

EXPLORING STUDENT ENGAGEMENT THROUGH CULTURALLY RESPONSIVE
SCIENCE TEACHING IN ALASKA

by

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of

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ABSTRACT

Alaska Native high school students at Mt. Edgecumbe High School have often reported that science classes feel disconnected from their lives, cultures, and communities. This disconnect can lead to lower engagement, reduced confidence, and difficulty seeing the value of science in everyday life. The purpose of this action research project was to explore whether integrating Alaskan Native culturally responsive teaching methods into tenth-grade Physical Science instruction could increase students' engagement, confidence in learning science, and their sense of relevance and connection to science content.

To investigate this question, culturally responsive teaching methods were incorporated in lessons over a six week instructional semester for students in Physical Science classes (N=101). The methods included place-based examples/phenomena, connections to native subsistence practices, discussions of community issues, and Native elder speakers. Data was collected through student surveys, weekly classroom observations, reflective student work samples, and small group interviews. Quantitative data was analyzed using descriptive statistics, and qualitative responses were coded for patterns related to engagement, confidence, and relevance.

Results from the pre-treatment survey indicate that culturally responsive instruction has a positive influence on students' experiences in science class. Some students, however, provided neutral or minimal responses, suggesting that not all cultural connections were equally impactful for all students and that implementation over time might affect the students' perceptions of how their science identity and cultural identity are connected.

The study shows that culturally responsive teaching can meaningfully improve student engagement and confidence in science classes and help students view science as more relevant to their lives and communities in Alaska. These findings suggest that continued development of culturally responsive science instruction may support stronger science identities and deeper learning experience for Alaska Native students. Future phases of the project could expand data collection, refine instructional practices, and explore how these approaches affect students' academic performance in science.

CHAPTER ONE

INTRODUCTION AND BACKGROUND

Context of the StudyBackground

The purpose of my action research study is to explore the implementation of Alaska Native culturally responsive teaching in my high school Physical Science classes. This study integrated instructional strategies that align with Alaska Native ways of knowing and learning into my curriculum, and then examined how these strategies influence students' engagement, confidence in learning science, and perceptions of the relevance of science in their lives. By integrating traditional Alaskan knowledge systems and culturally meaningful experiences into science education, I aim to bridge the gap between my students' cultural identity and science identity.

As a science educator working with predominantly Alaska Native students, I have observed the disconnect many students experience between their cultural backgrounds and the science curriculum. I believe this disconnection often leads to disengagement, diminished confidence in their ability to succeed in science, and difficulty seeing how science fits into their lives. To address this, I need to implement strategies that allow me to teach science in a way that is both academically rigorous and culturally relevant. This research has helped me better understand how to design lessons that reflect my students' lived experiences, validate their identities, and strengthen their sense of curiosity and belonging in science.

For my students, the significance of this study lies in making science more accessible, meaningful, and connected to their lives. By seeing their culture, values, and community knowledge reflected in the curriculum, students may develop a stronger science identity, greater engagement, and increased confidence in their abilities. Culturally responsive instruction can also empower students to view science not as an abstract subject, but as a practical and valuable tool for understanding and engaging with their environment and community.

Beyond my classroom, this study holds potential significance for other educators who seek to more effectively support culturally diverse learners. By documenting practical methods and student experiences, this research can inform professional development and curriculum planning. On a broader scale, it contributes to the growing field of culturally responsive science education by emphasizing the importance of teaching practices that recognize the cultural assets students bring to learning and that promote equity, engagement, and representation in science.

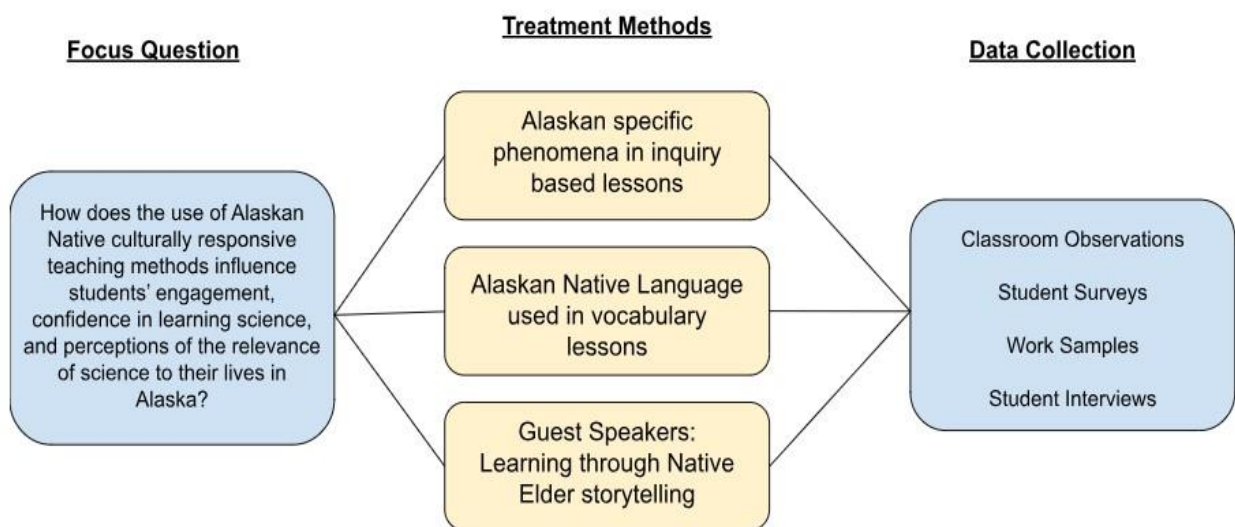


Figure 1: Action Research Project Chart: Overview of Focus Question, Treatment Methods, and Data Collection Methods to be Used.

Purpose Statement

The purpose of this study is to examine how integrating Alaska Native cultural knowledge, place-based examples, and community-relevant issues into Physical Science instruction impacts students' engagement, confidence, and perceived relevance of science. This research is guided by the following investigable questions:

1. How do Alaska Native culturally responsive teaching methods influence students' engagement in high school Physical Science?
2. In what ways do culturally responsive teaching methods impact students' confidence in understanding and applying science concepts?
3. How do culturally responsive teaching methods shape students' perceptions of the relevance of science to their lives, futures, and communities in Alaska?
4. (Additional) How will the results of this research impact me as a teacher in rural Alaska?

These questions strike a balance between conceptual significance and research feasibility. They focus on measurable aspects of student experience (engagement, confidence, and perceived relevance) while allowing for the depth needed to understand the effects of culturally responsive teaching methods on student perceptions.

Support Team

A support team of four individuals has played a key role in shaping and reviewing this project. Chohla Moll, a fellow science teacher and former cultural integration coordinator, offers expertise in culturally responsive strategies and ensures cultural accuracy and respect. Ted Delikatny, a mathematics teacher with a PhD in physics, provides guidance on data processes and methodology. Michael Mahoney, a retired Physical Science and Chemistry teacher with decades of experience at my school, contributes mentorship and contextual insight about the

unique learning needs of Alaska Native students. Annika Krafcik, an attorney for the Sitka Tribe of Alaska, supports the writing process as a proofreader and ensures community perspectives are honored. Together, this team provides pedagogical, cultural, methodological, and editorial support essential for conducting meaningful action research. Lastly, Marcie Reuer serves as my science reader, providing thoughtful feedback to strengthen the scientific accuracy of my project.

Focus Question

“How does the use of Alaskan Native culturally responsive teaching methods influence students’ engagement, confidence in learning science, and perceptions of the relevance of science to their lives in Alaska?”

To address this question, I used a mixed-methods approach to data collection. Qualitative data includes student interviews, open response survey questions, and classroom observations to gauge student engagement, perceptions, behaviors, and connections between culture and science. My quantitative data collection involved pre- and post-treatment surveys to measure changes in student perceptions throughout the treatment period. The end goal of my research is to provide practical insights into how culturally responsive pedagogy can be effectively implemented in science education, while honoring the unique cultural context of Alaska Native students in my school.

CHAPTER TWO

CONCEPTUAL FRAMEWORK

Direction for Action Research

Introduction

Understanding how Alaska Native culturally responsive teaching can enhance engagement, confidence, and perceived relevance in high school science requires grounding the project in existing research on culturally responsive pedagogy, Indigenous knowledge systems, and science identity development. This conceptual framework synthesizes findings from prior studies in mathematics, chemistry, and culturally grounded science education, as well as theoretical scholarship on learning as a cultural process. Together, these works provide both a rationale and a model for the design of my action research project, helping to clarify the instructional strategies, implementation approaches, research questions, and methodological decisions at the heart of this study.

