

The History of Safe Drinking Water:

Its Influence on Self-Identity

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Abstract

## THE HISTORY OF SAFE DRINKING WATER

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This thematic curriculum unit is centered around the Safe Drinking Water Act of 1974 and is in compliance with the criteria provided by the DINE Institute of 2019 sponsored by Northern Arizona University. The activities in this unit explore the history and accessibility of safe drinking water on the Navajo reservation located in Northern Arizona. It provides recommendations for instructing students in researching and presenting information relevant to the issue of high rates of contaminated water.

### Context

Chilchinbeto, Arizona is the small rural community that I teach in. It is located in the northeastern area of the Navajo reservation, about twenty-five miles southeast of Kayenta. The public community organizations consist of the Chilchinbeto Community School, the Chilchinbeto Chapter House, and the Canyonlands Healthcare Clinic. There are no established local businesses, like a gas station or grocery store within the area. The nearest ones are located about twenty-five miles away. According to a community assessment report conducted by J.B. Kinlacheeny under the Chilchinbeto Chapter in 2016, the population of the Chilchinbeto community is at 839. In terms of home resources, 63% of residents have access to running water, 72% of homes have electricity, and 20% have an internet connection.

Chilchinbeto Community School, where I teach at, serves students grades Kindergarten through eighth. There is only one class for each grade level. On average, the student to teacher ratio is twenty to one. An average of 120 to 140 students, whom are predominantly of Navajo descent, are enrolled at Chilchinbeto Community School (CCS) during the regular school year. As of 2016, twenty-one students were Exceptional Student Service learners and 37 were English Language Learners. While teaching at Chilchinbeto Community School, I have taught seventh

and eighth grade combined for the past three years, but this year, I am only teaching eighth grade. Most of the students currently enrolled in my class, were in my class last year, so I already have an established relationship with them.

Considering that I have some history with my students, I recognize that their academic performance level averages are at and above below level in both Math and Reading. According to the Northwest Evaluation Association data, only one student per subject, in Math and Reading met the proficient performance level in the entire school, and most students scored within the below and approaches performance level range. Being familiar with most of my students' learning styles allows me to modify for their needs by implementing methods devised through structured communication, written and oral instruction, differentiation, and language transitions in English and Navajo.

### Rationale

#### *What is Water?*

Water is scientifically described as H<sub>2</sub>O, which is the chemical composition of elements, meaning that each water molecule is made up of two hydrogen atoms and one oxygen atom (National Library of Medicine, n.d.). Scientifically speaking, water has three forms: a liquid, where it is known as water, a solid, where it is known as ice, and a gas, where it is called vapor. Water is not known to change its chemical composition when it changes form, but its density does (National Library of Medicine, n.d.)

In the Navajo language, water is called *tó*. There is a popular phrase, "*Tó éí iiná*" or "*Tó béé iiná*," meaning that water is life. Navajo culture encompasses the belief that each living

being is made of water, so we should respect and protect water as something sacred. Water is used to identify many clan groups, as well, which is a matriarchal system of self-identity that originated with the creation of the Navajo people. Each clan group's name has a story, and they often portray an establishment or adoption of customs by that clan. Another example of the significance of water is that Female Rain and Male Rain are water entities. They both provide sustenance for the land, but Female Rain takes form as a calm drizzle and Male Rain is a harsh storm. One of the most important deities in Navajo culture, along with his twin brother, is Tó Bájishchíní, meaning the Son of Water. His twin brother is known as Naayéé' Neezghání, the Monster Slayer. According to Navajo mythology, they freed the Navajo from a life stricken with fear by defeating many monsters that symbolized the evils faced by mankind. Several evils were left alive because they were deemed necessary to teach the Navajo valuable life lessons. The legend of the Twin Warriors portrays the bravery and willingness to sacrifice, which is what our ancestors hoped that our people would inherit. The essence of good and bad presence in Navajo traditional culture must be the reason why human beings must live with the ever-present threats to their life sources, like safe drinking water.

