

Process of Native Science

The perspective of Native science goes beyond objective measurement, honoring the primacy of direct experience, interconnectedness, relationship, holism, quality, and value. Its definition is based on its own merits, conceptual framework, and practice and orientation in the tribal contexts in which it is expressed. Concerned with the processes and energies within the universe, it continually deals in systems of relationships and their application to the life of the community. Science cannot divide its application into departments; it is integrated into the whole of life and being and provides a basic schema and basis for action.

For instance, the traditional Yupiaq people based their philosophy and lifeways on maintaining and sustaining relationships among human, natural, and spiritual worlds. The balance of nature, or ecological perspective, was of utmost importance to the Yupiaq. To understand the Yupiaq worldview it is necessary to understand the multiple meaning of a word that epitomizes Yupiaq philosophy. This word is “ella,” which is a base word that can be modified to change its meaning by adding a suffix or suffixes. Examples include “Qaill’ ella auqa?” (How is the weather?); “Qaill’ élan auqu?” (How are you feeling?); “Ellapak nunii” (The world’s land); “Ellagpiim yua” (Spirit of the Universe); “Ellapak” (Universe); and “Ella amigligtuq” (The sky is cloudy). Variations of this one root word can be made to refer to weather, awareness, world, creative force or god, universe, and the sky. The key word here is awareness of consciousness. Consciousness is the highest attainment of the human being; the human being must be able to make sense out of values and traditions as juxtaposed with the “objects” of the universe. As a manifestation of their “ella,” the Yupiaq developed a body of values and traditions that would enable them to maintain and sustain their ecological worldview (Kawagley 1995:15).

Native science stems from a deeply held philosophy of proper relationship with the natural world that is transferred through direct experience with a landscape, and through social and ceremonial situations that help members of a tribe learn the key relationships through participation and the “ella,” as the Yupiaq would say. Methodological elements and tools of Native science that have traditionally facilitated such learning included:

Observation. Careful observations of plants, animals, weather, celestial events, healing processes, the structures of natural entities, and the ecologies of nature.

Experiment. In Native science, there is no deliberate attempt to distort a natural event beyond observation. Native people have traditionally applied practical experimentation at all times to find efficient ways to live in their various environments, and ingenious and ecologically appropriate technologies were developed.

Meaning and understanding. These were the priorities of Native science, rather than a need to predict and control. Meaningful relationship and an understanding of one’s responsibilities to those entities in nature that people depended on were the reasons

for a Native science, which invited a desired result through entering into specific relationships with the energies of the natural world.

Objectivity. Native science reflects the understanding that objectivity is founded on subjectivity. There is a stress on direct subjective experience, predicated on a personal and collective closeness to nature, which will lead to an understanding of the subtle qualities of nature.

Unity. Native science stresses order and harmony but also acknowledges and honors diversity and chaos as creators of reality. “Relationships and renewable alliances take the place of fixed laws, and Indigenous science accepts the possibility that chance and the unexpected can enter and disturb any scheme. Thus, the circle is left open and chance as represented by the clown, the trickster, and gambling games, occupies an important role (Peat 1994: 257).”

Models. Native science also has models. Teaching revolves around high context models in which information is communicated at many levels, and which are highly representational and elicit higher order thinking and understanding. An example of such a ritual process model is the Plains Sun Dance, which may include symbols such as the circle, numbers, geometric shapes, special objects, art forms, songs, dances, stories, proverbs, or metaphors, all of which unify experience with meaning and facilitate the mind’s conscious process of connecting with the energies and animating power of nature. Native symbols go beyond simple archetypes when they represent the universe itself, as with a ceremonial structure such as the Navajo Hogan.

Causality. Native science reflects a belief in causes that affect and go beyond the physical, principles such as synchronicity and the action of natural energies and entities. Other such principles include the transformation of energy to other forms and resonance with the order of the universe, as reflected in the adage, “as above so below”.

Instrumentation. Native science relies on preparation of the mind, body, and spirit of each person as the primary vehicle of “coming to know.” The mind and body can be used for careful, disciplined, and repeatable experimentation and observation. Knowledge is gathered through the body, mind, and heart in altered states of being, in songs and dance, in meditation and reflection, and in dreams and visions.

