

# **Power and Place: Toward Developing and Implementing Native-Based Science Education**

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The purpose of this paper is to express my thoughts on developing Native-based science education at the college level. But first I would like to talk a little about some experiences I had developing Native-based curriculum in social studies and biology at the high school level. I think there are some interesting correlations and lessons to be learned.

## **The Navajo Years: Developing a Native American Studies program**

In 1976 I began my work with Native American people when I accepted my first full time teaching position at Chinle High School on Navajo reservation in northern Arizona. The Navajo reservation is the largest in the United States, approximately 25,000 square miles, and Chinle High School was then the largest school district in the continental United States, some 2000 square miles. There were approximately 1000 students – 99 percent of which were Navajo - grades nine through twelve at the high school. I was assigned the task of teaching American history.

I knew a lot about history, but knew very little about Native American history. Consequently, in the summer months before classes started in August, I read everything I could get my hands on about the Indian role in American history. It seemed logical that I would have to incorporate Native history into my American history classes. Among the books I found that were particularly helpful was Dee Brown's *Bury My Heart at Wounded Knee* and Alvin Josephy's *The Patriot Chiefs*. For contemporary Indian issues I read, re-read, and read again Vine Deloria Jr.'s *Custer Died for Your Sins*. By the time school started I felt pretty comfortable that I knew something about Native American history.

When school began I soon found out that I was wise to have prepared extensive lecture notes in American history and in Native history – I was issued only three textbooks for approximately 150 students. I soon found out that teaching materials were non-existence. Although the boy's basketball team was well supplied with new uniforms and other equipment (In contrast the girl's basketball team wore raggedly uniforms and had almost no equipment), textbooks and teaching supplies were always in scarce supply. Moreover, what books and supplies did exist went to the veteran teachers. I and several younger teachers made do with what we had. We practiced "meatball" teaching – so-named after the "meatball" surgery performed by the doctors on the popular television series *Mash*. In time we formed a small core of passionate, highly motivated, and very effective teachers who spent years fighting the establishment. Certainly I think we did well by our students back in those days.

After a couple of months on the job I found myself teaching a unit on the western Indian wars and specifically, the Nez Perce War. I based my lectures on what I read in *Bury My Heart* and

*The Patriot Chiefs.* I supplemented my lecture by showing the movie “I Will Fight No More Forever,” a reasonably historically accurate Hollywood production that featured Ned Romero (as Chief Joseph), James Whitmore, Jr., and Sam Elliot. The first day’s showing ended with the brutal massacre of the Nez Perce at the Battle of the Big Hole River. The movie accurately portrayed the killing of many women and children. It was a powerful scene and a number of my students left the room fighting back their tears. As the students left, my department chair stormed into the room, grabbed my arm, and literally screamed into my ear. “What are you trying to do? You are teaching these kids to hate white people!” I was stunned. This teacher also taught American history and had been at this high school for over 25 years. He had actually been responsible for hiring me. Now he was accusing me of promoting racism. As he left the room with a final admonishment that I “Should think hard about my teaching methods,” I sat down to appraise the situation. For the first time I began to see how “white” the school was. Although we were probably the largest Native American high school in the country, there was nothing to identify us as being an Indian school. No artwork, no tribal symbolism, and most disturbingly, no classes on Native Americans. I also realized that teachers like the one who had criticized me were a major part of the problem. As I noted earlier, he had taught at this school for a quarter of a century, yet knew nothing more of the Navajo people and their history and culture than the day he first arrived on the reservation. He, and a number of other teachers at the school, had a very prejudiced view of Navajos and maintained the same mindset of assimilation that had characterized American Indian education for over 100 years. And the students were victims of this prejudice. That night I decided to indeed take my colleagues advice and change the way I taught my class. Instead of teaching American history and incorporating Native American history into it, beginning the next day I began to teach Native American history and incorporate elements of “mainstream” American history into that. I have never looked back, nor have I ever regretted that decision.

A number of years later I took a year-long leave of absence and enrolled as a full-time student in the Masters program in American Indian Studies at the University of Arizona. There I studied under what was probably the best collection of Native scholars ever assembled at one university, among them Vine Deloria, Jr.(who would direct my thesis), N. Scott Momaday, Robert K. Thomas, and Tom Holm. My decision to endure a year of abject poverty as a graduate student – although officially granted a sabbatical I did not receive a penny from the school district - was based on the realization that I was teaching a very unique and special group of students. By this time I had fallen in love with the Navajo reservation and people. I came to realize that in order for me to be the best teacher I could be – and my students *deserved* to have me be the best teacher I could be – I needed to become an American Indian education specialist. If one owns a Rolls Royce, one does not take it to the neighborhood shade tree mechanic for repairs. One takes it to a specialist. I came to see my students as being the Rolls Royce’s of the American education system. In the years that followed I worked to re-write the curriculum at Chinle High School. By the time I left in 1995 we offered a full range of classes in Native American Studies and were the only high school in the State of Arizona to have tribal graduation requirement – Navajo History – which the Native American youth leadership organization I sponsored successfully petitioned the governing board to adopt.

