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INTEGRATING CULTURE AND UNDERSTANDING OF SCIENCE THROUGH TRADITIONAL FAIRY TALE FORMAT

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Introduction: Background Information

Success in science results from a variety of experiences and characteristics. Some come from within the individual while others are in the environment. For Native American Indians, achievement in science based upon traditional Western education and national testing traditions does not reflect American Indian knowledge of science or natural events around them.

Over the centuries, American Indian cultures have exhibited a closeness with nature, even to the point of considering their relationship spiritual. Cajete (1986) reported that expressions of the science thought process are abundant in historical and traditional American Indian cultures. He indicated those processes have ranged from simple practical technologies developed to survive in a given environment to highly complex and elaborate technologies developed by many of the "high" civilizations of the world. Unfortunately, traditional school testing has been unable to elicit this knowledge or those qualities. Possibly, the way science is presented in text and lesson has something to do with it.

Only recently have children examining any science textbook been able to see brown and black faces in print. Beyond the cosmetics of publishing a socially sensitive textbook, however, science is still presented to teachers and children in a manner that conveys the impression that its roots are in the European culture.

In 1976, the American Association for the Advancement of Science (AAAS) prepared the document, "Recommendations for the Improvement of Science and Mathematics for American Indians." Among its recommendations were:

- use an ethnoscientific approach in school science that draws upon the way scientific principles have been expressed in the American Indian culture.

- where loyalty to the language is fairly intense, use bilingual instruction.
- vigorously recruit American Indian students for programs in science and technology (Green and Brown, 1976).

Based upon AAAS's first recommendation, an ethnoscience in-service curriculum program for elementary teachers was developed at Sinte Gleska College, the nation's first accredited bachelor's and master's degree programs at a tribal chartered college (Rosebud Sioux Reservation in South Dakota). Its objectives, developed through summer institutes, were:

- to communicate to teachers the nature and characteristics of science necessary for children.
- to communicate that science is not a derivation of European culture alone, but that forefathers and mothers of all cultures engaged in some form of inquiry and problem solving to enrich their daily lives.

Those objectives were met by teachers attending the institutes through various means, but primarily by utilizing basic ESS and SCIS activities using ethnic materials and by preparing summary strategies to communicate their thinking and understanding of science to children (and even to other colleagues).

One such strategy successfully used a fairy tale format to tell the story about science and convey its basic inquiry philosophy to others. Not only did this strategy incorporate all the principles science educators urge for elementary teachers and children, but it reversed the cultural roles to illustrate that Europeans also sought answers and made mistakes as they developed their perceptions of reality.

A Scientific Tale

"Hear ye! Hear ye! It is decreed by the Great European Scientifico that science shall be taught from a book by a 'teacher.' The students shall not participate actively, but will read, learn by rote and answer specified questions. They shall not ask any questions that deviate from the text for these will not be answered and interest can therefore be controlled by the teacher. The results of this decree will improve the children's learning, for they will better be able to respond by rote and will therefore become better citizens. It is not necessary for them to inquire or learn to reason for this is the job of the teacher. Students are in school to respond to the teacher."

The teachers were excited, for, now, the students wouldn't ask questions for which they didn't have answers. Science would also be a class for which they would not have to prepare, and they could easily squeeze science in only occasionally. This would now give them time to

read the works of the Great European Scientifico to the students to help them sit more quietly through the day. Certainly their great leader would be pleased, for, now, their school would score high on the kingdom facts test for the King's literature.

When there was time for science, the teachers taught the same lessons over and over again. The students proved the same theories over and over again. Soon, the students forgot how to ask their unanswered questions. They forgot how to reason things out and to think. Many squabbles erupted in classrooms and schools throughout the villages.

Years passed by in the kingdom. New discoveries were made by adults for the purpose of everyday industry. Their discoveries were based upon many of the old standard theories. Even the adults were forgetting their reasoning and inquiry skills. Like in the schools, squabbles were now erupting among the adults.

In an out-of-the-way place of the kingdom, however, was a small farm. There was unrest on this farm, for its inhabitants did not feel the old ways were always the best. The family worked hard from dawn to dark, always making careful observations while they worked. They experimented with their methods and tried new techniques by asking questions and exploring new ideas.

They would draw conclusions from these ideas and write them down so they could try them again. They revised and revised all their methods until the final product was perfect. Their farm produced more and better products than any other around. This made the family very happy, but they were worried that the king would find out and put a stop to it all, for they were not following the old ways.

Soon, the neighbors of the family became jealous of the farm's success. It was whispered in the king's ear that witchcraft was used, and, of course, this was forbidden. The king sent his army to destroy the farm and bring the family back to the castle to be put to death. The farm was burned as the king had declared, and the family was devastated. The king's men had asked no questions as they had been taught, yet, they secretly wondered why the king would want to destroy something that seemed to work so well.

When the family arrived at the castle, they were taken before the king for his judgement. It would not take long for him to decide, for witchcraft was punishable by execution in his kingdom. However, as they stood accused before the king, his son, the Prince of the Kingdom, rushed forward, confessing that he had fallen in love with the farmer's beautiful daughter. He asked the king to spare the family so that he could ask them questions about their farm. This was highly unusual, for no one had ever questioned the king or had inquired about anything. Yet, since it was the prince and this was an unusual farm, the king allowed his son to inquire.

The prince asked the family many questions about their farm. They told him about their observations, experiments and revisions. They showed him their new theories, all of which had been tried and tested. The prince became very excited about what he had seen, for this was really an enjoyable and exciting way for people in his kingdom to learn about all the things around them.



Artwork by Bob Poe

As soon as the prince had finished questioning them, he told his father all that he had learned. The king couldn't believe his ears, for his son had never been so excited. Even the king got excited about what could happen in his kingdom because it all made a lot of sense to him. He immediately sent out a decree for all the teachers of his kingdom to meet in the Great Hall the next morning.

As the teachers arrived in the Great Hall, there was no great murmur, for they sat in silence, afraid of what the king was about to tell them. Soon the king arrived and started the meeting by giving each teacher a young plant. He told them to write down all that they could observe about the plant. The teachers were confused and afraid that something had happened to the king's mind, for they had never seen him act this way. They hardly knew what to do, for they had also forgotten what the word "observe" meant. But soon the hall was buzzing with excitement as the teachers worked in groups to compare notes and find out more about their plants. As the meeting went on, teachers began to call their plants the "Learning Plant," for this was a new concept in teaching and learning for the kingdom.

The king then explained how important it was for them to do science experiments they read about in their books and not just read about them. "Let the children inquire, ask questions, explore and draw conclusions!"

As the teachers worked all that day, they compiled new ways to teach and learn science. They decided that the books had good ideas, but that they and the students also had ideas that they could explore and try in their classes. Teachers even got together and found new ways they could bring science into other subject areas. After that day, they knew that the coming year was going to be fun and exciting. Certainly children would learn and remember more if they taught their classes the way the king had taught them. Now the children could inquire, ask questions of the teacher, process their own information and reason about nature. To learn by doing was going to be the key.

And what a year they had. The movement toward doing and learning had begun in the kingdom, the prince married the farmer's daughter and the schools were filled with laughter and learning. As soon as the children learned to ask questions again, exploring and drawing conclusions came easily. It wasn't long before they learned to apply this new excitement and learning to all of their lives.

As time passed, the king and his kingdom became the leaders in academic and economic achievement. The king was proud of his people and happy that the farmer and his family had lived and shared their new ideas about science with him. Now the farmers lived happily in the castle with the king as advisors to other farmers of the kingdom on how to inquire, write new theories and test them. All of this came about because someone dared to inquire, explore and experiment and draw conclusions.

Implications for Teachers

Certainly science is not a fairy tale, nor should that be conveyed to children. However, an attitude threshold must first be crossed before the integration of science can occur in either European or non-European ancestral cultures. Here, a fairy tale instructional strategy was useful to convey the meaning of science to both teachers and students on the Rosebud Reservation. Similarly, teachers within any race or culture need to pursue relevant examples as they continually evaluate their presentation of science to children.

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