Research Studies Informing Culturally Responsive Approaches in Math and Science

Because Physical Science integrates mathematics-heavy physics concepts and chemistry content, I initially sought research aligned with these disciplines to inform culturally responsive adaptations. Kisker et al. (2012) examined the culturally based mathematics curriculum Math in a Cultural Context, which was co-designed with Alaska Native communities and grounded in traditional subsistence activities, storytelling, and local knowledge. Their findings demonstrated significantly improved academic performance for Alaska Native students, suggesting that instruction aligned with students' cultural experiences can deepen understanding and increase

motivation. This study directly influenced my decision to anchor science lessons in Alaskan phenomena such as subsistence practices, renewable energy, and environmental systems. It also informed my research focus on student engagement and confidence rather than solely academic performance, recognizing that cultural alignment may affect students' attitudes and identity as learners.

Similarly, Spencer et al. (2022) investigated a snow chemistry curriculum rooted in Iñupiaq community knowledge. By connecting scientific inquiry to local environmental questions, they found that chemistry became more accessible and meaningful for students. This study provided a concrete model for designing culturally embedded inquiry-based science lessons. It directly shaped my treatment design, particularly the use of place-based phenomena to anchor inquiry, and reinforced my decision to examine perceived relevance as a key outcome variable.

Theoretical Foundations for Culturally Responsive Science Instruction

Larkin (2012) provides a key theoretical perspective by framing science as a cultural way of knowing. He argues that scientific understanding is socially and culturally situated and that students learn science more effectively when instruction draws upon their cultural backgrounds, lived experiences, and community knowledge systems. This framework strongly influenced the theoretical grounding of my study and justified my focus on cultural integration as a pedagogical necessity rather than an instructional enhancement. Larkin's work also contributed to my decision to investigate student confidence and engagement, as he highlights the role of identity and belonging in science learning.

Brown's (2017) metasynthesis further supports this conceptual foundation by demonstrating the complementary nature of culturally responsive teaching and inquiry-based science education. Brown emphasizes place-based inquiry and community-centered scientific problems as mechanisms for increasing relevance and accessibility. This directly informed my decision to combine culturally grounded content with inquiry-based learning activities, and to collect data on student perceptions of relevance, not just conceptual understanding.

Research Methodology and Practical Models of Implementation

Garvin's (2015) dissertation on culturally responsive teaching in a STEM-focused summer program provided a practical model for implementing culturally responsive instruction and evaluating its impact. Her use of mixed methods to assess student attitudes, interest, and content knowledge informed my decision to use a mixed-methods approach, including surveys, interviews, observations, and work samples. Garvin's emphasis on high expectations and culturally affirming communication also influenced my treatment design and observation rubric indicators.

Gilbert (2010) offers a particularly relevant model for Native American science curriculum development through community collaboration, language integration, and the inquiry-driven "Loololma Model." This study heightened my awareness of the importance of respectful cultural integration and collaboration with Indigenous knowledge holders. Gilbert's work directly informed two components of my treatment: integrating Native language vocabulary into science instruction and inviting Alaska Native elders to share knowledge through storytelling. His emphasis on bilingual science materials also shaped my decision to develop culturally grounded vocabulary supports.

Science Identity and Cultural Identity as a Framework for This Study

Recent research on science identity provides additional theoretical grounding for this study by demonstrating that students' cultural identities are deeply connected to how they see themselves as science learners and whether they engage with and feel confident in science. Science identity refers to how students perceive themselves and are recognized by others as "science people," and it can be closely linked to engagement, confidence, and relevance in science education.

Chow-Garcia et al. (2022) examined Native American students' persistence in science and found that cultural identity was a significant predictor of science identity, and that science identity strongly predicted students' intentions to continue in science related fields. Their findings suggest that affirming Indigenous cultural identity in educational settings supports students' confidence and sense of belonging in science, which in turn influences engagement and future academic choices. This study directly informed the focus of my research on student confidence and engagement as key outcomes of culturally responsive science instruction.

Similarly, Jin et al. (2021) synthesized research on culturally responsive science education for Indigenous students and found that culturally responsive programs supported students in navigating the boundary between Indigenous knowledge systems and Western science. This process of "boundary crossing" allowed students to integrate their cultural identity with scientific practices, leading to increased interest, motivation, and positive attitudes toward science. These findings support the design of my instructional treatment, which intentionally integrates Alaska Native knowledge, language, and storytelling to help students connect their cultural identities with scientific learning.

Studies on the link between cultural identity and science identity reinforce the premise that culturally responsive teaching is not only a matter of equity and representation but also a mechanism for fostering engagement, confidence, and a more relevant science classroom. By grounding Physical Science instruction in Alaska Native cultural knowledge, this study aims to support students' development of a positive science identity within their cultural identity and to examine how culturally responsive teaching influences students' perceptions of relevance and belonging in science.

Native Science as a Way of Knowing

Gregory Cajete's *Native Science: Natural Laws of Interdependence* (2000) provides an important philosophical foundation for my study by describing Indigenous science as a way of understanding the natural world that is embedded within a people's stories, language, relationships, and lived experiences. Rather than viewing science as isolated facts like Western science can often seem like, Cajete argues that Native science develops through generations of careful observations, interactions with the environment, and the application of that knowledge to everyday life. This perspective recognizes Indigenous knowledge systems, like those found in Alaskan cultures, as legitimate and sophisticated ways of knowing the natural world.

Cajete's work closely aligns with the purpose of my research project. Since time immemorial, Alaska Native peoples have developed deep understandings of weather, geology, ecology, and seasonal cycles through observation, experience, and cultural practices. Although these ways of knowing may differ in methodology from Western science, they share the same underlying goal of understanding and explaining the natural world. My research now builds on

Cajete's philosophy by exploring the effects of connecting Western scientific concepts with Alaska Native ways of knowing in my own classroom.

Conclusion of Framework

Across these studies, several consistent themes emerged: the importance of connecting academic content to cultural knowledge, the value of community involvement, the role of identity validation in learning, and the effectiveness of integrating inquiry with culturally responsive teaching methods. These insights shaped the theoretical and practical foundation of my study, guided the development of my culturally responsive Physical Science treatment, and informed the selection of research questions and data collection methods. Together, this framework supports my investigation into how Alaska Native culturally responsive teaching methods influence student engagement, confidence, and perceptions of relevance in high school science.

CHAPTER THREE

METHODOLOGY

Demographics

The research sample consisted of approximately 60 tenth grade students enrolled in four sections of Physical Science at Mt. Edgecumbe High School in Sitka, Alaska. Mt. Edgecumbe is a state-run boarding school that serves students from more than 100 rural communities across the state, the majority of whom identify as Alaska Native. In recent years, 85-95% of enrolled students have been Alaska Native, representing a wide range of cultural and linguistic groups including Yup'ik, Cup'ik, Inupiaq, St. Lawrence Island Yupik, Unanga, Alutiiq, Sugpiaq, Tlingit, Haida, Tsimshian, and Athabascan communities. As a result, the student body brings diverse cultural traditions, subsistence experiences, and community histories to the classroom.

Many of the rural communities these students come from face significant socioeconomic challenges. Rural Alaska villages are often geographically isolated, accessible only by plane or boat, with limited infrastructure, high cost of living, and fewer economic opportunities compared to urban areas. Schools in these communities may experience high teacher turnover, limited access to higher level courses, and fewer instructional resources. Still, these communities maintain strong cultural traditions, subsistence lifestyles, and deep intergenerational knowledge systems that shape students' identities and worldviews.

All tenth grade Physical Science students were included in the study because the treatment was embedded into the curriculum for all Physical Science classes. In this way, my cohort included the entire 10th grade class, avoiding selection bias and allowing the findings to reflect the experiences of a broad range of Alaska Native students. Students ranged in age from

14-16 and varied widely in prior science experience depending on their home communities. Some students arrived with strong foundational science knowledge, while others came from schools where regular science instruction was limited or inconsistent. This comprehensive sample provided a strong foundation for my data collection.