Appropriate technology. Because social value is gained by honoring mutual reciprocal relationships, spin-offs of Native science in technology are carefully applied. Adoption of technology is conservative and based on intrinsic need, and care is taken to ensure that technologies adopted and applied do not disrupt a particular ecology. Such care is grounded in the belief that it is possible to live well through adhering to a cosmology and philosophy honoring balance, harmony, and ecologically sustainable relationships.

Spirit. Native science incorporates spiritual process: no division exists between science and spirituality. Every act, element, plant, animal, and natural process is considered to have a moving spirit with which humans continually communicate.

Interpretation. Native science bases its interpretation of natural phenomena on context. Therefore, meaning is based on the context of the events and reflection of Native philosophy.

Explanation. Native science works with a multiplicity of metaphoric stories, symbols, and images to explain events in nature.

Authority. Native science gains its authority partly through the society, elders, direct experience, and dream or vision, and on the sanctity of the relationship established over time with particular environments. “Authority, if we are to use that word at all in the context of Native science, resides in individuals and their direct experience rather than some social establishment (Peat 1994: 265).”

Place. Particular places are endowed with special energy that may be used but must be protected. This sentiment extends from the notion of sacred space and the understanding that the Earth itself is sacred. The role of people is to respect and maintain the inherent order and harmony of the land.

Initiation. There are both formal and informal pathways to certain levels of Native science. For instance, in the Midewiwin Society of the Ojibwe, there are four stages of initiation, each involving extensive training, learning of songs, ceremonies, stories, interpretation of special scrolls, and petroglyphs (Peat (1994: 267-68).

Cosmology. All philosophies are founded on an elemental idea of how the universe was created along with humankind’s emergence into the world, and Native science is connected to the origins and migrations of people through the American landscape and to notions of time-space, sacred cycles, astronomy, art, myth, ritual, and dance. Cosmology is reflected in the cycles of community celebrations, rites of renewal, and stories, and serves the important function of validating Native peoples’ way of life, core values, and social ecology.

Representation. Signs and formulas of thought appear in many forms, records in stone, clay, birch bark, hides, structures, and hundreds of other forms. These representations record key thoughts, understandings, and stories important to remembering aspects of Native science.

Humans. People play a key role in facilitating knowledge about the natural world in conscious thinking and tool making. Given this role, humans have special responsibilities to the natural world and to other living things. Native science is the study of learning and carrying out these responsibilities. Native science is about stewardship and the practice of deep ecology.

Ceremony. Ceremony is both a context for transferring knowledge and a way to remember the responsibility we have to our relationships with life. Native ceremony is associated with maintaining and restoring balance, renewal, cultivating relationship, and creative participation with nature.

Elders. Elders are respected as carriers of Native knowledge, wisdom, and experience. Therefore, they are utilized as the first line of teachers, facilitators, and guides in the learning of Native science.