Perhaps my greatest sense of accomplishment lies in the many former Navajo students who later went on to become teachers themselves. I believe that there are now about a dozen of them

teaching in the Chinle Unified School District. Several are social studies teachers, and at least one that I know of specializes in Native American history. We keep in close contact with each other and she tells me that she still uses the notes she took in my class. Sometimes as teachers we do indeed make a difference.

### **Charles Darwin Meets the Indians**

In 2001 I found myself teaching at another Native American high school. This school was Vision Charter High School, a college preparatory school sponsored by the Tucson (Arizona) Indian Center. In addition to my duties teaching American Indian Studies and social studies classes, I was asked if I would like to teach science, particularly biology and environmental science. I have always loved science and jumped at the opportunity to do so. As I had done so many years earlier I set out to develop lecture notes and materials to teach science classes. This time I had enough textbooks and financial support to develop a first rate biology program.

The textbook I used was *Biology: Principles and Explorations* authored by George B. Johnson and Peter Raven. This book is probably the text most commonly by biology teachers in the United States. Again I used the summer to prepare. I also set out to bring as much Native American content as I could into the class. By the time school started in August I felt that I was ready. I was wrong.

For the first quarter of the school year I sailed along with very little trouble. Then we came to Unit 3 – Principles of Evolution. On the first day of this unit I gave what I thought was a very good introductory lecture on Charles Darwin and an overview of evolutionary theory. Indeed, I was rather proud of myself. At the conclusion of my talk I asked if anyone had any questions. One student quickly raised her hand and asked, “You really don’t believe that stuff do you?” This triggered a feeding frenzy. Student after student challenged my seemingly well-structured presentation on Darwinian thought. The class was comprised of about half Hispanics students – all of whom were Catholics, with the other half being Native Americans of Tohono O’odham and Yaqui descent – traditionalists or also Catholics. By this time I had built up a great relationship with this group of kids, and so the criticisms were good natured – they were obviously taking great enjoyment in having their teacher on the run. But there was also a serious aspect to their questions and comments as well – they clearly did not accept the evolutionary explanation I had offered them. The worst part was admitting that I did not believe “that stuff” either.

The next day I happened to have lunch with Vine. Having retired from the University of Colorado, Vine was then spending his winter months in Tucson and we would frequently get together to have a donerkebob at El Greco’s Greek restaurant. After I told him of my previous day’s experience attempting to teach evolution and of my own doubts, he gave me that famous all-knowing grin of his and suggested that I read the manuscript of his latest book – *Evolution, Creationism, and Other Modern Myths* - which dealt exactly with the source of my problems. That evening I stopped by his house and picked up the manuscript. What I read amazed me, particularly the references he made to the many credible scientists who themselves had reached the conclusion that evolutionary theory had so many flaws as to be practically worthless as a means to explain the origin of life on earth. I began to search out these books and articles. In the

months that followed I read all of the literature I could that questioned the theory of evolution. I found there were scores of books written by brilliant new scholars: Michael J. Behe, Harold R. Booyer, Michael Denton, Phillip Johnson, Norman MacBeth, Richard Milton, and Gordon Rattray Taylor to name a few - most were scientists themselves and none of them Christian creationists - that were seriously challenging Darwinian theory on firm scientific ground. Especially useful was Jonathan Well's *Icons of Evolution: Science or Myth*. With a subtitle that reads "Why much of what we teach about evolution is wrong," this book demonstrated that the examples used by Darwinists in textbooks as being the pillars of evolutionary theory are false and misleading, and that often the writers of these texts know it. By the following spring I was able to appear on a panel with Vine and Tom Hoffman at the Western Social Science Conference and present my own paper critical of evolutionary theory - a paper that stimulated lively debate in the discussion that followed. An expanded version of this paper - "Darwin, Deloria, and the Origin of Life" was later published in a book which Dan Wildcat and I co-edited entitled *Destroying Dogma: Vine Deloria, Jr. and His Impact on American Society* (2006).