Treatment

The treatment in my action research project involves the purposeful integration of culturally responsive teaching practices grounded specifically in Alaska Native knowledge systems over a six-week treatment period. Rather than replacing the existing curriculum, the approach enhances the current curriculum through three core culturally responsive strategies designed to increase engagement, confidence, and perceived relevance for Alaska Native students. These strategies focus on anchoring scientific concepts in familiar local contexts, validating cultural identity, and inviting community knowledge into the science classroom.

I have selected three specific elements of culturally responsive teaching methods to incorporate into the treatment of this study. Using Alaskan phenomena as anchors for inquiry-based lessons, incorporating Alaskan Native language into science vocabulary, and the inclusion of Native elders and community members knowledge through storytelling. Together, these three elements form a cohesive treatment designed to make science instruction more culturally meaningful, accessible, and personally relevant to Alaskan Native students.

Alaskan Phenomena as Anchors for Inquiry-Based Lessons

Each lesson taught throughout the treatment period begins with an authentic Alaskan phenomenon that students recognize from their lived experience or native environments.

Examples include the Aleutian Islands and associated land and seafloor features (plate tectonics), exploring rock types found locally as well as major rock types from villages across Alaska (rocks and the rock cycle), and interpreting stratigraphic columns that tell the history of different regions of Alaska (geologic history). These phenomena serve as the foundation for inquiry-based activities in which students investigate scientific principles through hands on exploration, data analysis, and collaborative problem-solving. Anchoring lessons in local contexts increases relevance and helps students see science as directly connected to their everyday lives and cultural knowledge.

Native Language Vocabulary Integration

Throughout the treatment period, key scientific vocabulary terms are paired with Native language equivalents when available, as well as with student generated descriptions rooted in cultural or subsistence experiences. This requires a lot of student and family input, furthering the engagement and meaningfulness of science within their cultural identity. This language integration also supports a deeper connection to science by validating students' cultural perspectives. Activities include learning from Native elders and community members back home, creating Native language science glossaries in science notebooks, using Native terminology during lab discussions, and examining how traditional words describe scientific observations. This strategy reinforces identity, supports academic language development, and honors the knowledge already embedded in Indigenous languages.

Alaska Native Elder Guest Speakers and Storytelling

As part of the treatment, Alaska Native elders and knowledgeable community members are invited to speak with students, either in person or virtually. These guest sessions emphasize

storytelling as a culturally significant mode of teaching and learning. Elders may share experiences related to Alaskan landscapes, rock types, seasonal knowledge, or subsistence technologies that involve scientific principles related to science topics. Storytelling sessions not only deepen cultural connection but also demonstrate to students that scientific thinking is embedded within traditional Alaska Native knowledge systems.

Validity of Treatment Design

To strengthen the validity of the treatment methods implemented in this study, I worked with a cultural integration coordinator as well as parents and community members to ensure that the culturally responsive strategies were authentic, respectful, and aligned with cultural values. The three primary components of the treatment, Alaska-based anchoring phenomena, integration of Native language vocabulary, and the inclusion of Alaska Native elders as guest speakers, were developed in collaboration with Chohla Moll, my school's Cultural Integration Coordinator. Ms. Moll has extensive experience supporting culturally responsive teaching practices and provided guidance to ensure that the instructional approaches were culturally appropriate and meaningfully connected to Alaska Native ways.

In addition, I distributed a parent/community feedback survey prior to implementation to gather input on the proposed strategies. This step allowed families and community members to offer suggestions, voice concerns, and recommend culturally relevant examples or speakers. Incorporating feedback from both a cultural integration specialist and community stakeholders strengthened the validity of my treatment by ensuring that the instructional strategies genuinely reflect Alaska Native perspectives rather than just relying on my interpretations.

Data Collection and Analysis Strategies

Data Collection Methods

To investigate how Alaska Native culturally responsive teaching strategies influence student engagement, confidence, and perceived relevance of science, this study used four complementary data collection methods: student surveys, classroom observations, student work samples, and student interviews. These instruments allowed for triangulation across quantitative and qualitative data sources, creating a picture of how students respond to the integration of culturally responsive teaching practices.

This research project was reviewed and approved by the Montana State University Institutional Review Board (IRB) prior to data collection to ensure the protection of student information and to adhere to ethical research standards. (Appendix B, Table B1: IRP Approval)

Table 1: Matrix of Research Questions and Data Collection Methods

Research Question	Survey	Observations	Interviews	Work Samples
How do culturally responsive methods influence student engagement?	X	X	X	X
How do culturally responsive methods affect students' confidence in science?	X	X	X	—
How do culturally grounded lessons shape students' perceptions of relevance of science?	X	X	X	—

Student Surveys

One of the most important data collection methods used throughout the project is the end of unit student survey. The intention of using this survey throughout the project was to see if

student perceptions of their own engagement and content retention change as a result of the treatment. The survey asked six Likert-scale questions designed to measure student engagement, confidence in science, and perceptions of cultural relevance. One open-ended prompt, designed to capture different dimensions of students' experiences during the instructional unit, followed. Surveys were administered to all 100 students in Physical Science classes both before, throughout, and after the treatment period. Each administration required approximately fifteen minutes during class time.

The Likert-scale items provided quantifiable data on shifts in engagement and confidence, while the open-ended question allowed students to elaborate on specific moments where science felt connected to their life or culture. This combination of closed and open responses aligned well with the study's focus on understanding not only whether students felt more engaged, but why certain instructional practices resonated with them.

Classroom Observations

Classroom observations served as a second data source, allowing the researcher to document real-time indicators of engagement and cultural connection during instruction. All four Physical Science classes were observed weekly over the course of the instructional unit. Observations focused specifically on student participation patterns, collaborative behaviors, attentiveness, enthusiasm, and spontaneous cultural connections made during lessons.

Each observation lasted a full class period and was recorded using a structured observation rubric. Indicators that were noted on the rubric included:

1. Engagement behaviors such as hand-raising, discussion participation, and peer collaboration.

2. Cultural connections, where students link scientific content to personal experience, community knowledge, or Native cultural practices.
3. Evidence of conceptual understanding, such as students correctly recalling or applying ideas from prior lessons. When available, observations were conducted by a fellow teacher or administrator to strengthen reliability.

The observation rubric served as field notes that were later coded for patterns within and across class periods.

Student Work Samples

Work samples completed during culturally responsive lessons (lab reports, models, journal reflections, and project-based assignments) provided another layer of insight into students' engagement and understanding. These artifacts allowed me to examine how students applied scientific concepts within culturally grounded contexts.

Work samples were collected throughout the treatment period, with particular emphasis on tasks requiring students to explain scientific ideas using both Western science and cultural knowledge. These samples were analyzed qualitatively using a rubric assessing depth of scientific explanation, accuracy and clarity of reasoning, and evidence of personal, community, or cultural connection. Student reflections included in these artifacts also offered a window into student thinking, motivation, and confidence while completing culturally responsive assignments.

Student Interviews

Interviews provided an in-depth source of qualitative data and helped illuminate how students interpreted their experiences with the culturally responsive lessons. Groups of students

were selected randomly to represent diverse genders, academic backgrounds, participation patterns, and home communities. Interviews occurred at three intervals: early in the, mid, and after the treatment period. Each interview lasted approximately 10–15 minutes and followed a structured protocol with room for asking probing questions.

Interview questions focused on students' sense of engagement, confidence, cultural connection, and personal meaning in the science lessons. Example prompts included:

1. “How have the cultural examples used in class helped you understand science concepts?”
2. “Do you feel more engaged in science this semester compared to past years?”
3. “What kinds of science lessons feel meaningful or memorable to you?”

Interviews were audio recorded with consent and used for later data coding.

Analysis Strategies

To establish consistency across data collection methods, I worked with members of my support team to determine appropriate definitions for the three variables being measured (engagement, confidence, and relevance). These definitions guided the development of the coding of both quantitative and qualitative data.

Engagement was defined as students' active and voluntary participation in classroom learning activities. Evidence of engagement included students raising their hands to contribute to class discussions, collaborating with classmates during activities, and completing laboratory investigations and assignments. Both observed classroom behaviors and student self-reported perceptions of engagement were considered during analysis.

Confidence was defined as students' belief in their ability to understand and participate in science learning. Confidence was observed through students' willingness to answer questions, contribute ideas during discussions, use appropriate scientific terminology when communicating, and demonstrate understanding during classroom activities. Student perceptions of their own confidence were also measured through the End of Unit Survey.