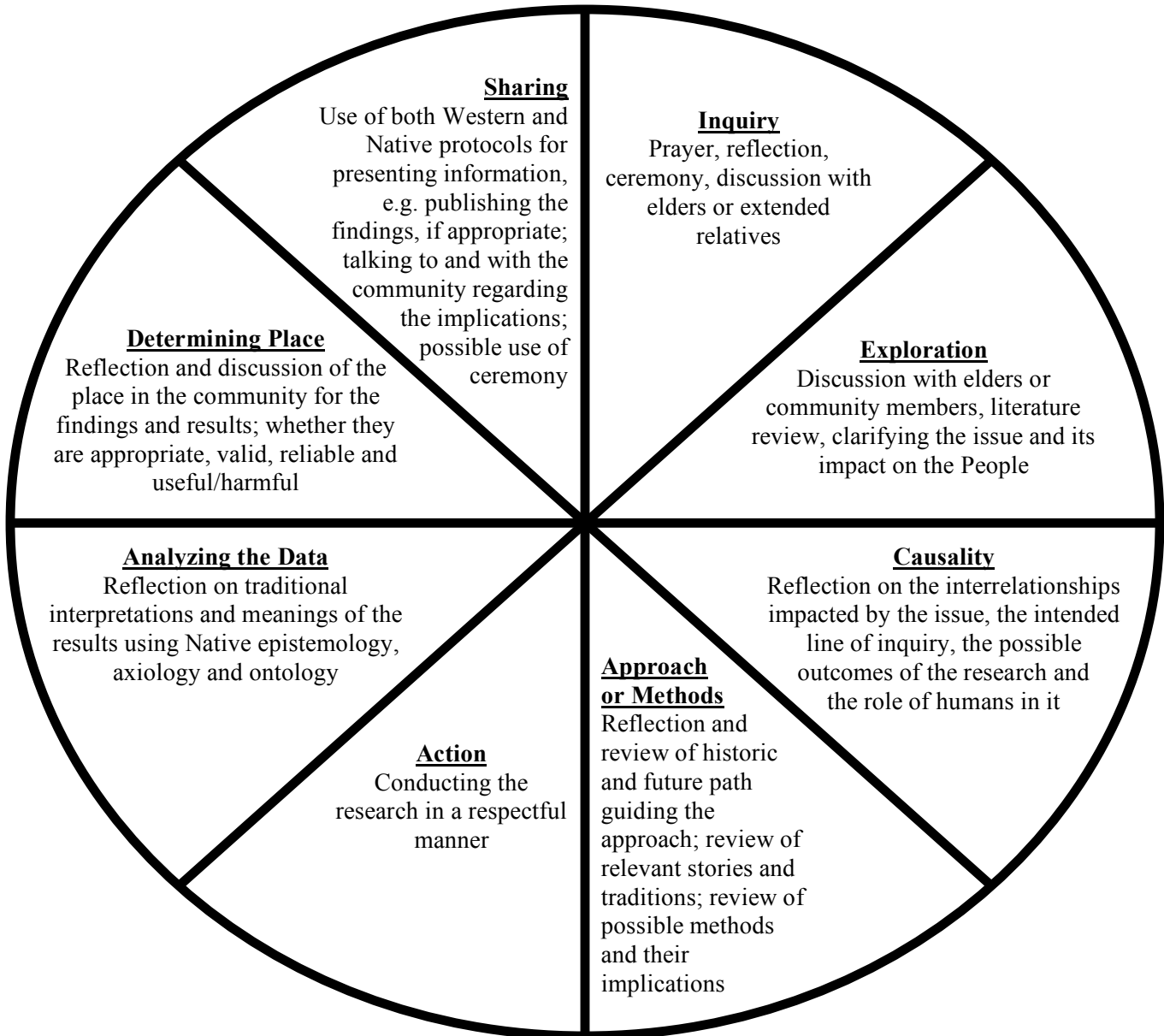
Life energy. Life energy is acknowledged throughout the expressions of knowledge, understanding, and application. All things have life force. There is a natural energy that moves all things that must be understood and respected.

Dreams and visions. Dreams and visions are a natural means for accessing knowledge and establishing relationship to the world. They are encouraged and facilitated.

Paths. Predetermined systematic activities of learning are viewed as ways to search for and find knowledge. All of nature has these inherent patterns of trajectories, “right paths,” which reflect the unfolding of natural pathways through which it may be understood. The “Good Red Road,” “Dream-Time Path,” “Earth Walk,” and “Pipe way” are some of the ways Native peoples have referred to the directed path in the quest for knowledge, meaning, and understanding.

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Native-based Student Research Protocol



Model for Native-based Student Research Protocol

This model is being offered for consideration as a basis for STEM research conducted within the tribal college setting. Components of the Western-based model of scientific inquiry can be found within the model; however, this model is premised on essentially Native concepts of science and the interrelatedness of science and the natural world, as well as Native processes based on those beliefs.

1. Inquiry: Prayer reflection, ceremony, discussion with elders or extended relatives

This step both begins and ends a fundamentally Native research process. This step involves asking reflective questions such as: Why should this research be conducted? What is the purpose or intended outcome of the research? How will it help the People? Will it be good for the People? Who will benefit? How will they benefit? Is it proper to ask the general question(s) I intend to ask? The process involves personal reflection, prayer, and, in some cases, ceremony. The process also necessarily involves discussions with elders or extended relatives as to their perspectives of these questions.