Over the next two years I re-wrote my biology curriculum, as well as my earth science and environmental curriculums. I soon came to realize that what I had done on the Navajo reservation in the field of Native American studies had been easy, even though it took almost two decades of hard fought battles to accomplish. Most people can easily see the connection between American Indian content and social studies curriculum. What is more natural than to include Native American history into an American history class, or to include tribal government and sovereignty issues into a political science course? The actual development and teaching of a tribal history course had been icing on the cake. But I now came to see that science - and the teaching of science - is viewed by most people in this country very differently. Most people do not see the equivalency between teaching creation stories and the scientific theories - and they are exactly that - theories - of the origin of the earth and the life that inhabits it. Moreover, pre-existing Native American knowledge about the land is never given the importance of knowledge acquired and promoted by western science.

In time I developed *Power and Place: A Native-Based Environmental Science Curriculum for Secondary Schools and Colleges*. The purpose of this curriculum is to present a Native American view of the natural world and to suggest possible Native American-based solutions to environmental problems. In developing this curriculum I used a philosophical foundation laid out by Vine Deloria, Jr. and Daniel R. Wildcat in their book *Power and Place: Indian Education in America* - Obviously I have stolen their title as well. Deloria defines *power* as being "The living energy that inhabits and/or composes the universe." He define *place* as being "The relationship of things to each other." Combining these two concepts Deloria arrives at the following equation:  $Power + Place = Personality$ . This equation simply means that the universe is alive, but it also contains within it the very important suggestion that the universe is personal, and therefore, must be approached in a personal manner. In this indigenous world view *reciprocal relationships* form the foundation of all life. - relationships that are both biological and spiritual - but most importantly, personal. Native people possessed a covenant with the natural world and all other life forms. As Vine points out in *Power and Place*, the human role in this covenant was to always act in an *appropriate* manner and to insure that relationships "must not be let unfulfilled."

Native Science is based on what has come to be called *Traditional Ecological Knowledge* (TEK). In recent years TEK has received a great deal of attention and in some parts of the country, most notably in Alaska, actual application by federal and state natural resources managers. In his book *Sacred Ecology: Traditional Ecological Knowledge and Natural Resource Management*, Fikrets Berkes – one of the leading advocates of TEK - defines it as being “A cumulative body of knowledge, practice, and belief, evolving through generations of cultural transmission, about the relationship of living beings (including human beings) with one another and their environment.” TEK is a product of both *sacred knowledge* – that given to the people directly by spiritual powers, and *experiential knowledge* – that learned from living as part of the natural world since time immemorial.

### **Native Science vs. Western Science: A Clash of World Views**

In addition to *Power and Place* by Deloria and Wildcat, I also have sought to expand upon the ideas presented by Greg Cajete in his excellent book *Native Science: Natural Laws of Interdependence*. Cajete defines Native Science as being “The process of perceiving, thinking, and knowing that have evolved through the Native American experience with the natural world.” Cajete goes on to offer 14 tenets of Native Science. For the purposes of my own work I adapted Cajete and went on to develop my own following 12 characteristics of Native Science – heavily influenced by Vine - as it applies specifically to environmental science:

1. That the Earth, solar system, and all life forms are products of a spiritual creative force.
2. That the Earth is influenced by a multitude of spiritual or “energetic” entities that are always present. These entities may serve as helpers or guardians to mankind.
3. That as products of a spiritual creation, every natural entity – animals, plants, water, the sky, and even the Earth itself – possesses the inherent right to life and should be afforded respect by man.
4. That all natural entities are related, interconnected and bound together in a covenant of personal reciprocal relationships.
5. That humankind is inherently part of the natural world.
6. That the natural world is structured and ordered in a meaningful manner and that every natural entity has its own unique purpose and reason for being.
7. That the personal relationships and actions of humankind toward the natural world must be performed in an appropriate manner.
8. That humankind possesses relational obligations to the natural world which must not go unfulfilled and serves to insure the continuance of all life.

9. That all so-called “environmental” problems are caused by the transgressions of humankind and that consequently only mankind can restore order to the natural world through corrective actions such as prayer and ceremony, responsible and appropriate behavior, and other restorative action.
10. That within the creation stories of every Native American tribe lies a sacred body of knowledge through which humankind can appreciate and understand the workings of the Earth and the life that resides there, and importantly, his own place.
11. That the nature of all things can never truly be understood or proven, and that indeed, there are things within the natural world that we can not and are not meant to understand.
12. That as the Indigenous people of the Americas, Native Americans possess a body of traditional ecological knowledge pertaining to the natural world that can be traced back since time immemorial. This intimate knowledge of the landscape and its natural inhabitants provide a unique perspective that may well offer solutions to many of the most pressing environmental problems we face today.

