

Tribal Legacies of Pathfinding
Secondary/Post-Secondary
Indigenous and Western Science
Carmelita Lamb, Ph.D. (Lipan Apache/Hispanic)



An in-depth investigation into the Corps of Discovery that invokes science, literacy, art, and inquiry from the worldview of the American Indian tribes along the Lewis and Clark Trail.

Curriculum Abstract:

The Honoring Tribal Legacies curriculum is designed to bring the richness of the American Indian experience to the Corps of Discovery mainstream story that has been widely recounted over the generations. Critical pieces of information and support were shared by American Indian people with Lewis and Clark which enabled them to successfully traverse the North American continent in 1804–1806. In terms of actual resources, the tribes along the trail furnished information regarding the terrain to be crossed, guides that were knowledgeable on many levels (geography, language, tribal associations), medicines derived from native plants, alternate sources of food that were plant-based when hunting was unsuccessful, multiple means of transportation (horses, canoes) and extended shelter from the harsh environmental elements. Without the contributions of these vital resources from the tribes they encountered along the journey, the explorers would have faced extreme hardship and possible failure in their mission to reach the Pacific Ocean.



Tribes that Lewis and Clark encountered along the way
<http://www.pbs.org/lewisandclark/native/>

Table of Contents

Curriculum Abstract

Curriculum Designer Biography

Teaching 1: Cartography

Teaching 2: Geological Formations

Teaching 3: Ethnobotany

Teaching 4: Human Adaptive Physiology

Appendices

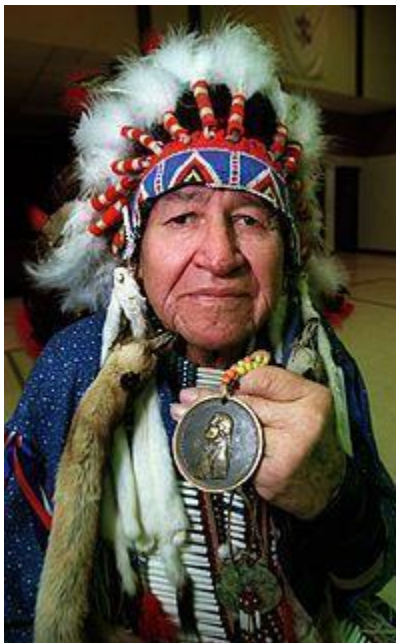
A. Learning Spiral & Assessment Materials

B. Teachings (1-4) Support Materials

C. Rubrics

D. Digital Reference and Support Materials

Document Analysis Guide



Indian artist Paha Ska, of Keystone, S.D., an Elder of the Oglala Sioux tribe from the Pine Ridge Reservation in South Dakota, holds an authentic Presidential Peace & Friendship Medallion from President Thomas Jefferson, Monday, Dec. 17, 2001, during a visit at St. Mary School in Elyria, Ohio. The medallion was given to Indian leaders by the Lewis and Clark Expedition in 1803. Paha Ska, who is about 80 years old, talked about and answered questions about Native Indians. (Photo/Paul M. Walsh)

Featured Contributor:

Tribal Legacies of Pathfinding is the work of Carmelita Lamb, Teacher Education Department Chair at Turtle Mountain Community College on the Turtle Mountain Indian Reservation in Belcourt, ND. Dr. Lamb has devoted her professional career to teacher training and development of American Indian students enrolled in the tribal college to become birth to grade 12 educators. She is of mixed heritage: Hispanic and Lipan Band of Apache. Although born and raised in south central Texas, she has completely immersed herself over a period of 33 years in the Northern Plains community, and has particularly strong personal ties to the Turtle Mountain Band of Chippewa Indians. Dr. Lamb is most noted for her love of science and the incorporation of Native Ways of Knowing into the science curriculum of Pre-K-12 classrooms. She has contributed multiple stories to the *Tribal College Journal* describing teacher education at Turtle Mountain Community College, served as a reviewer of scientific abstracts and proposals for the Society for the Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS), is a Mellon Fellow through the American Indian College Fund, and is a contributing writer for the *Mellon Tribal College Research Publication Series*. Carmelita is an avid horseback rider and enjoys extended time in nature picking berries, gardening, and canning.



Blue Roan Horse Effigy
Photograph by Butch Thunderhawk, Used with Permission

My Personal Pathfinding...

I want to share with you a candid reflection of my work with the Honoring Tribal Legacies project. Let me begin by sharing my first recollections of what the Lewis and Clark expedition represented to me as a young child. It was an obscure journey of individuals of whom I had no personal reference or context with respect to the tremendous significance of this trek. In the environment of a south Texas classroom this story was touched upon briefly and with almost no

significant detail as to the nature of the travelers other than the connection to the Louisiana Purchase and the tremendous amount of land acquired by the United States for such a small price! Later as an adult, and especially since my time with Native peoples of the Ft. Berthold, Turtle Mountain, Standing Rock, Spirit Lake, Crow, Blackfeet, Lummi and Yakama Reservations, this story has taken on cultural, societal, historical, and educational transformation in my understanding of how the story of the Lewis and Clark expedition needs to be recounted in the Honoring Tribal Legacies place-based multiliteracies curriculum.

As I approached the task of curriculum design, I was first drawn to the huge scientific “data-set” available for study. In my mind, I designed a curriculum entitled *Tribal Legacies of Pathfinding* that invoked complete immersion by all students in multiple sensory experiences involving the sciences (biological, botanical, geological) in a diverse and deeply collaborative way. The overarching question –“Who were the people serving as hosts to the Lewis and Clark explorers and why was their role so important to this story?” drives the entire *Tribal Legacies of Pathfinding* curriculum. Thus, the teachings of this curriculum were and are designed to act as a launching point for both student and instructor discovery.