Relevance was defined as the extent to which students perceived science from the classroom as meaningful and connected to their lives, communities, and Alaska Native cultural experiences. Evidence of relevance included student reflections describing personal or cultural connections to science lessons, opportunities to engage with Alaska Native language and cultural knowledge, and students' willingness to participate in culturally responsive learning activities. Relevance was measured primarily through student survey responses and interviews while classroom observations documented whether students engaged with opportunities to connect science concepts to their culture and experiences.

Triangulation

Qualitative analysis was used to identify recurring ideas and patterns across student survey responses, interviews, and observational data. I began with more general analysis, followed by more specific analysis to find links between themes such as engagement, relevance, and content retention. Quantitative data from student surveys was tracked over time to identify any trends or shifts in engagement, confidence, or relevance related to the integration of culturally responsive teaching methods.

I used triangulation strategies in my analysis by comparing patterns across the surveys, interviews, classroom observations, and student work samples to determine whether there were

any consistent themes coming from my data. For example, as survey data showed an increase in engagement over time, I also analyzed observation notes looking for increases in participation and other engagement behaviors. When multiple data sources support the same conclusion, my confidence in the results is better supported. Just as well, when discrepancies between different data collection methods emerged, I examined the results closely to better understand the cause.

CHAPTER FOUR

DATA ANALYSIS

Quantitative Data AnalysisEnd of Unit Surveys

The first major component of my data collection was to measure student perceptions of engagement, confidence in learning science, and the cultural relevance of science instruction through an End of Unit Survey which consisted of six Likert-scale questions. To analyze patterns against my research focus question, the questions were grouped into three categories: Engagement, Confidence, and Cultural Relevance. Questions 1 and 6 were categorized as Engagement because they focused on students' interest and motivation during culturally connected science lessons. Questions 2 and 3 were categorized as Confidence because they asked students to reflect on their confidence in understanding and applying science concepts. Questions 4 and 5 were categorized as Cultural Relevance, as they addressed whether students perceived science lessons as meaningful and connected to their lives, communities, or cultural experiences in Alaska. Grouping the questions in this way allowed for me to have a clearer analysis of how different aspects of student perception changed during the treatment period and provided for a triangulation strategy.

Each survey question used a five-point Likert scale with response options (Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree) assigned numerical values from 1 to 5, respectively. In this scale, Strongly Disagree was coded as 1, while Strongly Agree was coded as 5. This scoring allowed the student responses to be analyzed numerically, where the higher

average rankings indicate stronger agreement that culturally responsive teaching improved student engagement, confidence, or the relevance of science in their lives in Alaska.

The average rankings were calculated using a weighted scoring approach. The number of responses at each rating level was multiplied by the value of that rating and summed. This total was then divided by the number of responses to determine the average score for each question. Question averages were then combined within each category to determine overall average response rankings for Engagement, Confidence, and Cultural Relevance.

Table 2: End of Unit Survey - Average Rankings Throughout Treatment Period (N=79)

Analysis Groups	Average Rating			
	Pre-Treatment	Treatment 1	Treatment 2	Treatment 3
Engagement Questions 1 & 6	3.59	3.96	4.07	4.32
Confidence Questions: 2 & 3	3.49	3.46	3.62	3.77
Culturally Relevant Questions: 4 & 5	3.15	3.26	3.67	3.87

Survey Rankings Throughout Treatment Period (N=79)

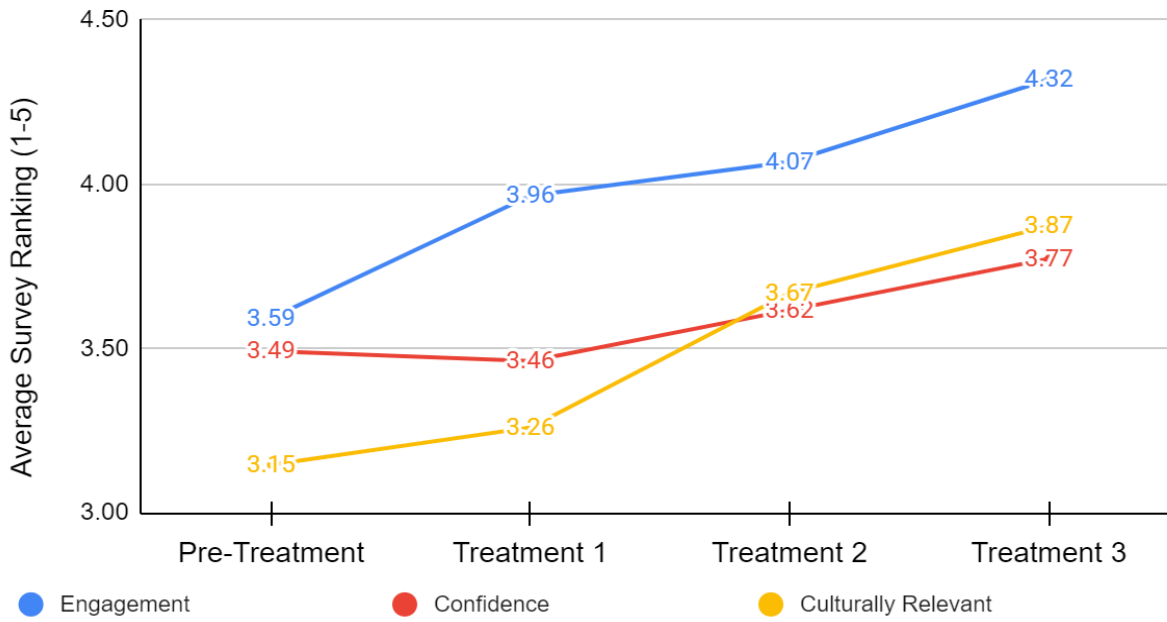


Figure 2: Survey Rankings Throughout Treatment Period (N=79)

Analysis of the survey data revealed clear trends across the treatment period. Average rankings generally increased across all three categories as culturally responsive teaching strategies were implemented. In the Engagement category, which included Questions 1 and 6, the average rating increased from 3.59 in the pre-treatment survey to 3.96 after the first treatment unit, 4.07 after the second unit, and 4.32 after the third unit. This steady upward trend suggests that students increasingly felt interested and motivated during science lessons as culturally responsive teaching methods were incorporated.

A similar pattern emerged in the Confidence category, though the increases were more gradual. Confidence scores began at 3.49 during the pre-treatment survey, remained relatively

stable during the first treatment period (3.46), and then increased to 3.62 and 3.77 during the later treatment units. This pattern could suggest that while culturally responsive instruction may quickly influence engagement, gains in students' confidence in their ability to understand science concepts may develop more gradually as students continue to experience these teaching approaches over time.

The most notable shift occurred in the Cultural Relevance category. Initial averages began at 3.15 during the pre-treatment survey, indicating that students were generally neutral regarding whether science felt connected to their lives in Alaska. Over the course of the treatment period, this average increased to 3.26, then 3.67, and finally 3.87. This increase suggests that as culturally responsive strategies were implemented such as the use of Alaska-based phenomena, Native language vocabulary, and elder/community involvement, students increasingly perceived science as meaningful and connected to their own experiences.

Classroom Observations

Classroom observation data was collected throughout the treatment period using the Classroom Observation Sheet, a structured rubric designed to record observable student behaviors during instruction. Each observation indicator was scored using a five-point rating scale, where 1 = Not Observed, 2 = Rarely, 3 = Sometimes, 4 = Frequently, and 5 = Consistently. Similar to the student survey analysis, observation indicators were grouped into three primary analytical categories: Engagement, Confidence, and Cultural Relevance. Grouping the observation indicators in the same way as the survey questions allowed the two data sources to be compared more easily during triangulation. The Engagement category included observations of behaviors such as student participation, collaboration, and attentiveness during culturally

connected lessons. The Confidence category focused on observable indicators of students demonstrating understanding, explaining ideas, or assisting peers during learning activities. The Cultural Relevance category captured moments when students were able to connect science concepts from class to their community, culture, or experiences in Alaska. The observation rubric also included an additional category labeled Conceptual Understanding, which attempted to document evidence of students applying scientific ideas during activities; however, these data were not used in the final analysis. Average ratings for each analytical category were calculated by averaging the recorded ranking for 3-4 different observations that fit into the appropriate category. These averages were then compared throughout the treatment period (Pre-Treatment, Treatment 1, Treatment 2, and Treatment 3).