In contrast, I would offer the following 12 characteristics of western science as they apply to environmental science and as a comparison to Native beliefs:

1. That the earth, solar system, and all life forms are products of two separate and basically unrelated events caused by the accidental coming together of cosmic materials and subsequent chemical reactions.
2. That no spiritual entities exist, creative or otherwise.
3. That current life on earth is the latest stage in the process of evolution as first defined by Charles Darwin.
4. That each form of life evolved separately, so that while humankind shares a common origin with all life, it does not share a common evolutionary experience and thus no intimate relationship with other life forms.
5. That humankind is the *ultimate expression* of the evolutionary process and as such, is superior to other life forms.
6. That the ultimate purpose of humankind – and of Western science – is to advance the progress of humankind.
7. That all other life forms exist for the pleasure, use and advancement of humankind.

8. That while most environmental problems are acknowledged to be products of the transgressions of humans, the need to solve them is directly tied to the desire to enhance the quality of *human* life.
9. That since knowledge is wholly secular and expressly for the purpose of advancing the progress and quality of life for humankind, there are no limits placed on the quest for it.
10. That only the knowledge that can be proven – preferably through the so-called *scientific method* - is considered legitimate and therefore accepted to be factual.
11. That those things which are abstract in the natural world or which appear to be anomalies are dismissed as being of no relevance or importance.
12. That in the end, science will ultimately provide the answer to all environmental problems.

I am not a scientist. I am a social scientist and a naturalist who has devoted his life to studying the natural world and how people, especially Native people, relate to it. I am sure that most scientists would disagree with my analogy of their profession. I also suspect that I could be accused of being anti-science. Nothing could be further from the truth. I do, however, admit to being extremely critical of the mainstream scientific community which I think is devoid of creativity, makes exaggerated claims of preeminence, and lacks an ethical foundation. It is clear that these two ways of looking at life – the traditional Native view and the western scientific view - are clearly different *world views* – each diametrically opposed to each other. The Native American metaphysical view is what I would call *place-centric* – the fundamental concern is in maintaining appropriate relationships. The western scientific view is highly *anthropocentric* – the fundamental concern is in benefiting people. But is there common ground? And more importantly, how do we deal with the interface points where the differences are irreconcilable?

For this upcoming fall I have been brought in by Northwest Indian College to help develop and teach what will be the first ever Bachelor of Science degree program in *Native Environmental Science* (hereafter the BNES program). I know that a lot of good people have already put a lot of time and energy into developing this program. Let me add a few of my own thoughts and ideas to this ongoing effort.

The BNES program as I see it is an attempt to combine Native science with western science. Specifically it is hoped that we can develop the next generation of tribal resource managers – people who are knowledgeable, comfortable, and non-apologetic with their Native background and traditional ecological knowledge, while at the same time able to sit at the table with, and thoroughly understand and converse in the language and concepts of the mainstream scientific community.

Most tribes run their own natural resources programs. For some tribes this means simply managing their natural resources to meet the subsistence needs of their people. But many other tribes have commercialized the natural world. From tribes that fish commercially, to tribes that

open their lands to outside trophy hunters, to tribes that produce and sell timber and various mineral products for profit, Native people are taking from the Earth in ways that could not be imagined by their ancestors. Faced with the reality of ever-shrinking resources and ever increasing demands and pressures being placed by the outside world to provide these resources, the question then becomes as to how tribal resources will be managed. Will they be managed in an ecological sound manner? Will they be managed in such a way that would please tribal ancestors?

The fact is that many tribal natural resources programs are largely staffed by non-tribal members, especially the science positions in these programs. Moreover, simply having “Native face” – even in leadership positions – does not insure that resources will be managed in a tribally sensitive manner. In sum, there is a desperate need to “indigenize” tribal natural resource programs, and a desperate need to culturally prepare the people to management and staff these programs.

I think Wildcat summarized the need for such an educational approach when he wrote in *Power and Place*: “We desperately need indigenous scientists and engineers, but not in the mold of those produced by the dominant educational institutions of the United States.” He goes on to discuss the need to create a “Native MIT” – an institution as he puts it “the likes of which has never been seen before.” While this is a laudable goal that I wholeheartedly support, the fact is that more can be done to accomplish the same ends throughout Indian Country through the all-ready existing tribal college system. The fact is that tribal colleges are not only the *best* place to dramatically indigenize the scientific world, but the *only* place to do so. So to borrow Wildcat’s line, I believe that the task of Northwest Indian College is to establish a BNES program “the likes of which have never been seen before.”