I am a former North Dakota Horsemanship 4-H State Coordinator and a certified high school science teacher. I taught in secondary for 6 years in a high school that had 95% enrollment of American Indian students. This school was in a county that continues to have the highest poverty rate in ND. Many of the students were in single parent homes or lived with extended family members. Most came from families who did not have high school graduates. For most of these students school was a place to get a meal, a means of survival in the most basic of ways. The idea of being engaged in science was certainly not a priority for my students. Their experiences in this subject had been without cultural context or personal meaning up to this point. Yet I knew they were intelligent, innovative and curious. The problem to me seemed to stem from a lack of motivation and self confidence in their ability to learn. I began to research in the most rudimentary ways different strategies that would get my students away from the textbook and into the real wonder of science. My classroom moved from one collaborative project to another throughout the course of the academic year. Students spent time learning how to use technology for the purpose of discovery. I let them tell me what they wanted to learn about a particular subject and then I allowed them to pursue their interests within the content area. I honestly believe the shop teacher in that high school began to dread seeing me in his doorway for he knew I wanted something...wood, tools, PVC pipe, wool mesh, copper wire, nails, electrical tape...the requests were never ending. Through it all though, I believe that those students actually looked forward to coming to science class because they knew we were going to make something happen. This same philosophy of deep immersion, culturally responsive, collaborative, making something *happen* instruction, can be seen throughout this curriculum. Much of my career since that time has been in higher education within the tribal college and university (TCU) system, specifically teacher preparation for Native students; it seemed logical to pilot the *Tribal Legacies of Pathfinding* curriculum with pre-service Native teachers. The intent and inspiration was to model a highly engaging, deeply contextual learning experience that would invoke skill development in science certainly, but also in literary research, artistic design, and project-based cooperative learning.

Through this pilot process much was learned with regard to Native student perceptions of the Lewis and Clark expedition. While all students knew of this historical event, many stated they never made the connection between the survival of the travelers being dependent upon the generous “hosting” of the numerous American Indian tribes along what is now referred to as the Lewis and Clark National Historic Trail (hereafter referred to as the Trail). During the research phase of the curriculum necessary to create the timeline and identify multiple tribes living along the Trail, students were filled with a sense of wonder, surprise, and pride at what American Indian people actually contributed to this epic journey.

With this joy of discovery also came the realization, however, of how *differently* the story had been told to each of them in primary and secondary school. It was at this point that I asked the crucial question: “How will *you* teach the story of the Lewis and Clark expedition when you become Early Childhood, Elementary and Secondary teachers?” Here is a sample of their responses:

- “I think it’s important for students to know about the highly developed systems of commerce and trade that Indians had established long before Lewis and Clark.”
- “The idea of how much tribal people contributed to this journey and that not one person was ever killed or harmed by a Native person is important to me.”
- “I thought it was interesting how the map given to Lewis and Clark by the Mandans was so important to the navigation along the Trail. The Mandan map is not talked about much, I would emphasize that more.”
- “In the textbooks that I read in school Indians were always portrayed as savages. That is wrong, they gave so much more than they received from the explorers, they were generous and kind and so knowledgeable in science. I think this is something that I would really emphasize about this unit when I do it in my classroom.”

Their responses reaffirmed the appropriateness of my strategy to pilot the curriculum with pre-service teachers. Once the students had completed the *Tribal Legacies of Pathfinding* curriculum, they were eager to pass their new-found knowledge and Indigenous perspective of this historical event to their students in a much more balanced way which completed a circle of understanding inclusive of both Euro- and Native American contributions. Through this deeply engaging learning experience, the beautifully rich perspectives of all Native people along the Trail are honored, thus truly becoming a lesson about Honoring Tribal Legacies for us all to appreciate.

I have grown intellectually, extended myself emotionally, embraced the social aspects of the community we created in my classroom, and have grown spiritually while designing the *Tribal Legacies of Pathfinding* curriculum. The experience left me with a grounded and profound understanding of the benefits that Native students receive when they look at themselves in a more positive and enduring manner.

HONORING TRIBAL LEGACIES

Place-Based Teachings (Curriculum Units)

Note to Editor: this is where I would like to place the diagram that depicts how each curriculum fits into a Place-Based Teaching paradigm. I could not get the graphic to load up as it is made of a composite of smaller embedded graphics (each color block of the diagram is separate and the overall diagram is a separate image). Anyway, I will let those more knowledgeable in this technical area deal with it!

Tribal Legacies of Pathfinding

Introduction

This curriculum design is based upon a model posed by Inglebret and CHiXapkaid (2013), the Place-Based Multiliteracies Learning Spiral (Appendix A). This framework approaches learning from a holistic perspective that is centered on the elements of a particular place. Using this model teachers and students work together to design learning environments that value multiple ways of knowing and diverse forms of literacy. Vine Deloria Jr. (1991) effectively defines “place” as a dynamic entity that involves interactions and relationships which include the natural environment, peoples, and the built environment, as viewed through time.¹ The story of the Corps of Discovery can only be described fully within this learning framework, as it is a true reflection of the Indigenous worldview by way of the incorporation of auditory, linguistic, gestural, sensory (smell/taste), spatial (location, time, orientation of the body) spiritual, tactile and visual interpretation of an experience.

Honoring Tribal Legacies Standard (The Eleventh Standard):

Demonstrate environmental stewardship and a sense of service achieved through acknowledgement of the interconnectedness of humanity in historical, cultural, scientific, and spiritual contexts.

Common Core State Standards within Language Arts that support this Unit:

English Language Arts—Science & Technical Subjects: Grade 9-10

- CCSS ELA-Literacy.RST.9-10.2: Determine the central ideas of conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
- CCSS ELA-Literacy.RST.9-10.4: Determine the meaning of symbols, key terms, and other domain specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.
- CCSS ELA-Literacy.RST.9-10.9: Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

Curriculum Expressions

Big Idea:

Honoring Tribal Legacies along the Lewis and Clark National Historic Trail.

Enduring Understanding(s):

Indigenous peoples had been living along the exploration trail for thousands of years prior to the Lewis and Clark expedition. These Native people had developed sophisticated survival techniques that were place-based and in harmony with the cycles of nature. The teachings of this knowledge were passed down from the tribes along the Trail to the exploration team and

¹ Deloria, V. (1991) Reflection and revelation: Knowing land, places, and ourselves. In J. A. Swan (ed.), *The power of place: Sacred ground in natural and human environments*. (pp. 28-40). Wheaton, IL: Quest Books.

ultimately contributed to the successful completion of the journey.

Essential Question(s):

1. How did early civilizations navigate the continents and oceans?
2. How were traditional maps (land-based points of reference) incorporated into the cartography of the final map of the expedition that was submitted in 1814 to President Jefferson?
3. How did the Native peoples along the trail affect the final map product?
4. What geological/ecological changes have occurred along the trail since 1862?
5. What are the Native understandings and representations of these changes?
6. What essential survival techniques were shared between the tribes and the expedition team members and what stories (written or oral) were created from this sharing?