Table 3: Classroom Observation Sheet - Average Ranking Throughout Treatment Period (N=81)

Analysis Groups	Average Rating			
	Pre-Treatment	Treatment 1	Treatment 2	Treatment 3
Engagement	2.67	3.50	4.17	4.08
Confidence	2.25	2.67	3.42	3.42
Culturally Relevant	1.33	3.75	4.00	4.00

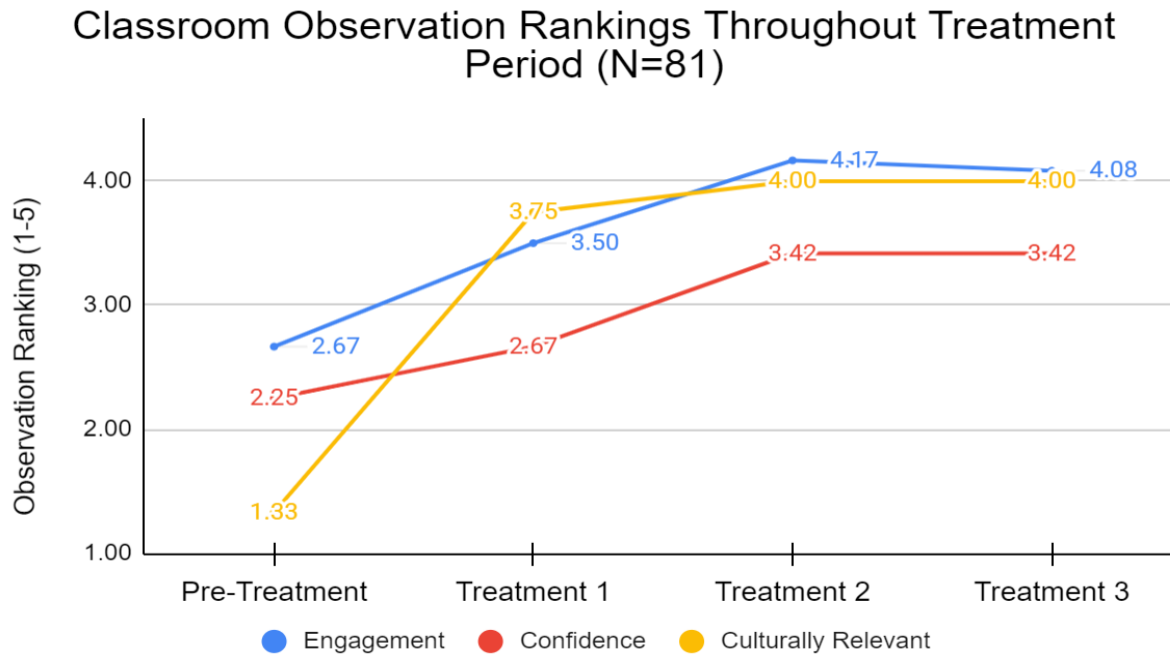


Figure 3: Classroom Observation Rankings Throughout Treatment Period (N=81)

The results of these calculations showed the average rating for Engagement increased from 2.67 during the pre-treatment observations to 3.50 during Treatment 1, 4.17 during Treatment 2, and 4.08 during Treatment 3. This upward trend suggests that student participation, collaboration, and attentiveness increased as culturally responsive teaching strategies were implemented.

I observed a similar trend in the Confidence category. Pre-treatment observations showed an average rating of 2.25, indicating that behaviors associated with student confidence were observed only occasionally at the beginning of the study. As the treatment progressed, this average increased to 2.67 during Treatment 1 and 3.42 during both Treatment 2 and Treatment 3. These results suggest that students gradually became more comfortable explaining scientific ideas, contributing to discussions, and demonstrating understanding during classroom activities.

The most dramatic change occurred in the Cultural Relevance category. During pre-treatment observations, the average rating was 1.33, indicating that connections between science instruction and students' cultural or community experiences were rarely observed. Following the introduction of culturally responsive teaching strategies, the average rating increased sharply to 3.75 during Treatment 1 and remained high at 4.00 during both Treatment 2 and Treatment 3. This substantial increase suggests that lessons incorporating Alaska-based phenomena, Native language vocabulary, and community knowledge created more opportunities for students to make meaningful connections between science content and their own lived experiences.

Student Work Samples

Throughout the treatment period, student work samples were collected from lab activities that were directly connected to the culturally responsive lessons I had implemented. These lab activities were designed not only to reinforce the science concepts being taught, but also to incorporate Alaska-based phenomena, inclusion of Alaskan Native languages, and storytelling from elders and community members. Because these assignments required students to actively participate in the lesson activities, student performance and completion rates were used as indicators of student engagement.

Each laboratory activity was scored based on a point grading scale, with student scores recorded out of a possible total of 50 points. The average score for each activity was calculated by averaging the individual scores of all participating students. In addition to the assignment scores, completion rates were also analyzed. To calculate completion percentages, assignments were coded using a binary system in which completed assignments were coded as "1" and

incomplete or missing assignments were coded as “0.” These values were then used to calculate the overall percentage of students who completed each assignment during the observation period.

Table 4: Average Student Work Sample Scores and Completion Percentages Throughout the Treatment Period (N=60)

Average Score & % Complete				
	Pre-Treatment	Treatment 1	Treatment 2	Treatment 3
Average Score Out of 50 pts	40	42	46	47
% Complete	73%	86%	94%	97%

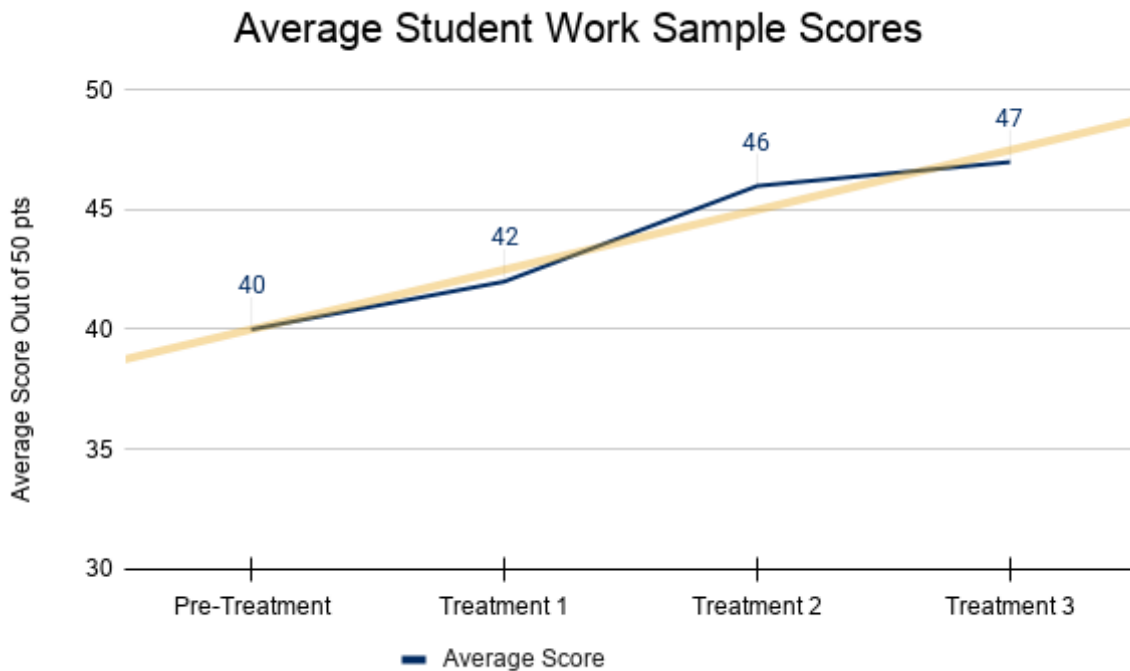


Figure 4: Average Student Work Sample Scores (N=60)

Average scores and completion rates were compared across four lab activities throughout the treatment period (Pre-Treatment, Treatment 1, Treatment 2, and Treatment 3). The average

score out of 50 points increased from 40 during the pre-treatment period to 42 during Treatment 1, 46 during Treatment 2, and 47 during Treatment 3. This upward trend suggests that students were increasingly successful in completing and demonstrating understanding of the laboratory activities as culturally responsive instructional strategies were introduced and reinforced.