**In looking at the foundations for any Native science program, I think there are several things to keep in mind.**

First, any Native science program must emphasize spirituality. This spirituality, in turn, must revolve around the teaching and promotion of Native creationism. Native Americans *are* creationists – certainly not in the same manner or belief system of Christian creationism, but creationists none the less. Every Native American tribe possesses a body of creation or origin stories that are the *sacred history* of their people. To tribes this reality is based on a different view of time and space – an Indian metaphysics. Nowhere are these stories more important than in the teaching of science. All science classes taught to Native American students should begin with presenting Native creation stories as being the first choice explanation as to the origin of life. To Native American students – and thus to the instructors who teach them – these stories are *real* – not merely a metaphoric version of what western science tells us is true by way of their own *theory* of origin. This is not to say that evolution should not be taught. It should, but only as an alternative theory.

Secondly, any Native science program should emphasize traditional values. Again, Deloria provides guidance in *Power and Place* when he writes of the need to fulfill reciprocal relationships, of seeing fellow entities of the natural world as kin rather than merely resources,



and especially in acting in an appropriate manner. In effect, what we are talking about here is *Native environmental ethics*. I think matter of ethics is the greatest strength of Native science, and conversely the greatest weakness of western science. The fact is that western science for the most part *lacks* any great measure of expected ethical behavior. Earlier this summer I telephoned a number of institutions of higher education that were recommended to me based on their earned reputations for preparing Native scientists. In one of these conversations I talked to the director of a Washington state-based “Native Forestry program.” I asked him if his program taught any courses involving environmental ethics, and if so would he be kind enough to send me a syllabus? His response was – and this is pretty much a direct quote: “We don’t teach ethics here. When you are talking about ethics you are really talking about an individual’s personal opinions – and that has no place in a science program.”

I would argue that in an indigenous sense ethics are not merely one person’s opinions, but rather the collected set of values of a people. I would argue that this is *exactly* what is needed in a Native science program.

Thirdly, any Native science program should stress traditional ecological knowledge (TEK). By this I mean that traditional knowledge component of the program must be looked upon intellectually and taught academically with the same level of emphasis as the western scientific component. We do not need another environmental science program that is basically western in outlook and content but “made Native” by “incorporating” aspects of Native content into the curriculum. Hanging ornaments on a tree does not change the fundamental nature of the tree. Any matrix of course offerings should reflect a balance between Native-oriented and western scientific-oriented classes.

Fourthly, any Native science program should acknowledge the fact that irreconcilable differences exist between the Native beliefs and values and western science. Differences are not necessarily a bad thing and should be dealt with openly and honestly. There should never be an effort made to *force* a merger of the Native and western components of the program. And most importantly, The Native component should never be used as a means to validate the western component. Native creation stories, for example, are not simply metaphors for evolutionary theory!

And finally, any Native science program should maintain the highest standards and expectations. Our goal should be to produce *professionals* who are the equal of anyone else out there in the environmental field. Indeed, our graduates have to be *intellectually better* than anyone else. In some ways this might be our hardest challenge. The fact is that due to a legacy of paternalism and forced assimilation, Indian education has by every standard imaginable been a dismal failure and sadly has also come to mean “something less” in the eyes of even our own students. It is important that we work to turn this attitude around. Going from a two-year college to a four-year institution puts Northwest Indian College in a different league that only a handful of other tribal colleges have reached.

One final word on standards and expectations: After over thirty years of teaching Native American students at all levels from middle school through graduate college I have come to be a firm believer in the “self-fulfilling prophecy.” By this I mean that as an instructor I tend to get what I expect out of my students. If I expect mediocrity, that is what I will get. If I expect

excellence, that is what I will get. I am convinced that our students at Northwest Indian College will also rise to our levels of standards and expectations.

For three days we are gathering to honor the life and work of my colleague, mentor, and friend, Vine Deloria, Jr. But most importantly, we are here to continue his work, to pick up the threads of inquiry and action that he pursued and to forge ahead to make the world a better place for Native people, indeed for all people. Vine devoted the later years of his life to tearing down the infallibility – the dogma - of western science and promoting the intellectual wisdom and value of traditional Native knowledge. I believe that institutions like Northwest Indian College offer us our best hope – if not our only hope – to do so.

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