Basic scientific concepts under investigation in this curriculum:

- Cartography—TEACHING 1
 - How were maps made in the early 1800's?
 - How is current map making different, and similar?
 - What were unique features of the maps given to Lewis and Clark by the tribes along the Trail?
 - What were the tools used in guiding people on travels in the 1800's?
 - What about before this time?
- Geological Formations along the Trail—TEACHING 2
 - What are the greatest geological challenges that were encountered on the trail?
 - How did the exploration team negotiate these natural obstacles?
 - What did they learn from the Indian people who were with them?
 - Using external research documents, develop a timeline of the expedition including the engagement of each tribal nation along the way.
 - Depict the major geological formations in a three-dimensional way on your timeline. Include the Indigenous names for these places as well as the modern recognized names.
- Ethnobotany—TEACHING 3
 - What was the significance of making records of the plant life along the Trail?
 - What were the contributions made by the Native peoples to these records?
 - Compile a digital collection of the flora described in the Corps of Discovery journals. Label these samples with the Indigenous name and current scientific taxonomy, and affix them to your timeline in the appropriate tribal homelands.
- Human Adaptive Physiology—TEACHING 4
 - What were the items necessary for the expedition party to survive?
 - How effective were they in their planning?
 - Depict key items used by the expedition to meet the physiological needs of the explorers on the timeline.
 - What did the Native people know that the explorers didn't with regard to maintaining physical health in the northern climate, and how did they share their knowledge?
 - How were the traditional knowledge sets of the Native people along the Trail important to the survival of the Corps of Discovery participants?

SUMMATIVE ASSESSMENT OPTIONS:

- (a) Data collection, interpretation and reporting are incorporated into a final digital piece using a presentation application of choice (EdCanvas, Prezi, Symbaloo) which utilizes student research based upon primary documents, such as journal entries, archived letters, literary accounts (non-fiction), and Web-based scientifically acclaimed research (ex. National Geographic <http://www.nationalgeographic.com/lewisandclark/>).
- (b) Students (working as cooperative groups) will submit a final three-dimensional project that reflects their understanding of the Lewis and Clark expedition based upon the study of cartography, geology, ethnobotany, and human adaptive physiology. The rubric for this project is located in Appendix C.
- (c) Students will create their own journal of how they have interpreted each key component of the Honoring Tribal Legacies curriculum (cartography, geology, ethnobotany, and human adaptive physiology). This journal may be either digital or analog and may incorporate songs, art, mixed media, prose, interview, and film.

[Insert photograph, PowerPoint slide 11, here]

Tribal Legacies of Pathfinding

Teachings: Lesson Plans

Teaching 1: Cartography

Grade Level: High School, grades 9–10

- Learning Objectives: aligned with appropriate Common Core State Standards (grade level and content area)
 - CCSS English Language Arts>Science and Technical Subjects G 9–10.
 - RST.9–10.2 “Determine the central ideas of conclusions of a text....”
 - RST.9–10.4 “Determine the meaning of symbols, key terms, and other domain specific words and phrases....”
 - RST.9–10.9 “Compare and contrast findings presented in a text to those from other sources....”

Students will:

- Investigate the technical steps necessary to create a map.
- Compare the understandings of physical location during the time of the Lewis and Clark expedition to modern locating systems incorporating measurements of latitude and longitude.
- Research ways in which they can make a map of a location along the Trail which is closest to their homes.
- Integrate astronomical data from their Stellarium² application or other astronomical software (such as StarWalk³) into their own place-based map.
- Present their map to the class with explanations of important landmarks.
- Display their art/science project work in the classroom.
- Entry Question(s):
 - How are maps made?
 - What are vital understandings in the development of an accurate map?
 - Who are maps intended for?
 - Do maps only address linear direction? What other information about a place can be conveyed on a map?
 - What were some Native methods of location determination?
 - What are characteristics of maps of a place over time?
 - How many ways are descriptions of a journey communicated? Think of this across the globe.
 - How is a data set analyzed in the realm of mapping?
 - Who would have been responsible for this task of compiling data in the exploration of the Lewis and Clark trail?
 - How did the Native people involved in this journey contribute to the data set?

² www.stellarium.org

²This application is a free web based application that can superimpose the skyscape of any location on the globe at any point in history. Students may load the latitude and longitude coordinates and the date and a screenshot of the orientation of celestial bodies will be displayed thus mimicking the navigational tools used by Native and non-Native people in the early 1800’s.

³ StarWalk is an application similar to Stellarium that is available on iPad devices for \$2.99.

- Materials:
 1. Student access to computers or iPads, using:
 - a. Prezi <http://prezi.com/>
 - b. National Park Service Mapping program
<http://imgis.nps.gov/DSC/Viewer/?Viewer=LECL>
 - c. Stellarium <http://www.stellarium.org/>
 - d. EdCanvas <http://www.edcanvas.com/>
 - e. StarWalk app for iPads.
 2. Content based readings and videos (See Appendix B and D for support materials):
 - a. <http://www.edgate.com/lewisandclark/cartography.html>
 - b. <http://www.youtube.com/watch?v=wXaENXchtLE>
 - c. <http://www.lewis-clark.org/content/content-article.asp?ArticleID=1263>
 3. Teaching 1 Handout in Appendix B.
 4. Heavy-duty, wax-backed paper (double-layered butcher paper works well for this with the waxed sides of the paper facing each other on the inside).
 5. Paints, art pencils, markers, crayons.
- Learning Modalities: Visual, Tactile, Spatial, Linguistic, Multimodal.
- Place-Based Multiliteracies Learning Spiral (Refer to Appendix A):
Explicit teaching strategies, specific questions, comments, and directions for use by teachers.

Situated Practice: Students should be presented with a broad overview of the intended mission of the Lewis and Clark expedition through the resources noted in the resource section of this curriculum; visualization of a map of the U.S. circa 1860; overlay of the Louisiana Purchase; identification of student's "home" on that map; discussion on the manner in which guests are received at their home, describing the traditions, modes of hospitality and family behaviors; discussion of using a map to find their way in an unfamiliar environment.