*Why is Safe Drinking Water a Relevant Issue?*

There is the physical appearance of water being clean or dirty, and also the water's quality, meaning it can either be safe or poisonous. Poisonous water, however, does not always coincide with filthy-looking water, and this has created a hazardous predicament for the Navajo people. Residents of the Navajo reservation have been struggling with the consequences of their water quality since settlers arrived in the southwestern region of North America. Retaining a deep understanding of the reverence we should have for the basic sustenance that water provides us is a lesson I want to instill in my students.

Our ancestors endured the relocation effort known as the Long Walk, and seemed to have succumbed to the treachery that could have been our undoing, but they signed the Treaty of 1868 with the federal government in an effort to give future generations the opportunity to learn about Anglo philosophy and use it as a device to take back our land. As a consequence of overturning power of the land to settlers, 1,500 wells on Navajo land have been poisoned, mostly by means of mining for uranium.

Across the United States, about 99% of citizens have access to running water in their homes, but across the Navajo Nation, about 40% of citizens do not have this access, and that amounts to tens of thousands of people across the 27,413-square mile reservation (VICE News, 2015). It was expected that our people would struggle for some time after agreeing to the terms of the treaty, but it was always meant to be temporary, and our children have to be reminded of that because it has already been over 150 years since our ancestors signed the agreement. The lack of infrastructure among the Navajo people has persisted for much too long, and our education system has finally resisted the boarding school mantra to “kill the Indian, save the man,” (nativepartnership.org, n.d., Bear, 2008) and is recognizing that our traditional values and native language need to be preserved, so we need to take these advantages and educate our children that they have the power to change the social construct behind our lack of accessibility to safe drinking water.

According to the Navajo Nation Safe Drinking Water Act, §2531. *Primary Drinking Water Regulations*, “the [Executive] Director [of the Navajo Nation Environmental Protection Agency or his/her designee] may prescribe by regulation the maximum permissible levels for contaminants in all public water systems on the Navajo Nation. These regulations shall govern monitoring and reporting of the water quality of all public water systems, and shall be at least as

stringent as federal regulations promulgated pursuant to the SDWA or, with respect to quality control and testing procedures, as stringent as the alternative procedures published by the Administrator as guidance pursuant to SDWA '1401(1), 42 U.S.C. '300f(1) (navajopublicwater.org, 2012).” This implicates that there are allowable levels of contaminants in our so-called safe drinking water, and these regulations are compliant with the law across the United States.

“In passing the Safe Drinking Water Act in 1974, members of Congress thought they had set in action a program to establish ceilings on the allowable levels of all serious contaminants entering drinking water supplies and a program of water monitoring to ensure that tap water was safe. But “the Act has failed miserably” according to Sen. Dave Durenberger, who chairs the subcommittee on toxic substances and environmental oversight.” The Safe Drinking Water Act only set standards for 23 contaminants, but in 1986, the Environmental Protection Agency introduced amendments to the Act that added 83 additional contaminants to the list. The downside to these amendments, however, was that they had no regulations on mixed toxins (Raloff, 1986). This means that any set of federal or tribal statutes can never fully produce a range of regulations than can keep us safe from consuming contaminants, especially in a world where toxins are naturally and technologically constructed, but at least the Safe Drinking Water Act does provide some standards that provide a basic level of drinking water safety.

Additionally, the Navajo Nation has its own Navajo Nation Environmental Protection Agency (NNEPA). The NNEPA applied for Treatment as States, and received approval from the EPA to have “primacy,” meaning they have primary authority to implement both federal and Navajo Nation standards under programs and laws where they are TAS approved and, in some cases, where they have primacy (Grant, 2007). Treatment as States, according to EPA, means that:

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Several federal environmental laws authorize EPA to treat eligible federally recognized Indian tribes in a similar manner as a state (TAS) for implementing and managing certain environmental programs. The Clean Air Act (CAA), Clean Water Act (CWA), and Safe Drinking Water Act (SDWA) expressly provide the authority for Indian tribes to play essentially the same role in Indian country that states do within state lands (Environmental Protection Agency, Treatment as a State, 2018).

