apply critical thinking to traditional life skills to establish relationships with the environment. Students will get an introduction in forestry and climate change. First, they will be asked to describe in their own words what forest and climate change mean to them. The teacher will find researched material about forests and climate change and present the topics through PowerPoint and through the use of YouTube videos. For the students to successfully master the main objective, they will be given the following success criteria that will be reminded with each of the activities. The success criteria are the following: 1) understand what climate change and a forest is; 2) explain what climate change is and how it affects the forest; 3) create a plan to implement going “green” at home; 4) gather information from relatives about how the Navajo People use the forest; and 5) create a science project that will either inform the public or create a solution to climate change.

To show mastery of the first activity by showing what a forest and climate change is, students will create a “Carbon Footprint” activity. They will do this by creating a footprint of their foot to explain how they cause greenhouse gas emissions in their own lives. They will then be asked to come up with solutions that show how using traditional life skills can help to reduce their emissions.

After introducing the subject through PowerPoint and by watching YouTube videos, I will introduce environmental strategies that can help our community reduce climate change. The objective of this activity will be for students to identify “Go Green” strategies and explain how these will be beneficial to our community and the entire world. Students will watch a video called, “Climate Change on the Navajo Reservation.” It will give insight on how climate change has affected parts of the Navajo Nation.

The success criteria for this activity is: 1) understand and explain what climate change is; 2) identify what “Go Green” is and what strategies there are to “Go Green;” 3) create a chart that will help keep track of the types of strategies to do each day for the week; and 4) share the findings of their strategies with their peers. These strategies will be activities where students will use building skills that create critical thinking and collaboration and they will apply what they learn to create a sustainable lifestyle.

Students will have a week of activities based on how they can help slow climate change at home. Each of these activities will be introduced with an introductory PowerPoint. They will be shown what each activity should look like and they will have a log where they will document what they did for each activity. Students will share their findings in class about the success of their at home “Go Green” activities. Students will turn in their logs for grading.

The first activity done at home will be to teach students to respect the outdoors. This will be something simple like planting a small garden or setting up a bird feeder. The idea behind this activity is to get students to become aware of their surroundings and to get them to discuss the plants and animals they see and why it is important to protect these habitats. The second activity will teach students about recycling. Students will need to understand what items can be easily recycled in our community and begin recycling these items with their family. They will be mindful of the rules for what can and can not be recycled. The third activity is to teach students how to make their own water. Students will learn about how bottled water is expensive and harmful to the environment. They will also learn that filtering their tap water is more economical and better for the environment. The fourth activity will be to teach students about cleaning up their environment. Students will do a clean-up around their house or grandparent’s house. I will also try to organize a clean-up at the school or a nearby business area as a clean-up activity for the group. The fifth activity will be to teach students about going “Green.” Students will learn about what items in their home like water or firewood could be used less and make a log about how they went green and what alternative route they took.

When students have completed their “Go Green” week, they will identify traditional survival skills of the Navajo People that involve forestry. The objective for this will be for students to identify and explain how the Navajo forest is used in sustaining traditional survival skills. The success criteria for this are the following: 1) identify the types of forest located on the Navajo

Reservation; 2) identify the types of trees that grow in the forest and how they are utilized in Navajo culture; 3) have a discussion about how their family utilizes wood from the forest and how it is beneficial to them; and 4) create a project.

Students will read an article called, “The Values and Uses of the Navajo Forest,” by Virginia R. Yazzie. They will highlight and take notes about where certain types of trees grow in the forest and how the forest is utilized. Students will create a small project by choosing a tree to describe and to think about how this tree has been used traditionally by the Navajo People. While reading this article, the teacher will show a PowerPoint that has visuals of what Yazzie describes. Further details about each use of the forest will also be listed in the PowerPoint. The teacher will also suggest ways that the forest can be protected and utilized.

In the next part of this curriculum, students will create a science project about how the forest can help their community by mitigating climate change by reducing greenhouse gas in the atmosphere. They will be introduced to several topics about how the forest can benefit their community and they will review how Navajo people use the forest. Students will interview and record findings from their parents and grandparents and will compare and contrast their environment. Some of the subtopics they will learn in this lesson are how the forest gives clean air, how forests are a source of nutrients, the benefits of shade from a tree, how trees are a source for dyes and pigments, and how trees form windbreaks. These topics will help get students to think about how they can help their communities by educating others about the benefits of forests and how we can protect them. Students will be encouraged to research other topics that align with the goal of this activity.

I predict that this curriculum unit will take at least three weeks and will consist of teacher introductions using PowerPoints and videos and presentations from community members and people of the Navajo Nation. There will be three projects that students will turn in that will be measured by rubrics and assessment given by the teacher.

Student Assessment Plan

After each step of each activity, there will be exit tickets, assignments to be turned in, summaries conducted, and a rubric for the scientific method and their final project. For the first activity, the assignment will be for students to answer questions about what they learned about climate change and forests. Students will also create a flow chart on this process using the Carbon Footprint activity.

In the second activity, students will create a poster that will explain how the Navajo people have depended on the forest for their survival and give information about what types of trees grow in the Navajo Nation and how they are utilized. The poster will be graded using a rubric scale.

For the science project, students will also be graded using a rubric system. The rubric will be graded on the scientific method and how their investigation was completed and extra points will be given if there is evidence that the student went further in their investigation.

Alignment with Standards

This unit will utilize the Arizona State Standards for World and Native Languages, the Navajo Nation Standards, and the Arizona State Standards for Science. Some strategies I will include in this unit are hands-on learning, critical thinking that incorporates math, reading, writing, and art as well the scientific method, Science Facts Triangle, Mind Map, Reading Frames, Issues, Evidence and You, Science Logs, and Questioning Students to Engage in Inquiry.

The Arizona state standard that aligns with this curriculum is Earth and Space Science_E1: The composition of the Earth and its atmosphere and the natural and human processes occurring within them shape the Earth's surface and its climate.

The standard from the Arizona World Native Languages Standard that will be addressed comes from the section "Cultures: Use the target language to investigate, explain, and reflect on the relationship between the practices, products, and perspectives of cultures studied." The student can: participate in age-appropriate and culturally authentic activities such as celebrations, songs, games, and dances and recognize products of culture (e.g., food, shelter, clothing, transportation, toys). The other standards that ties in with this curriculum is "Connection: build, reinforce, and expand knowledge of other content areas and evaluate information and diverse perspectives while using the target language to develop critical thinking and creative problem solving." Through this, the student can identify and use familiar vocabulary and phrases in the target language supported by resources (e.g., maps, graphs, visuals, audio, digital media) to reinforce prior knowledge and make connections to new knowledge of familiar topics in other content areas (e.g., geography, history, arts, math, science).

From the Navajo Nation Standards I will be using the standard, I will develop and apply critical thinking to establish relationships with the environment. Concept 4: I will express gratitude in everything, PO 4. I will practice life skills from my relatives.

Resources

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