Overt Instruction: Design modes tie back to the CCSS defined in the Unit (ELA-Science and Technical Subject). Focused instruction will occur in the development of student skills in the technical navigation of the National Park Service mapping applications, design of the EdCanvas (or other presentation application) which will contain the critical research materials from which the students will reference their written work, three-dimensional work, as well as public presentations. In addition, students will receive instruction in the design and development of a timeline that will incorporate dioramas of key moments along the Trail as well as the geographic/geological sites they will construct from the references to historically important tribal places, references to flora and fauna cited in the primary documents (journal entries by Corps of Discovery members) and expressions of the human physiological response to the environment along the Trail. Students will be exposed to the astronomy technology (ex. Stellarium) and will interpose coordinates into the software program to replicate the night sky along the Trail and how this ancient "compass" influenced the movement of human beings across the planet as well as

along the Trail.

Critical Framing: The story of the Lewis and Clark Trail is more than one of a precursor to Manifest Destiny. It's important to understand that two stories are being told here, that sovereign nations across the North Central and North Western reaches of what is now the United States all played a part in this narrative and are vital to the overall human experience that shaped the future of this country.

Transformed Practice: This lesson guides the student in the conceptual understanding of how raw data collection for mapping was done in the early 1800's and now. It also brings to the forefront how the Native tribes along the Trail contributed to the original data set in significant ways.

- Differentiated instruction for advanced and struggling learners:
 - Four Corners for linguistic learners⁴ (Refer to page 98 of the cited document for details).
 - Choral Response for auditory learners (brain-based techniques).
 - Inside-Outside Circle for kinesthetic learners.⁵
 - Concept Maps for visual learners.
- Suggested Formative Assessment of Learning Outcomes:
 - Monitor student fluency in navigating the National Park Service mapping program.
 - Engage students in discussions concerning the night sky along the Trail and how the Stellarium program helps to visualize how the tribes along the Trail had used stars for navigation.
 - As student groups develop their timeline and 3-D dioramas, question their use of materials to convey the image of the Trail and why they selected certain tribal areas/places for their diorama scenes, how students selected certain plants and animals they would depict along their timeline and why, and finally, engage students in the understanding of the human physiological limits when subjected to the environmental elements encountered along the Trail.

- Student Outcomes:
 - Students will understand the significant contributions by Native peoples along the Lewis and Clark Trail to the success of the Corps of Discovery.
 - Students will create historically accurate depictions of the Trail using the assistance of National Park Service mapping applications.
 - Students will understand the navigation tools used by Native people as well as those of Lewis and Clark on their journey. A study of the stellar constellations will result in a sequenced “map” along the latitude and longitude of the Trail.

⁴ Sanchez, Nicolas (2010). Interactive classroom strategies and structures for success: Focus on English learners. At: <http://www.csustan.edu/SAIL/documents/InteractiveClassroomStrategiesandStructuresforSuccess-Dr.FranciscaSanchez.pdf>.

⁵ http://eworkshop.on.ca/edu/pdf/Mod36_coop_inside-outside.pdf.

- Culminating Performance Assessment of Learning Outcomes:
 - Student constructed maps, timelines, and dioramas.
 - Student digital presentations of the Trail using Prezi or EdCanvas and incorporating the Stellarium program to show the constellations along the navigational coordinates from St. Louis to Fort Clatsop.
- Using Primary Sources:

Share general advice drawn from personal stories about collaborating with tribal communities, particularly with elders and traditional cultural bearers often sought out to present in classes. Students will use the Document Analysis Guide (found in the Support Materials section) to help them determine appropriate use of primary sources.

[Insert photograph, Power Point slide 8 here]

Teaching 2: Geological Formations

Note to Teachers: Here is where the actual construction of the timeline really begins to unfold. The timeline becomes the repository for all the data that the students have collected on the Lewis and Clark expedition. The timeline should be divided into “chunks” of time that each group becomes directly responsible for creating. It involves science, history, culture, and art in an overall product that truly immerses each student in this great story. For the best experience, a place should be devoted to this piece that allows for continued work by the class. As it begins to take shape students “think” about how their section can be more true-to-life and find objects from any number of sources to put on the timeline that will add to the science, history, and culture of the overall project.

Grade Level: High School, grades 9–10.

Learning Objectives: aligned with appropriate Common Core State Standards (grade level and content area).

CCSS English Language Arts>Science and Technical Subjects G 9–10.

- RST.9–10.2 “Determine the central ideas of conclusions of a text....”
- RST.9–10.4 “Determine the meaning of symbols, key terms, and other domain specific words and phrases....”
- RST.9–10.9 “Compare and contrast findings presented in a text to those from other sources....”

Students will:

- Investigate the first-hand journal entries from the Corps of Discovery found on the website:
<https://maps.google.com/maps/ms?ie=UTF8&t=h&oe=UTF8&msa=0&msid=202977755949863934429.00049f8ff9a29bab34a82> (student groups should select certain dates along the timeline of this expedition and tailor their investigations around that particular time in the historical record).
- Compare the understandings of physical location during the time of the Lewis and Clark expedition to modern locating systems.
- Research ways in which they can make a map of a location along the Trail which is closest to their homes.
- Depict a three-dimensional model of geographic places along the Trail upon their timeline from Teaching 1, for places that hold tribal/spiritual significance.
- Present their updated timeline with three-dimensional formations to the class with explanations of tribal places of significance.

Entry Question(s):

- What are the greatest geological challenges that were encountered on the Trail?
- How did the exploration team negotiate these natural obstacles?
- What did they learn from the Indian people who were with them with regard to sacred places?

Materials (dioramas depicting significant tribal places along the Trail):

1. Model making materials for 2-D/3-D, such as paper, paint, rulers, clay, paper mache supplies, quick set plaster (the type used for making a cast on broken limbs of humans

and animals works best; it is meshed and dries quickly), tree branches, leaves, any or all things that will add to the richness of the diorama. Students should be free to explore their own creative imaginations in developing this comprehensive art-science project!

- Learning Modalities: Visual, Tactile, Spatial, Linguistic, Multimodal.
- Place-Based Multiliteracies Learning Spiral (Refer to Appendix A):
Explicit teaching strategies, specific questions, comments, and directions for use by teachers.