The Navajo Nation received TAS authority and primacy in regard to the Safe Drinking Water Act on October 23, 2000, to become effective December 6, 2000 (Grant, 2007). The NNEPA established the Navajo Nation Safe Drinking Water Act in 1995, and first amended it in 2001, and then again in 2012 (Navajo Public Water, 2019). Authority under the Safe Drinking Water Act and associated federal rules and regulations means that the Navajo Nation is able to regulate Public Water Systems (PWS), such as those in schools and government buildings (Grant, 2007). There are over 200 public water systems within the Navajo Nation, and the NNEPA Public Water System program regulates approximately 160 of them. That means that some are not regulated by the NNEPA. That fact, and as noted above, the fact that the Safe Drinking Water Act only regulates certain substances in drinking water, means that we can't claim that our water is absolutely clean and free of toxins. This distinction about what clean and safe drinking water actually means, is something that I want students to understand and learn about from this unit.

### Content Objectives

My thematic unit will follow Arizona State Standards and Dinè Language and Cultural Standards in the subjects of social studies, science, English language arts, and Navajo language and culture. The Arizona State Standards and Diné Content Standards will be taught through interdisciplinary activities and methods.

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In the content area of social studies, students need to understand that modern interests and perspectives of land and water use have been heavily influenced by Anglo philosophy and patriarchal/self-advancing practices. I don't want to sway students to view it as a negative aspect of the modern world, but rather to substantiate the two parts that make up the contemporary and traditional world that they construct. The contemporary aspect defines the governmental policy-making and civic pursuits in history that apply to their homeland and their access to safe drinking water. The traditional aspect embraces matriarchal values and perceptual endearment towards nature and self-sustainment. The traditional aspect of their learning process will be attained throughout their research, and is the ultimate goal of the lesson.

To offset a bias perception toward either aspect, students must understand that geographic and environmental factors also influence a community's availability and accessibility to resources. An understanding of natural competitiveness among living beings is critical to developing an understanding of the outcomes governmental policy-making and civic pursuits.

Students will learn that the location and infrastructure of their homeland is a huge factor of the availability and accessibility of safe drinking water, and those are factors that aren't necessarily shaped solely by humans. According to the article, "Is an Exemption from U.S. Groundwater regulations a Loophole or a Noose?"

*In the United States, the Safe Drinking Water act (SDWA regulates most groundwater used for drinking. The Act covers most urban areas but because it does not cover small water systems, it implicitly exempts nearly half of those living in rural America... The outcome is that those outside of the SDWA's protections remain outside and continue to*



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*drink contaminated water by the glass full. So, while congress created a loophole, it may have inadvertently tied a noose* (Daniels, Weinthal, & Hudson. 2008).

In the content area of science, students must understand that identifying and solving a problem is a multi-step process, and that it could take several attempts to unfold a problem and mitigate a solution. I believe my students have a grasp on this concept because most of them have been familiarized with the Scientific Method and Engineering Design Process. The Navajo Cultural Paradigm, however, will introduce the concept that our personal critical-thinking processes inexplicably relate to these formally established strategies. This will also be the first time they analyze an environmentally relevant issue in depth. Students will need to tap into a mode of self-realization that they may have never tried to access or articulate before, and mold it into words that they can share with others. That is an elevated level of investigation and communication that will be challenging for some to accomplish, but the implementation of differentiated teaching strategies will aid in meeting the content objectives.

In the content area of English Language Arts, students must understand that they are essentially telling their stories through shared experiences and knowledge, so they have to have a focused tone, purpose, and audience in mind. They have to support their comprehension and findings with textual evidence and respectfully honor their sources of information because they are documenting history and potentially influencing the perspectives and interests of their readers. The documentation and presentation of their writing process will also implicate their problem-solving knowledge.