2. Exploration: Discussion with elders or community members, literature review, clarifying the issue and its impact on the People

This step builds on the previous step and involves actively researching the topic in a scientific yet culturally-congruent manner. This step would involve a formal literature review. The “literature review” document should contain understandings as acquired through discussions with elders, community members, or other Native representatives as to the cultural perspective, history, implications, and impact of the issue to be researched. The questions to be asked in this step would include: What does [a/the/my] Tribe say about the issue? Are there any local traditions, stories, understandings that contribute to the overall knowledge about this issue? Am I asking the question(s) in a culturally-congruent manner? How might the answer(s) impact the People? Is it proper to ask the specific question(s) I intend to ask?

3. Causality: Reflection on the interrelationships impacted by the issue, the intended line of inquiry, the possible outcomes of the research and the role of humans in it

This stage of research will help to clarify and determine the research question. This step would involve a written document that outlines the stakeholders involved in the issue, the relationships impacted by the line of inquiry and outcomes of the project, and the role of the researcher(s) in addressing the issue. The questions asked in this step would include: Who is impacted by this issue? Who has been impacted historically? Who may be impacted in the future? How will the relationships be impacted by the results and/or recommendations of the research? This step would be a critical step in addressing the “black box” dilemma of research. In addition, this step would refine and establish the actual hypothesis.

4. Approach or Methods: Reflection and review of historic and future path guiding the approach; review of relevant stories and traditions; review of possible methods and their implications

This step would analyze the best possible method(s) to use in the research. This path would include a written analysis, based on the cultural knowledge gained through the previous steps, of the different types of approaches that have been taken in addressing the issue, and the type of approach that would be culturally-relevant and congruent. It would include discussion with faculty mentors or a written document that would include a pro/con list of possible approaches and a short analysis of the cultural implications of the approach taken.

5. Action: Conducting the research in a respectful manner

In this step, the student would actually conduct the research. Conducting the research in a respectful manner would entail notifying or working with tribal experts (if conducted on tribal lands), utilizing community-based expertise to enhance the quality of the data and the data-gathering techniques, using cultural frames of reference (wherever possible) in interpretation of data, controlling access to any sensitive or proprietary cultural information, analyzing all documents and steps to data for cultural relevance and appropriateness and using all proper protocols for accessing data among tribal lands, communities, and people.

6. Analyzing the Data: Reflection on traditional interpretations and meanings of the results using Native epistemology, axiology and ontology

This step would include mainstream data interpretation. In addition, the data should be analyzed using a cultural framework and applying the values, understandings and meanings of Native peoples to the findings. Questions that might be relevant in this step would include: Are there any cultural implications in the findings? If so, what are they? Are there any cultural influences in my interpretation of the findings? If so, what are they? What would be the similarities in how mainstream Western science and my own Native people would interpret the findings? What would be the differences? How might these differences be resolved? What, if any, are the cultural implications of the findings?

7. Determining Place: Reflection and discussion of the place in the community for the findings and results; whether they are appropriate, valid, reliable and useful/harmful

In this step, students would provide documentation of reflection or discussion of the meaning of the findings. In other words, are the findings helpful or useful for the community? How will the findings impact or integrate with traditional cultural knowledge? Who else will be impacted by the findings and their interpretation? What are the implications of these findings on the seventh generation? Where is the “place” for the findings in the community?

8. Sharing: Use of both Western and Native protocols for presenting information, e.g. publishing the findings, if appropriate; talking to and with the community regarding the implications; possible use of ceremony

In this step, students would address the following questions: What is the proper method for disseminating this information? What are the relationships that need to be tended to in reporting this information? Is there anything additional that needs to be done with the findings (e.g. ceremony, approval of elders, discussion with community, etc.)? What are the appropriate ways to present the information to the respective audiences? In this step, students should be encouraged to use the findings for a community-based and practical purpose. Students should also be encouraged to ask the question “What further research do these findings merit?” and relate their findings back to the first step of this process (Inquiry), recognizing the cyclical nature of community-based and participatory research.