Situated Practice: Students will refer to their work in Teaching 1 and deepen their knowledge by studying the major geological formations along the Trail and the challenges that may have been associated with those formations. The timeline serves as a seasonal reference point, which together with the geology of the Trail makes a contextual connection for students with regard to navigation along the Trail by the Corps of Discovery.

Overt Instruction: Design modes tie back to the CCSS defined in the Unit. Focused instruction will occur in the development of student skills in researching the geology of the Trail and the inclusion of seasonal changes most likely to have occurred as the traveler migrated west. Students will incorporate the traditional names of critical tribal sites into their depiction of the geological formation on the timeline from Teaching 1.

Critical Framing: Students will be mindful of how the geology of the Lewis and Clark Trail has changed yet remained the same over time. A written reflection of their thoughts should be part of this unit (<http://www.creative-writing-ideas-and-activities.com/creative-journal-writing.html>) and included in the overall PowerPoint, Prezi, EdCanvas or whichever means of presentation platform they select to showcase their knowledge of this subject.

Transformed Practice: Although the places have remained the same, the Indigenous names associated with the tribal lands traveled upon by the Corps of Discovery have been superimposed upon by the names given by non-Native visitors.

- Differentiated instruction for advanced and struggling learners:
It is important to recognize the importance and significance of the Indigenous names and include them as reference points when studying the Trail.
 - Four Corners for linguistic learners.
 - Choral Response for auditory learners (brain-based techniques).
 - Inside-Outside Circle for kinesthetic learners.
 - Flow Maps for visual learners.
- Suggested Formative Assessment of Learning Outcomes:
 - Monitor student fluency in using the National Park Service mapping program.
 - Engage students in discussions concerning the night sky along the Trail and how

the Stellarium program helps to visualize how the tribes along the Trail had used stars for navigation.

- As student groups develop their timeline and 3-D dioramas, question their use of materials to convey the image of the Trail and why they selected certain tribal areas/places for their diorama scenes, how students selected certain plants and animals to depict along their timeline and why, and finally engage students in the understanding of the human physiological limits when subjected to the environmental elements encountered along the Trail.

□ Student Outcomes:

- Students will understand the significant contributions by Native peoples along the Lewis and Clark Trail to the success of the Corps of Discovery.
- Students will create geologically accurate models of tribally significant places along the Trail.
- Students will understand the significance of how the new Euro-based names assigned to Indigenous traditional places affected the tribal groups' sense of place along the Trail.
- Students will research the navigation tools used by the explorers in their attempt to develop a map of the Trail: <http://lewis-clark.org/content/content-channel.asp?ChannelID=61>.
- Students will compare the mapping techniques of Native people with those of Lewis and Clark.
- Students may include screen capture information from Stellarium to support the comparison of European-Native mapping techniques.

□ Culminating Performance Assessment of Learning Outcomes:

- Student-constructed maps, time lines, and dioramas.
- Student digital presentations of the Trail (ex. Prezi) incorporating the Stellarium program to show the constellations along the navigational coordinates from St. Louis to Fort Clatsop.

□ Using Primary Sources:

Share general advice drawn from personal stories about collaborating with tribal communities, particularly with elders and traditional cultural bearers often sought out to present in classes. Students will use the Document Analysis Guide (found in the Support Materials section) to help them determine appropriate use of primary sources.

[Insert photograph, 010.JPG here]

Teaching 3: Flora and Fauna

Grade Level: High School, grades 9-10.

Learning Objectives: aligned with appropriate Common Core State Standards (grade level and content area):

CCSS English Language Arts>Science and Technical Subjects G 9–10.

- o RST.9–10.2 “Determine the central ideas or conclusions of a text....”
- o RST.9–10.4 “Determine the meaning of symbols, key terms, and other domain specific words and phrases....”
- o RST.9–10.9 “Compare and contrast findings presented in a text to those from other sources....”

Students will:

- o research the flora and fauna described in the journals of Clark and make connections to the medicinal properties of certain plants that were important to tribal peoples along the Trail.
- o develop journals of flora and fauna with drawings and Indigenous names as well as names assigned by Lewis and Clark. These drawings will be incorporated into the timeline/diorama/geological formation, three-dimensional project started in Teachings 1 and 2.
- o Students will listen to the story of the journey through the voices of tribal elders along the Trail, especially the Tent of Many Voices (http://www.lewisandclark.org/partners/many_voices.pdf) and from these oral histories will write their own story from the perspective of a Native/non-Native youth (of their own age).
- o Write a short skit that depicts key moments along the Trail from the perspective of a Native youth.

Entry Question(s):

- o What are the names of some common plants that were used for food? For medicine?
- o How were these plants represented in the primary documents (Lewis and Clark journal entries)?
- o What were the primary sources of animal protein along the Trail?
- o Describe the habitat of these creatures and their significance from a tribal perspective.

Materials:

Digital research devices, art materials for drawing plants and animals, toothpicks or popsicle sticks with glue for displaying the flora and fauna at points along the timeline.

- Learning Modalities: Visual, Tactile, Spatial, Linguistic, Multimodal.
- Place-Based Multiliteracies Learning Spiral (Refer to Appendix A):
Explicit teaching strategies, specific questions, comments, and directions for use by teachers.

Situated Practice: Students should be presented with multiple resources that are visually rich in the representation of the flora and fauna recorded in the journals of Lewis, Clark and others in the group who observed the vast richness of nature’s

diversity in the northwest. See: <http://www.lewis-clark.org/content/content-channel.asp?ChannelID=60>. Students will be directed to the journal entries in order to develop a perspective from the view of the explorers as well as the Native interpretations of how the explorers behaved in their tribal homelands with respect to nature. See:

<http://apps2.nlm.nih.gov/nativevoices/interviews/index.cfm?mode=video&speaker=73&clipId=20>.

<http://apps2.nlm.nih.gov/nativevoices/interviews/index.cfm?mode=theme&theme=3>.

Overt Instruction: Design modes tie back to the CCSS defined in the Unit. Focused instruction will occur in the development of student skills in the botanical and zoological identification of plants and animals and their natural habitat and contribution to the survival of the Lewis and Clark expedition. See http://lewisandclarkjournals.unl.edu/read/?_xslsrc=lc.img.corpus.04.xml&_xslsrc=L_Cstyles.xsl.