Last, but not least, in the content of Navajo Language and Culture, students must understand that this lesson requires a certain amount of reverence for Navajo traditional

teachings. Several of my students speak and understand a certain amount of the Navajo language, but even though they are not teased for it, they are not entirely comfortable with speaking it openly. This lesson will hopefully encourage students to develop their Navajo language skills and to recognize that their native language possesses relevance in their education.

### Teaching Strategies

#### *Flexible Ability Groups*

A substantial portion of my instruction will follow the *I do, We do, and You do* model because it is effective in demonstrating skills to most learners. Arranging students in flexible ability groups during the *We do* stage of the learning process will effectuate the practice skills and produce work. It will also allow for students to develop their efficacy in various group settings, which will link to their understanding of societal and individual roles in creating and solving a problem.

#### *Inquiry-Based Instruction*

Students will engage in inquiry-based instruction when presented with precursory questions about their thoughts on water and a survey about their access to safe drinking water. Students will share their opinions and experiences with their peers to formulate an understanding of the situational context of the lesson. The Navajo Cultural Paradigm will also be implemented during this stage of informational processing. The Navajo Cultural Paradigm is a cyclical critical-thinking process that mirrors components of the Engineering Design Process and implements Navajo traditional philosophy. The Navajo paradigm envelopes the traditional pedagogy of *nitsahakees* (thinking), *nahat'a* (planning), *iina* (life), and *sihasin* (reflection). The

implementation of the introductory questionnaire, personal survey, and filtering cycle of the paradigm will help students organize relevant knowledge and identify the problem being analyzed.

### *Visualization*

The objective of this thematic unit is to research and apply the knowledge of federal statutes and personally beneficial standards of safe drinking water within one's own community. Students will be educated about safe drinking water in terms that the government provides for them and in the traditional beliefs and practices that have sustained their elders, so that they can comprehend the real-life subsistence of accessibility issues.

### *Cooperative Learning*

Students will engage in individual, small group, and whole class activities to practice skills and develop an understanding of the content objectives. Some individually performed activities will include creating diagrams, formulating interview questions, and presenting results. Some small group projects will include creating models, and possibly, conducting an interview with the help of a translator. Whole class activities will involve discussion, reading or presenting texts, and watching videos or presenters together. These culminating activities will promote the growth and expression of each student's ideas and communication skills.

### *Differentiation*

The expectations of each student's research and presentation will be modified to their capabilities. For example, when creating a model, some students may need to be arranged in small groups and assigned a small, but significant role, instead of being arranged in pairs where

half the responsibility is all theirs. In another instance, students who have more developed communication skills will be required to interview an elder whom speaks only or mostly Navajo, but they will be allowed the help of a translator. The enrichment of that task would be to transcribe the stories as accurately as possible and make essential connections to the content objectives.

The teacher will provide support for students who need help with the research or presentations. This support may include providing access to technology, writing or transcribing information, or reiterating the modified expectations of a product. The final presentation can also be differentiated to fit the needs of each student to achieve success.

### *Implementing Technology in Instruction*

This thematic unit will heavily integrate the use of technology because it is a research-based project. Students' main tool will be their Chromebooks, which is available on an almost individual basis at school. Students will conduct some research, create their presentations on Google Slides, and submit work using their Chromebooks. Other technological applications required in this unit include scientific measures to create models and to conduct tests on water quality. Most importantly, students will use technology to record interviews and other relevant demonstrations, and to present their final results.

### Classroom Activities

The topic of my thematic unit will focus on learning about the history of safe drinking water within their community. As students develop their comprehension of the Safe Drinking Water Act and how the government has played a role in protecting our water sources, or how

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they have abused their power over our water sources, they will explore people's roles of keeping their own water sources safe. This will include researching and experimenting with some at-home practices for purifying water. Students will test the water before and after experimenting with at-home practices and link it to the rates of water-related impacts within their communities, or even across the nation.

Before learning about the Western and Navajo cultural expectations for safe drinking water, students will document their opinions to several opening questions: *What is water quality? What is the difference between safe drinking water and clean water? What does Water is Life mean to you? What does it look like when living organisms consume safe drinking water? What does it look like when living organisms consume unsafe drinking water?* Students will also take a survey about where they get their drinking water from and what they use it for before learning about the Safe Drinking Water Act.

Next, students will develop an understanding of what water is through a scientific and Navajo cultural lens. This will help them understand that on an elemental level, water does not change its form, whether it's safe or unsafe; water is more of a transportation system for other elements. This will connect to their development of understanding how humans and nature interact to create and solve problems.

The science activities will include learning about the water cycle in both a healthy ecosystem and in a chemically infected ecosystem. During this activity students will identify the components of a healthy and unhealthy environment that can either benefit or destroy an ecosystem. Students will create their own water cycle inside of a container with a partner to develop an understanding of how different components interact to put the water cycle in motion.

They will relate the environmental effects to relevant issues occurring within their own communities, and they will use these connections to create interview questions about the sources and practices of drinking water within their own communities.

The vital undertaking of these activities will be to interview knowledgeable elders about the history of safe drinking water within their own communities. Students will ask their elders about their personal experiences with accessibility to safe drinking water and their roles in ensuring that water was safe for consumption. They will also ask about their knowledge of unsafe drinking water and the adverse effects of it. Students will use this information to create an interactive presentation with photos, video, and technological media. Students may even learn about an at-home water-testing procedure from their interview and test it as part of their research, and present the results.

#### Student Assessment Plan

By the end of this thematic curriculum unit, I am confident that my students will have developed their knowledge and perspective of the value of water and its standards for consumption. Their development will be assessed through observational rubrics with a criteria for identifying and mitigating a solution for a relevant environmental issue, conducting and documenting research efforts, and communicating their findings as a means of educating others about the historical and societal importance of their knowledge. Ultimately, I want students to leave this lesson with the perception that overcoming an obstacle has to start somewhere and you may find a solution within your own community, your own family, or even your own experiences.

The research and presentations for each student will be assessed through summative rubrics with a criteria for meeting content standards and objectives. The criteria may be modified to students' individual needs. Written and comprehensional reading products of the unit will be assessed through District Formative Assessments provided by our school's curriculum from Beyond Textbooks. Even with modified criteria for the outcomes of the thematic unit, each student must present their findings in a structured environment, such as a public community meeting.

#### Alignment with Standards

The Arizona State Standards in the subject of Social Studies that my thematic unit plan will align with are:

- 8.SS.C1.03 Analyze the influence of personal interests and perspectives when people address issues and problems in government and civil society.
- 8.SS.C3.01 Describe the impact of political and civic institutions such as political parties, interest groups, elections, and the media in shaping policy.
- 8.SS.H2.03 Explain how geographic and environmental factors shaped communities and how competition over resources have affected government policies.

The Arizona State Standards in the subject of Science that my thematic unit plan will align with are:

- 8.RST.03 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

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- G8.3S.C1.PO2 Analyze possible solutions to address the environmental risks associated with chemicals and biological systems.
- G8.1S.C4.PO5 Communicate the results and conclusions of the investigation.

The Arizona State Standards in the subject of English Language Arts that my thematic unit plan will align with are:

- 8.R.RL.01 Cite the textual evidence that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.
- 8.W.05 With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.

The Department of Diné Education Standard in the subject of Navajo Language and Culture that my thematic unit plan will align with are:

**Concept 1 – Nihidine'é nít'áá' baa náháne'go, nihe'é'ool'jil dóo nihizaad bee hadahodiidzaayígíí baa ákonisin dooleel.**

I will present how Diné people and events have influenced the development of Diné communities and culture to the present day.

**PO 1. Diné kéedahat'jígóó t'áá ákwííjí binaanish ádeil'jil nít'éé'ígíí naashkaah dooleel.**

I will research daily survival skills from the past that influenced the development of my community.

## Resources

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