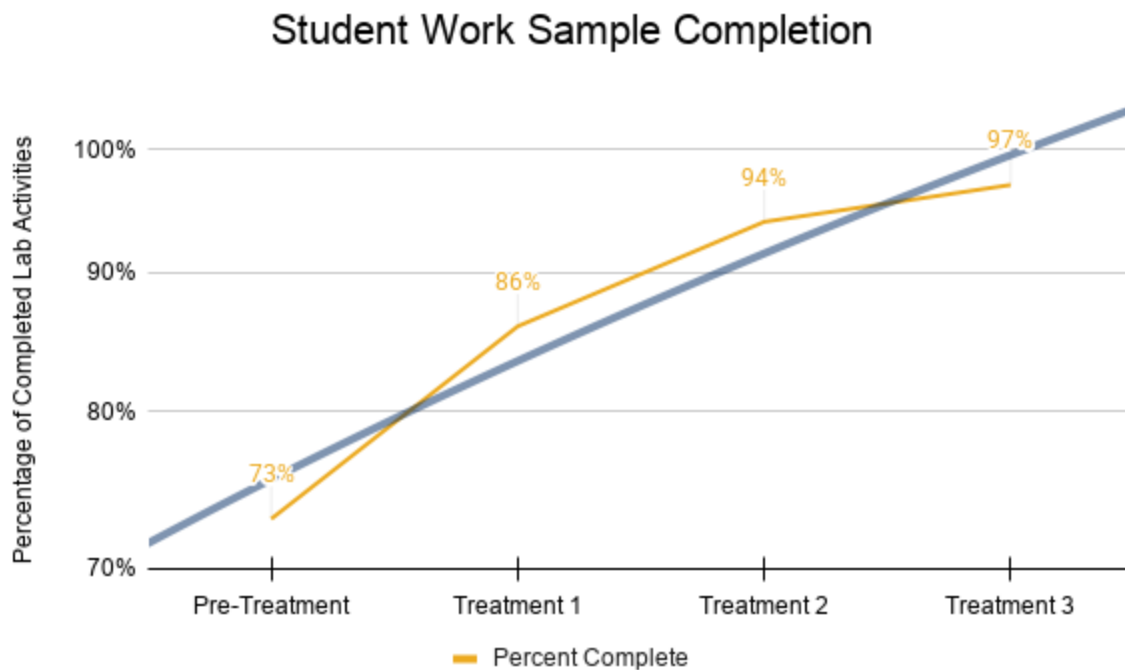


Figure 5: Student Work Sample Completion (N=60)

A similar pattern was observed in the percentage of students who completed the assignments. During the pre-treatment period, 73% of students completed the assigned lab activities. This completion rate increased steadily throughout the treatment period, rising to 86% during Treatment 1, 94% during Treatment 2, and 97% during Treatment 3. The increase in assignment completion suggests that students became progressively more willing to participate in and complete the lab activities that were associated with culturally responsive lessons.

Together, the increases in both average scores and completion rates suggest that students were increasingly engaged in the laboratory activities throughout the treatment period.

Qualitative Data Analysis

End of Unit Surveys

The End of Unit Survey also included a qualitative, free response question: “Describe a time this semester when a science lesson or activity felt especially connected to your life, your community, or your culture. What made it meaningful to you?” Qualitative responses to the free-response survey question were analyzed to determine whether students perceived culturally responsive lessons as meaningful and relevant to their lives in Alaska. Student responses were coded into four categories: High Engagement and/or Relevance, Neutral Engagement and/or Relevance, Low Engagement and/or Relevance, and Unanswered.

Table 5: End of Unit Survey Free Response Coding

Coded Categories	Description/Examples of Coded Categories
High Engagement/Relevance	Students in this category were able to name a specific lesson/activity and explain how it is connected to their life, community, or culture. Example Student Responses: “When we learned about the Aleutian Islands and heard the Unangax song about the earthquake and water washing away the village, it felt really meaningful. My family has told stories about earthquakes before, so it made me think about how science and our stories are connected.”

	“The rock unit was meaningful when I talked to my grandma about the different rocks in our village. She showed me pictures and told me stories about where they come from.” “When we used Native names for rocks and talked about stratigraphy in Alaska, it made more sense to me. I’ve seen those layers before near my community, so it felt like I already knew part of it.”
Neutral Engagement/Relevance	Students in this category did not identify a specific lesson/activity, but generally stated that they are connected to their life, community, or culture. Example Student Responses: “Some of the lessons felt connected to where I live because we talked about Alaska a lot. That made it easier to understand.” “It was meaningful when we talked about things in our communities, like rocks and land. It made it a little more interesting than normal.” “Learning about Native words for science terms was cool. It made me think about how science is used in different ways.”

Low Engagement/Relevance	Students in this category did not identify a way the lessons/activities were connected to their life, community, or culture. Example Student Responses: “I didn’t really feel like any of the lessons connected to my life that much.” “We did some stuff about Alaska, but it didn’t really stand out to me as meaningful.” “I don’t really remember anything that felt connected to my culture or community.”
Unanswered	Students in this category chose not to respond to the prompt.

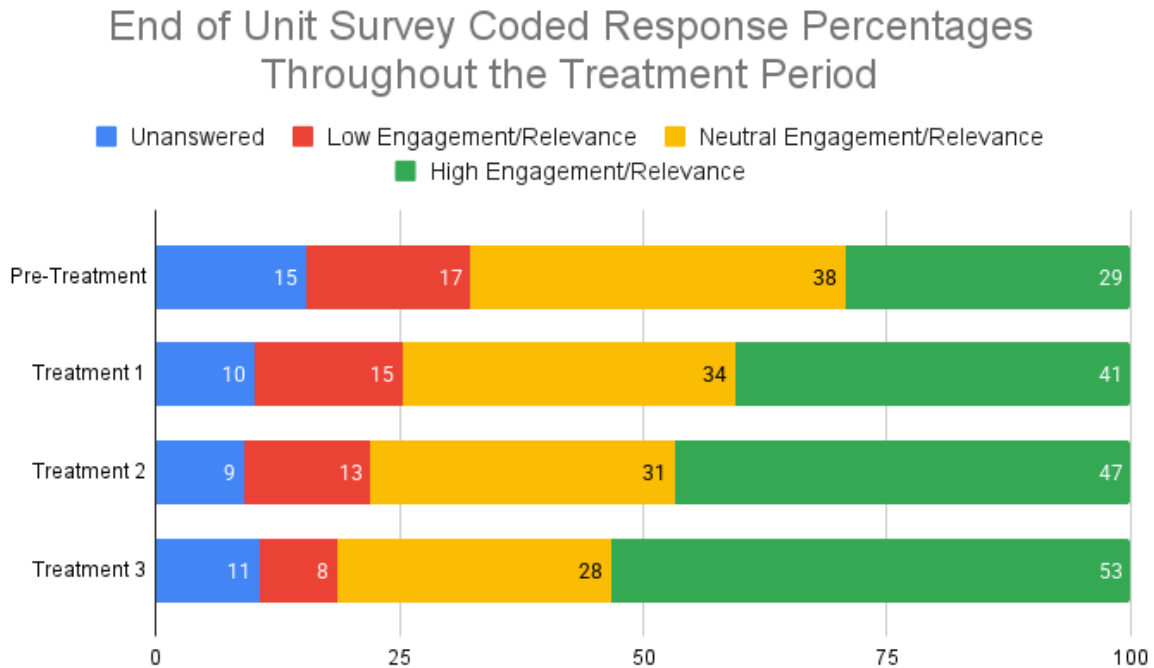


Figure 6: End of Unit Survey Coded Response Percentages Throughout the Treatment Period (N=79)

Student responses were coded, tallied, and calculated into percentages for each of the coding categories. To analyze the data, I looked at the change in percentage for each category throughout the treatment period. Analysis of the coded responses revealed a clear trend across the treatment period. During the pre-treatment survey, 29% of responses were categorized as High Engagement/Relevance, meaning the students were able to name a specific lesson/activity and explain how it is connected to their life, community, or culture. As culturally responsive instructional strategies were implemented, the percentage of responses coded as High Engagement/Relevance increased steadily, rising to 41% in Treatment 1, 47% in Treatment 2, and 53% in Treatment 3. At the same time, responses categorized as Low Engagement/Relevance, meaning the students did not identify a way the lessons/activities were

connected to their life, community, or culture, decreased from 17% to 8%. Neutral responses also declined throughout the treatment period. These shifts suggest that as culturally responsive teaching methods were integrated into science instruction, a growing number of students were able to identify meaningful connections between science lessons and their own lives, communities, and cultural experiences. The increasing proportion of High Engagement/Relevance responses supports findings from the survey and classroom observation data, further indicating that culturally grounded instruction helped students perceive science as more relevant and personally meaningful.

Post-Treatment Student Interviews

To further explore student engagement and perceptions of culturally responsive science instruction, I conducted a series of post-treatment student interviews with a small sample ($n = 12$) of students after the 3rd unit of the treatment period. The purpose of these interviews was to gain deeper insight into how students experienced the culturally responsive teaching strategies and to better understand how these approaches influenced their engagement, confidence, and perceptions of the relevance of science to their lives in Alaska.

Student responses were analyzed using a thematic approach, and I gave particular attention to any recurring ideas related to engagement, confidence, and perceived relevance. Overall, student responses suggested that culturally responsive instructional strategies helped make science content feel more engaging, accessible, and meaningful.

One of the most consistent themes across interviews was that students felt more engaged when science content was connected to real-world experiences in Alaska. Several students noted that lessons incorporating local examples or issues were more interesting and easier to

understand. For example, one student shared, “I think I paid more attention during the lessons where we talked about real things in Alaska. It felt more real than just reading from a book.” This response supports the same trends observed in the End of Unit Survey and classroom observation data, which indicated increased engagement during culturally responsive lessons throughout the treatment period.

Another emerging theme was the importance of cultural and community connections in shaping students’ perceptions of science being relevant to their lives in Alaska. Students frequently referenced lessons that related directly to their communities or cultural experiences. One student explained, “When we used Native language words in class, it made it feel more connected to where I’m from.” Similarly, another student noted, “When we talked about hydroelectric power in the village, it made more sense because it’s something that could affect where I live.” These responses suggest that incorporating culturally relevant content helped students see science as more meaningful and applicable to their own lives.

The interviews also provided some evidence of increased student confidence, particularly in terms of participation and willingness to contribute. One student stated, “I don’t usually talk a lot in class, but when we talked about things from my community, I felt like I actually had something to say.” While not all students reported strong changes in confidence, this type of response suggests that culturally responsive instruction may help create more inclusive learning environments where students feel more comfortable engaging.

At the same time, some responses indicated that the impact of culturally responsive teaching strategies was not the same across all students. One student shared during an interview, “I wouldn’t say it changed everything for me, but it did make some lessons more interesting.”

This highlights the importance of recognizing variation in students and the cultural diversity that exists, even just within Alaskan Native cultures, and suggests that while culturally responsive strategies may increase engagement and relevance for many students, their impact may differ depending on individual backgrounds and preferences.

Overall, I think the interview data supports findings from the End of Unit Survey, classroom observation, and student work sample data by providing qualitative evidence that culturally responsive teaching strategies can enhance student engagement and help students perceive science as more relevant to their lives in Alaska. While the data from interviews is limited by the small sample size, the consistency of themes across student responses certainly still strengthens the overall analysis of my study.

CHAPTER FIVE

VALUE

Claims from the StudyFocus Question Claim

In conclusion to the study, I will revisit my original focus question to make an overarching claim. “How does the use of Alaskan Native culturally responsive teaching methods influence students’ engagement, confidence in learning science, and perceptions of the relevance of science to their lives in Alaska?”

The findings of my research support the claim that the use of Alaska Native culturally responsive teaching strategies increases student engagement, confidence in learning science, and perceived relevance of science in their lives in Alaska. I found, across multiple data sources, students demonstrated increased interest in science, greater participation in classroom activities, and stronger understanding and connections to course content when instruction incorporated culturally meaningful elements such as Alaska-based phenomena, Native language vocabulary, and shared community knowledge.

Evidence and Reasoning

Evidence supporting this claim came from all four data collection methods of the study. First, the End of Unit Survey data showed clear increases in student perceptions over time. Average engagement ratings (1-5) increased from 3.59 during pre-treatment to 4.32 during Treatment 3, while cultural relevance scores increased from 3.15 to 3.87. Confidence scores also increased, though more gradually, from 3.49 to 3.77. These results indicate that students

increasingly agreed that science lessons were engaging, meaningful, and connected to their lives in Alaska.

Second, classroom observation data reinforced these findings through observable student behaviors. Engagement ratings (1-5) from classroom observations increased from 2.67 to 4.08 and cultural relevance showed an increase from 1.33 to 4.00 over the course of the study. These observations suggest that students were not only reporting increased engagement, but were also visibly participating more, collaborating with peers, and making connections between science content and their lives in Alaska.

Third, student work sample data provided additional evidence of increased engagement. Average lab scores increased from 40 to 47 out of 50 points, while assignment completion rates rose from 73% to 97%. These results suggest that students scored higher and were more willing to participate in and complete assignments when lessons were culturally relevant and connected to their experiences.

Finally, qualitative data from student interviews and free response survey questions provided insight into how and why these changes occurred. Students frequently described culturally responsive lessons as more meaningful and easier to understand. For example, one student shared, “I think I paid more attention during the lessons where we talked about real things in Alaska. It felt more real than just reading from a book.” Another student explained, “When we used Native language words in class, it made it feel more connected to where I’m from.” These responses highlight the importance of cultural and community connections in shaping student engagement and perceptions of relevance.

When these data sources are considered together, a clear pattern emerges. Students are more engaged in science when they see themselves, their culture, and their community reflected in the curriculum. The triangulation between surveys, classroom observations, lab work samples, and student interviews strengthens the validity of this claim as similar trends are supported by all data collection methods.

At the same time, the data suggest that confidence in learning science develops more gradually than engagement or perceived relevance. While engagement and relevance showed immediate increases, confidence improved at a slower rate. This may indicate that while culturally responsive teaching can quickly make science feel more meaningful and accessible, building confidence requires sustained exposure and reinforcement over time.

Additional Claim from Data Analysis

An additional claim supported by the results of this study is that student engagement, confidence, and perceived relevance in science increase gradually over time through consistent implementation of culturally responsive teaching strategies. Rather than producing immediate or dramatic changes after a single lesson or activity, the data suggests that culturally responsive teaching methods become more impactful as students repeatedly experience instruction that values their cultural backgrounds and traditional knowledge.

Evidence for this claim can be seen consistently across all four data collection methods. In the End of Unit Survey data, all three coded analysis categories (Engagement, Confidence, and Cultural Relevance) showed steady increases throughout the treatment period rather than sudden one time spikes. Engagement scores started at 3.59 during the pre-treatment survey and increased each administration up to 4.32 by Treatment 3. Both the Confidence and Cultural

Relevance categories showed similar trends, gradually increasing each time the data collection method was administered. Similar patterns appeared in the classroom observation data, where observable student participation, collaboration, and culturally connected discussions became more frequent with each treatment period. Lab work sample data also followed this same trend, with both assignment completion rates and average scores steadily improving over time rather than immediately after the introduction of the treatment. Qualitative data further supported this pattern, as later survey responses included increasingly detailed student reflections about science connecting to their culture, community, and identity.

The consistency of these trends suggests that culturally responsive teaching may require time before students fully respond to it. One possible explanation is that culturally responsive teaching methods provide an opportunity for students to build a relationship between science and their cultural identities, but that relationship takes time. Many students may not initially view science as something connected to their identity or cultural experiences because of prior educational experiences that presented science as disconnected from their lives. Through repeated exposure to culturally responsive lessons, students may gradually begin to recognize science as something meaningful and culturally relevant. These results suggest that culturally responsive teaching is best as an ongoing instructional approach that becomes more powerful through consistent implementation over time.

Value of the Study and Consideration for Future Research

Continuing the Research

This study contributes to the growing amount of research on culturally responsive science education, particularly within Alaska Native and rural contexts. The findings suggest that

integrating culturally relevant content into science instruction can make learning more engaging and meaningful for students, while also supporting increased confidence in science.

One of the most valuable aspects of my study is that it demonstrates that culturally responsive teaching does not require a complete overhaul of curriculum, but can be just thoughtful integrations of local knowledge, Native languages, and community connections into your existing science instruction. This makes the findings applicable to other educators working in similar contexts.

Future research could build on this study by exploring several key areas: long-term integration of culturally responsive strategies and specific strategies. Researchers could examine the long-term impact of culturally responsive teaching on student confidence and academic achievement, as confidence appeared to develop more gradually in this study. Additionally, further research could explore which specific culturally responsive strategies have the greatest impact on different aspects of student learning.

Impact of Action Research on the Author

Moving Forward

Conducting this action research project has had a significant impact on my development as a science teacher in Alaska. Through this process, I have become more intentional in designing lessons that not only meet academic standards but also reflect and honor the cultural identities and experiences of my students. This study challenged me to not view science as a neutral or purely academic subject, but to recognize it as something that can and should be connected to students' communities, cultures, and everyday lives. As a result, I have shifted my instructional approach to place greater emphasis on cultural connection.

I have also gained a deeper appreciation for the importance of listening to students. The qualitative data, particularly student interviews, provided a very powerful insight into how my students experience the classroom. Hearing students describe when and why science lessons felt meaningful has reinforced my commitment to continuing to try to make science and cultural identity fit together for my students.

One important recommendation that emerged from this study is that educators interested in implementing culturally responsive teaching strategies should actively seek input from the communities and families connected to their students. Prior to implementing my treatment, I distributed surveys to parents and community members asking how they would like to see culture represented in the science classroom. I also worked closely with my school's Cultural Integration Coordinator to ensure that the strategies were respectful and meaningful. Through this process, I learned that the most valuable guidance often comes directly from the stakeholders who know the students best. Elders, parents, and community members can provide culturally grounded perspectives, stories, language, and experiences that make classroom instruction more authentic, relevant, and impactful for students.

Moving forward, I plan to continue learning, refining, and expanding culturally responsive teaching practices in my classroom. This project has not only improved my teaching but has also strengthened my belief that when students see themselves reflected in science, they are more likely to engage, participate, and succeed.

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APPENDICES

APPENDIX A: DATA COLLECTION MATERIALS

Table A1: Physical Science - End of Unit Survey

Physical Science - End of Unit Survey B <i>I</i> <u>U</u> This short survey asks about your experiences and feelings in science class. There are no right or wrong answers! Your honest opinions will help me make science lessons more meaningful and connected to our lives here in Alaska. Please rate each statement using this scale: 1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree
1. I feel interested and engaged during science lessons that connect to Alaskan or local cultural knowledge. 2. Science concepts make more sense to me when they are explained using examples from life in Alaska. 3. I feel confident in my ability to understand and apply science concepts we learn in class. 4. The science activities and projects in this class feel meaningful to me personally. 5. I see how what I am learning in science relates to my life, community, or future. 6. When we talk about science in connection with Alaskan Native culture, I feel more motivated to participate and share my ideas. 7. <u>Open-Ended Question</u>: Describe a time this semester when a science lesson or activity felt especially connected to your life, your community, or your culture. What made it meaningful to you?

Table A2: Classroom Observation Sheet

Classroom Observation Sheet

Observer: _____ Date: _____
 Class/Period: _____ Lesson Focus/Unit: _____
 Lesson Type: ☐ Culturally Responsive ☐ Traditional/Comparison

Rating Scale: 1 = Not Observed | 2 = Rarely | 3 = Sometimes | 4 = Frequently | 5 = Consistently

Student Engagement

Indicator	1	2	3	4	5
Students are attentive and on-task	☐	☐	☐	☐	☐
Students voluntarily participate	☐	☐	☐	☐	☐
Students collaborate with peers	☐	☐	☐	☐	☐
Students show enthusiasm or curiosity	☐	☐	☐	☐	☐

Student Confidence

Indicator	1	2	3	4	5
Students attempt to answer questions	☐	☐	☐	☐	☐
Students explain ideas using science language	☐	☐	☐	☐	☐
Students persist when tasks are challenging	☐	☐	☐	☐	☐

Cultural Relevance

Indicator	1	2	3	4	5
Lesson connects to Alaskan/local phenomena	☐	☐	☐	☐	☐
Students reference personal/cultural experiences	☐	☐	☐	☐	☐
Native language, storytelling, or elder knowledge used	☐	☐	☐	☐	☐

Conceptual Understanding

Indicator	1	2	3	4	5
Students apply prior knowledge accurately	☐	☐	☐	☐	☐
Students make meaningful connections	☐	☐	☐	☐	☐

Field Notes:

Table A3: Student Interview Protocol

Student Interview Protocol

Interviewer: _____ Date: _____ Class/Period: _____

Opening Script: Thank you for agreeing to talk with me today. There are no right or wrong answers. Your participation is voluntary, and your responses are confidential.

1. How would you describe your experience in Physical Science this semester so far?
2. What kinds of science lessons do you usually enjoy the most? Why?
3. Can you describe a lesson or activity that felt especially interesting or engaging?
4. Do lessons that connect to Alaska, your community, or your culture feel different? How?
5. How confident do you feel when learning new science concepts this semester?
6. Have any lessons helped you feel more comfortable sharing your ideas?
7. Can you think of a time when a science lesson felt connected to your life or future?
8. Do you feel science matters to your life in Alaska? Why or why not?
9. What types of activities help you learn science best?
10. What would you change or add to make science class more meaningful?

APPENDIX B: MISCELLANEOUS MATERIALS

Table B1: IRP Approval



Outlook

IRB Protocol #2026-2419-EXEMPT APPROVED

From NoReply@TOPAZTI.net <NoReply@TOPAZTI.net>

Date Mon 2/9/2026 7:53 AM

To: walter@montana.com <walter@montana.com>; Holmes, Colton <colton.holmes1@student.montana.edu>; Szott, Brenna <brenna.szott@montana.edu>

****External Sender****

Hello Holmes, Colton,

Your protocol was reviewed by the IRB and has been approved.

Pl: Holmes, Colton

Approval Date: 2/9/2026

Title: Exploring Student Engagement Through Alaskan Native Culturally Responsive Science Teaching

Protocol #: 2026-2419-EXEMPT

Review Type: Exemption

Expiration Date: 2/9/2031

Work described under this protocol may now commence. The PI is responsible for ensuring that the protocol accurately describes research practices being conducted.

- > Review Category designation determined by the IRB can be found in the final section of your protocol.
- > Any changes must be submitted via Amendment prior to implementation.
- > Per the Common Rule, research only requires Interim (annual) Review by the IRB if 1) it was reviewed via Full Committee or 2) is regulated by the FDA.
- > All research is subject to post approval monitoring.
- > All protocol types must be renewed 5 years after approval.
- > Inform the IRB once your research is complete so that the protocol may be inactivated.

Please contact your IRB Program Manager with any questions or if you are in need of assistance. Thank you for your diligence in the care of human subjects research participants.

Institutional Review Board for the Protection of Human Subjects | Office of Research Compliance | Montana State University

Access your protocol anytime at <https://nam10.safelinks.protection.outlook.com/?>

[url=https://montanaiprod.topazti.net/%3FElements%3FemailLink%3D11%252c102%252c15202&data=05%7C02%7Ccolton.holmes1%40student.montana.edu%7C5434a3f998b84b86e1cb08de67fbc7ac%7C324aa97a03af644fc91e43846fbced113%7C07%7C0%7C639062528286949923%7CUnknown%7CTWFBvGZsb3d8evFbX8OeU1hcGkiOnRvdWUUSilyYoiIwLjUaUMCAwMCIslAiQJuaXw4zMiIsIkFOliqITWFpbCIsldUIovfO%3D%3D%7C7C%7C&sdata=%2B7yIHhaiIMTg7imF7qiWvgGY4r6kw8RIspAf4WI0Kic%3D&reserved=0](https://montanaiprod.topazti.net/%3FElements%3FemailLink%3D11%252c102%252c15202&data=05%7C02%7Ccolton.holmes1%40student.montana.edu%7C5434a3f998b84b86e1cb08de67fbc7ac%7C324aa97a03af644fc91e43846fbced113%7C07%7C0%7C639062528286949923%7CUnknown%7CTWFBvGZsb3d8evFbX8OeU1hcGkiOnRvdWUUSilyYoiIwLjUaUMCAwMCIslAiQJuaXw4zMiIsIkFOliqITWFpbCIsldUIovfO%3D%3D%7C7C%7C&sdata=%2B7yIHhaiIMTg7imF7qiWvgGY4r6kw8RIspAf4WI0Kic%3D&reserved=0)