Critical Framing: Students will be asked to delve into how the attitude toward nature has changed since the time of the Corps of Discovery. Primary resource documents should provide evidence supporting their conceptual framework. How have the natural resources along the Trail changed in the 200+ years since the explorers were there? Why have these changes occurred and who is most affected by the changes?

Transformed Practice: This lesson is meant to bring forward the vast diversity of nature along the Trail and how the natural resources have been challenged by humankind since the Corps of Discovery walked across the tribal homelands of the people living there. Students are encouraged to think critically about how the continued ecological practices of humankind may affect the survival of the planet. Extrapolation exercises would emphasize the startling pace at which the ecology along the Trail is changing.

- Differentiated instruction for advanced and struggling learners:
 - Four Corners for linguistic learners.
 - Choral Response for auditory learners (brain-based techniques).
 - Inside-Outside Circle for kinesthetic learners.
 - Concept Maps for visual learners.
- Suggested Formative Assessment of Learning Outcomes:
 - Student proficiency in researching various sources to find examples of the species of flora and fauna found in the early 1800's along the Trail.
 - Observe the various ways in which students choose to depict their collection of samples of flora and fauna on their timeline using Indigenous and scientific nomenclature as well as the significance of certain plants to healing and medicine in traditional cultures.

□ Student Outcomes:

- Students will gain a deeper understanding of the diversity of nature along the

Trail, the contributions of the flora and fauna to the survival of the expedition, the sharing of traditional knowledge with the explorers in order that they may be well and continue in their journey.

- Students will write in their journals personal reflections regarding their findings. The journals may be either digital or analog and may include any number of design platforms (music, art, prose, film) to enrich their story.
- Culminating Performance Assessment of Learning Outcomes:
 - Students continue to add their new found knowledge to the original timeline. Now incorporated will be researched flora and fauna depicted in multiple spatial dimensions.
- Using Primary Sources:

Share general advice drawn from personal stories about collaborating with tribal communities, medicine people, berry gatherers, root diggers, harvesters of sage and cedar; particularly with elders and traditional cultural bearers often sought out to present in classes.

[Insert photograph 030.JPG here]

Teaching 4: Human Adaptive Physiology

Grade Level: High School, grades 9–10.

Learning Objectives: aligned with appropriate Common Core State Standards (grade level and content area).

CCSS English Language Arts>Science and Technical Subjects G 9–10.

- RST.9–10.2 “Determine the central ideas or conclusions of a text....”
- RST.9–10.4 “Determine the meaning of symbols, key terms, and other domain specific words and phrases....”
- RST.9–10.9 “Compare and contrast findings presented in a text to those from other sources....”

Students will:

- Review the Lewis and Clark journals from May 1804 to September 1806 and plot the temperature entries which would pose physiological problems for the people on the expedition. See:
http://www.nationalgeographic.com/lewisandclark/journals_maps_4.html.
- Document the events that occurred along the Trail that posed physical distress to the expedition (for example, on Wednesday April 24, 1805, Meriwether notes that the wind is so fierce that water is brought onto the boats and the men complain of painful eyes), and draw inferences as to the cause of human physical discomfort.
- Describe how the explorers dealt with the physical difficulties they encountered.
- Compare how Lewis and Clark’s group dealt with the environmental and physical hardship to how modern camping has made these conditions more bearable.
- Develop a chart which shows 10 items brought along on the expedition by both Lewis and Clark as well as their tribal companions and the modern counterpart to that piece of camping equipment.
- Plot along the timeline the specific areas where journal entries are most compelling with regard to human physical effort and provide a brief summary of the incident and how the explorers were able to cope.

Entry Question(s):

- What are examples of environmental conditions that can be potentially dangerous to human survival?
- How have survival techniques changed since the time of the Lewis and Clark expedition?
- Are there some situations today that have not changed since the time of the expedition with regard to human physical risk?

- Learning Modalities: Visual, Tactile, Spatial, Linguistic, Multimodal.
- Place-Based Multiliteracies Learning Spiral (Refer to Appendix A):
Explicit teaching strategies, specific questions, comments, and directions for use by teachers.

Situated Practice: Depending on the age group in which this lesson is presented (9th grade general Biology or 12th grade Advanced human anatomy/physiology), the lesson may need to be modified to meet the needs of all learners in each phase of the

learning experience (researching the biology of the human body, thermoregulation, disease immunity, or dietary influence on physiologic homeostasis).

Overt Instruction: Of all of the Teachings thus far presented, perhaps this one speaks to the spirituality of the experience most directly. The students will begin to understand how the very nature of the human spirit propelled this band of travelers across the Northwest to the Pacific Coast. Students will be asked to reflect deeply upon what they have learned through the Honoring Tribal Legacies curriculum and voice their understandings of how the timeline was a multilayered assessment of their extensive research and interpretation of this event.

Critical Framing: As the multidimensional story of the expedition has now been fully embraced, students will appreciate each tribal nation along the Trail and the contribution of each tribe to safe passage. No longer is the story of the Lewis and Clark expedition a one-sided tale that is merely an expression of Manifest Destiny, but rather a historical story of first contact between two sovereign peoples.

- Differentiated instruction for advanced and struggling learners:
 - Four Corners for linguistic learners.
 - Choral Response for auditory learners (brain-based techniques).
 - Inside-Outside Circle for kinesthetic learners.
 - Flow Maps for visual learners.
- Suggested Formative Assessment of Learning Outcomes:
 - Student proficiency in researching various sources, making comparisons between human physiology in 1804-6 and today, and drawing conclusions with regard to the differences noted and possible explanations for these physiological changes (diet, environment, disease, lack of basic resources).
- Student Outcomes:
 - Students will gain a deeper understanding of the physical limitations and capabilities of the human body.
- Culminating Performance Assessment of Learning Outcomes:
 - Students continue to add their new found knowledge to the original timeline.
 - Students will be asked to create short films (interview, narrative, soliloquy) that reveal their personal reactions to the “journey” they have made in learning the historically equitable story of the Lewis and Clark expedition through Honoring Tribal Legacies. This will capture the sentiments of the students in their engagement of this deep learning process and provide valuable feedback to educators for future modifications of the Pathfinding curriculum.
- Using Primary Sources:

In this lesson, perhaps the greatest use of primary sources is in the development of a base knowledge in the physiological limitations of the human body. By researching the Lewis and Clark journal entries, students will discover how remarkable it was that none perished along

the way except for one in the first weeks in South Dakota. Share general advice drawn from personal stories about collaborating with tribal communities, medicine people, berry gatherers, root diggers, harvesters of sage and cedar; particularly with elders and traditional cultural bearers often sought out to present in classes.

[Insert photograph Power Point slide 10 here]

APPENDIX A

Learning Spiral & Assessment Materials

HONORING TRIBAL LEGACIES PLACE-BASED, MULTILITERACIES LEARNING SPIRAL

Ella Inglebret, Washington State University
CHI Xapkaid, University of Oregon

FRAMEWORK

A place-based, multiliteracies framework approaches learning holistically in a manner that is centered on the elements of a particular place. Using the framework, teachers and students work together to design a learning environment that values multiple ways of knowing and diverse forms of literacy. Understanding and respecting multiple viewpoints serves as a foundation for generating creative responses to challenges faced in real world contexts. In the following, the underlying concept of place and of multiliteracies is described along with the associated place-based, multiliteracies process.

PLACE - a holistic and dynamic entity that involves interactions and relationships among many elements (Vine Deloria, Jr., 2001), including the natural environment, peoples, and the built environment, as viewed through time. The scope of territory involved may be limited to a specific location, such as a school yard, natural site, or local community, or may be more expansive, such as an entire national historic trail.

• **Natural Environment** - all living and nonliving things inclusive of physical features and forces that interact to form natural ecological systems; examples of natural elements include plants, animals, water, air, soil, geologic formations, climate, micro-organisms, landscapes, and energy

• **Peoples** - groups of people who have historically inhabited, currently inhabit, or have passed through a particular place

• **Built Environment** - spaces used by humans that have been constructed or altered by human labor; examples include parks, roads, buildings, trails, mining sites, and cities

• **Time** - involves concepts of past, present, and future; may be viewed in different ways, such as occurring along a line (timeline) or as a circle with interconnections among past, present, and future

• **Scope of Territory** - dimensions of a geographic region examined varying from a specific location, such as a school yard, natural site, or local community, to a more expansive region, such as an entire national historic trail

PROCESS

Situated Practice

- Begins with knowledge and skills that students bring to learning
- Prior knowledge is used as a foundation for new knowledge
- **Defining Place:** Students and teachers are positioned as part of a place and each identifies his/her perceptions of and experiences of a particular place

Overt Instruction

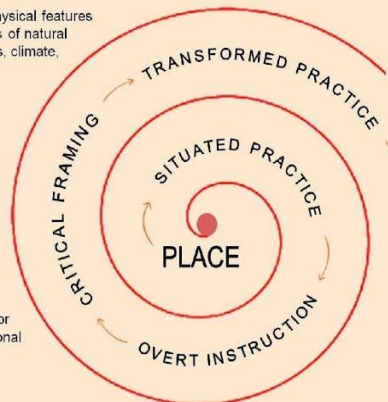
- Design modes and factors associated with their use are explicitly taught
- **Defining Place:** Various design modes that might be used to learn about a place are explored and reasons for selecting each are identified

Critical Framing

- The learning process and design modes are examined from various stakeholder perspectives
- Assumptions underlying various perspectives are explicitly analyzed
- **Defining Place:** Various stakeholder groups associated with a place are identified and their perspectives are explored

Transformed Practice

- Selected design modes are used to address real life concerns for a real purpose and for a real audience
- Learning is connected to individual lives, communities, and society
- **Defining Place:** Multiple ways of understanding a place and associated concerns are recognized, valued, and acted upon



MULTILITERACIES - systems for perceiving and making meaning of (interpreting) our world through one or a combination of the following design modes (modalities)

• **Auditory** - sense or act of hearing; for example, awareness of voice, environmental and animal sounds, loudness, rhythm, and music

• **Linguistic** - a set of symbols or language(s) commonly understood and used by a group of people; for example, awareness of oral and written stories, poetry, speeches, books, and names of places

• **Movement/gestural** - sense and act of body movement as a whole or as parts (such as arms, hands, head, eyes); includes expression of personal feelings and affect

• **Smell/taste** - sensory awareness through the nose and mouth; for example, awareness of odors associated with plants, soil, water, animals, and industrial sites and tastes and odors associated with particular foods

• **Spatial** - sense of space; awareness of the relationship among elements (such as location, distance, and time), including body position in space

• **Spiritual** - process of self-discovery, of searching for meaning and purpose in life, and of learning who you are and who you want to become; a sense of interconnectedness and interdependence among all elements of life

• **Tactile** - sense or act of touching; for example, awareness of textures and pressure, such as light or firm touch

• **Visual** - sense or act of seeing; for example, awareness of color, shape, size, angles, and composition (foreground and background)

APPENDIX B

Teachings (1-4) Support Materials

Teaching 1



Please navigate to the following link to find information that will answer these questions:
<http://www.edgate.com/lewisandclark/cartography.html>.

CARTOGRAPHY CONCEPTS

1. Describe 4 different types of maps and their purposes.
2. What is the name of the grid system used in mapping and why is it important?

3. Describe how you can predict distance and direction on a map.

4. Since there had not been a map available to the Corps of Discovery team on their travels across to the Northwest, describe the steps and tools they used in order to construct the first modern map of this area.



INDIAN COUNTRY

1. How did American Indians contribute to the Corps of Discovery's geographical information along the Trail?
2. What were the three distinct Indian cultural areas traversed by the Corps of Discovery? Identify individual tribes within those groups and their lifestyles.
3. How did the tribes along the Trail describe their scale with respect to time and distance?

MAPPING THE TRAIL

1. What were the names of the primary maps prepared by Lewis and Clark? What was unique about these maps and why were they important to the mission of this exploration?
2. What were the events that led to the difficult travel through Lolo Pass? Who greeted the expedition members when they emerged from this part of the Trail and how was the outcome of the expedition affected?
3. Why was it that the tribes who met these strangers were friendly? Were there times/incidences when the expedition could have failed? What were they (specifically)? Describe how the explorers were able to survive.
4. How did the Indians make maps to show Lewis and Clark the way west? Describe each method and provide reasoning for the importance of each type of map.

5. What gift did the Mandan Chief Shahaka (Big White) share with Clark and what did it show?

Chief Shahaka



Image source:

http://www.ndstudies.org/resources/IndianStudies/threeaffiliated/leaders_trad_mandan.html

6. Compare the navigational instruments used for mapping in 1804 with those available to cartographers today. Provide images of these tools and discuss their relative accuracy in mapping.
7. What navigational mistake led to a more difficult passage across the Rocky Mountains? What was the outcome?

FILLING IN THE EMPTY SPACES

1. By 1810 Clark was finishing his final map of the Corps of Discovery Trail. Describe contributors to this final product and how the information was included?
2. Consider each of the prevailing misconceptions of the western half of the continent and explain how these misconceptions were wrong and what effects the misconceptions had on the outcomes of the expedition in 1804.
3. Compare the [Aaron Arrowsmith 1802](#) map with post-expedition maps such as [Clark's map of 1810](#) and discuss some of the updates made by the Corps of Discovery. Include place names that retained their American Indian heritage on the 1810 map. Another resource is the National Park Service interactive map: <http://imgis.nps.gov/DSC/Viewer/?Viewer=LECL>.

Appendix C

Rubrics

For Group Project:

Rubric Link:

http://web.pdx.edu/~fischerw/courses/advanced/methods_docs/pdf_doc/wbf_collection/0901-0950/0908_USMedu_NSF_SG_for_Group_Projects.pdf.

For writing narrative:

http://eastprovidencehighschool.com/web/sites/default/files/Rubric_Narrative_Writing.pdf.

<http://www.creative-writing-ideas-and-activities.com/writing-a-personal-narrative.html>.

Timeline Development and Construction Rubric

Name: _____

Points					Criteria
	1	2	3	4	
_____	Less than three (3) significant events are present. This includes date and description.	At least three (3) significant events are present. This includes date and description.	At least five (5) significant events are present. This includes date and description.	At least six (6) significant events are present. This includes date and description.	Documentation of Events
_____	At least 3 of the dates or sequences are not in the proper order.	At least 2 of the dates or sequences are not in the proper order.	At least 1 of the dates or sequences is not in the proper order.	All dates indicated on timeline are correct and are sequenced in the proper order.	Accuracy
_____	Does not meet the requirements of the timeline.	The timeline is lacking detail with regard to tribal historical significance.	Meets many requirements of the timeline with regard to tribal historical significance.	Goes beyond the requirements of the timeline with regard to tribal historical significance.	Requirements
_____	Writing is not legible.	Writing is not legible in some places along the timeline.	Marginally legible handwriting, typing, labeling or printing.	Legible handwriting, typing, labeling or printing.	Legibility
_____	Total---->				

Teacher Comments:

Example of a diorama or artistic timeline depiction of the geology, flora and fauna along the Trail.



Rubric for Diorama

Score	1	2	3	4	
	Your diorama is not related to our topic.	Your diorama is slightly related to our topic.	Your diorama is somewhat related to our topic.	Your diorama is well-related to our topic.	Accuracy
	There is very little creativity in your diorama.	Your diorama shows some creativity.	Your diorama shows good creativity.	Your diorama shows excellent creativity.	Creativity
	You have presented very little research related to your topic.	You have presented some research related to your topic.	You have presented good research related to your topic.	You have presented excellent research related to your topic.	Research
	Your diorama shows little effort.	Your diorama shows fair effort.	Your diorama shows good effort.	Your diorama shows great effort.	Effort
	Your oral presentation is poor.	Your oral presentation is average.	Your oral presentation is good.	Your oral presentation is excellent.	Oral Presentation
	Your project was late.			You turned in your project on time.	On time?
	is not turned in with your diorama.			is turned in with your diorama.	This rubric...
					TOTAL

Comments:

Appendix D

Digital Reference and Support Materials

Teaching 1

<http://edudemic.com/wp-content/uploads/2012/12/theories-of-learning-fixed.jpg>.

http://lewisandclarkjournals.unl.edu/read/?_xmlsrc=lc.img.corpus.02.xml&_xslsrc=LCstyles.xsl.

<http://www.lewisandclark.com/facts/factstmlnmid.html>.

http://www.gorgediscovery.org/flash/TCO_FLP.pdf.

<http://www.edgate.com/lewisandclark/>.

<http://www.lewis-clark.org/content/content-channel.asp?ChannelID=61>.

<http://www.lewis-clark.org/content/content-channel.asp?ChannelID=57>.

Teaching 2

<https://maps.google.com/maps/ms?ie=UTF8&t=h&oe=UTF8&msa=0&msid=202977755949863934429.00049f8ff9a29bab34a82>.

<http://www.usgs.gov/features/lewisandclark.html>.

<http://www.creative-writing-ideas-and-activities.com/creative-journal-writing.html>.

Teaching 3

<http://www.ndstudies.org/search/results/search&keywords=lewis%20and%20clark/>

<http://rliv.com/pic/LewisClark.pdf>.

<http://www.sierraclub.org/lewisandclark/history/index.asp>.

<http://lc-triballegacy.org/main.php>.

<http://ngm.nationalgeographic.com/2009/04/departments/native-names-interactive>.

<http://www.usgs.gov/features/lewisandclark.html>.

<http://www.lewis-clark.org/content/content-channel.asp?ChannelID=60>.

http://www.lewisandclark.org/partners/many_voices.pdf.

Teaching 4

http://www.nationalgeographic.com/lewisandclark/journals_maps_4.html.

Document Analysis Guide

1. What kind of document is this? How do you know?
(a letter, an ad, a receipt, a government document, a diary, or journal entry?)
2. When was it written? Is there a date or other information that indicates this?
3. Who wrote or created the document? How can you tell?
4. For whom was the document written or created? How can you tell?
5. Where was the document written or created? How can you tell?
6. Why was the document written? Cite the evidence indicating its purpose.
7. Does the document reveal the writer's mood?
(does it convey anger, happiness, regret, surprise?)
8. Does the document provide any clues about the relationship between the writer and the audience?
9. List three things the author said that you think are important:
 - a.
 - b.
 - c.
10. List two things the document tells you about life in the United States at the time it was written:
 - a.
 - b.
11. Write a question to the author that is left unanswered by the document: