TELLING THE STORY

Edited by Dr. Loretta DeLong

TELLING THE STORY

Stories from the first five years of the
National Science Foundation's,
Tribal College Rural
Systemic Initiative.

Edited by Dr. Loretta DeLong

"One of the TCRSI's greatest contributions to Indian Country is that it raised the level of discussion about math and science education while allowing local educators to become part of the discussion."

Carty Monette

Printed in the United States of America
Minnesota State University, Mankato
Printing and Photocopying Services
309 Wiecking Center
Mankato, MN 56001

Acknowledgements

Telling the Story is dedicated to Dr. Jack Barden whose writing ability, knowledge and commitment enabled the growth and success of the Tribal College Rural Systemic Initiative. Jack was the primary writer of the initial planning grant proposal and the implementation proposal, serving the project until his untimely passing in 2001. Indian people everywhere are forever grateful to Wapaha Waste. In a small way "Telling the Story" will keep his memory alive so that his spirit will continue to soar.

We are very pleased to share Telling the Story with you. It consists of anecdotal stories, recounting of incidents, and brief chapters of history making events told by authors who interviewed, researched, listened and in the end crafted the untold successes of the Tribal College Rural Systemic Initiative.

This publication was made possible by a grant from the National Science Foundation to the Turtle Mountain Community College. The views, findings, and stories told represent evolving perceptions of people interviewed, places observed and information gathered over time. Neither the National Science Foundation nor the Turtle Mountain Community College is responsible for the opinions and information presented herein.

Contents

Foreward

By Louise Erdrich

What would have happened if, circa 1492, Native People of the Americas had sailed to Europe? What would have happened if those who landed were contagious with a host of deadly diseases to which nobody across the Atlantic was immune, resulting in the deaths of nine out of ten non-native people living at that time? At the very least, the result might have been that those Europeans who came to the Americas would have arrived in trickles, not floods. And if they were going to survive, they would have had to understand and be educated within the dominant Indigenous cultures of the Americas.

There would, of course, have been a great deal of learning and exchange on both sides. But imagine if nine out of ten Native peoples had not died on this continent and if entire cultures had not been colonized or destroyed. By 2004, all of the big colleges and universities in the land would be tribal, regional, with courses taught in Ho-Chunk or Kickapoo, Lakota or Narragansett, Miwok or Creek. English speaking students would puzzle over Cree syllabics. Spanish and French immigrant students would attempt to master difficult Ojibwe verb forms. But the world view that united breakthroughs by Newton, Einstein, and Hawking wit existential teachings by tribal elders and philosophers might actually resemble what Tribal Colleges are attempting to do today.

The year was 1977 and I had applied for a job with the Turtle Mountain Community College. I traveled to Belcourt to stay with

my grandparents, and was interviewed by an unusually dedicated, smart and focused man named Carty Monette. We sat in his office, a room partitioned off from others in a complex of trailers and pre-fab houses carefully painted the TMCC beige-brown. Flash forward twenty five years. Dr. Monette has in these years moved forward on an ambitious plan for the community college. Now my sister, the writer Heid Erdrich, is walking beside me as we enter the magnificent energy self sufficient Turtle Mountain Community College. We marvel at the beautifully constructed atrium of stone and glass, and at the harmony of its placement in the oak woodlands along the shores of a shining blue lake. We are arriving to teach the yearly Ojibwe Writers Workshop that takes place every August in the Turtle Mountains. For me, it is a chance to revisit a road not taken, as I did not end up teaching at TMCC but accepted a fellowship that allowed me to complete my first book. For my sister, it is a chance to use the expertise she has developed over years of teaching at St. Thomas College in St. Paul, Minnesota. She has mentored Native writers and run a reading series called Native words. At TMCC she can use what she knows in the service of other members of our tribe. We both embrace the chance to connect with writers of similar background, and to pass on to them what we know. For both of us, there is a quality to the teachings that is different from teachings anywhere else. That quality, I think, is what tribally based education is all about.

Don't be fooled by the technical language in this book, it is all about three simple things---strength, belief, and hard work. The tenacity of Native people is confounding. Perhaps to the chagrin of those who eulogized vanishing Americans while buying up cheap land still printed with moccasin footsteps, we have survived. But we have survived with fractured cultures, mixed influences, mixed bloodlines, into a tangle of histories and allegiances. There is no perfect continuity and we seem embarked, tribally and individually, on paths conceived to quantify our personal identity and protect our collective identity as tribal people. What tribal education really comes down to, I think, is a combination of community voice, shared history and family knowledge. It is

composed of an intricate combination of old and new: traditional understanding and language, current reservation or urban Indian issues. There is the comfort of being an insider—though there is a broad definition to that even within each tribe. When people learn from within their own culture, there is something precious gained beyond the testable skills.

This book is about stories of place and personal determination; it is about individuals who are finding that learning as part of a community is important. Along with the material that students absorb, there is a certain tensile strength that comes from self-belief. More than anything, Tribal Community Colleges are about that—the courage to trust our own strength.

Louise Erdrich

Preface

By Loretta DeLong

"It is important that we develop sufficient numbers of technically and scientifically trained American Indians who can guide our people in the future. What can be more exciting and natural than to carry on the knowledge of medicines, engineering and science that our ancestors knew but didn't label as such"
Jerry Elliott - Osage-Cherokee, NASA Engineer

Prior to 1492 education occurred as a part of life for Native Americans. Children were taught by example, primarily by those of the tribal unit who were older with experience in the ways of life and survival. Teaching materials were mother earth, the sky and all that was in it. The people and observance of life cycles of the people tied to mother earth and the sky were the methodologies. Learning herbs, grains, plants, trees, and roots that grew upon the earth and could heal and nurture human beings taught medicine, science, horticulture, agriculture, biology and math. Watching the sky and recording how the earth moved in accordance with the moon and sun and how constellations were formed, Native people became meteorologists, astronomers, scientists, storytellers. Native people were informed of weather changes through observation of the sky, winds, air, which allowed them to prepare the tribal community for survival. They chartered their journeys by celestial coordinates. In the oral tradition children were taught of beginnings, the origin of all things, and about conservation and respect for all things utilized in survival. That was the life practice. All teaching materials used were relevant to the lives of those learning. The goal of education in those surroundings was to become a good human being and to survive as a tribal entity.

After changes that occurred with the coming of the Europeans, Native Americans could never again live and learn in the way they once had. Life for Native Americans was changed in a way previously unimagined. There were disruptive veins in the spirit; chapters of darkness and dismay within the culture, the language, and spirituality as natives were pushed from their lands and way of life. It has been the strongest testament to the spirit of the people that they somehow, in the end, managed to sustain and to grow.

Education

From the fifteen hundreds to the present, there have been many different periods of time when formal education was imposed upon Native Americans. Early on, religious orders set up schools in which the goal was to civilize and Christianize the natives with no thought of them as human beings. Children were uprooted from their homes and sent hundreds of miles away to live in boarding schools. Many did not survive the loneliness and illnesses that came upon them. Later education centered on teaching Native People a trade in which they could make a living. Again, they were sent away from home and grew up segregated from their people. Beginning in the early 1900's a more humane decision of the United States government resulted in building schools on Indian reservations, which allowed children to grow up within their family and community.

Standardized Assessment

Early schools established on Indian reservations, for the first time enabled Native parents to be involved in the educational lives of their children and to be present as parents in their children's daily life The curriculum taught in these schools was basic to what was being taught elsewhere in the country. Still Native American students did not achieve at the same level as non-native children in schools. This lower achievement on standardized tests has continued to the present time. The attempt to understand why Native Students have not achieved at a higher level has been the

topic of thousands of research projects. Results from these studies have given many different reasons, all of which are relevant, but in the end do not answer the questions, nor give adequate solutions.

Education was and is of great importance to Native people. That can be attested to by the "right to education" language used in over 120 treaties entered into by Tribes and the United States government between 1794 and 1868. While this value is placed on education in Native communities, standardized test scores still place Native American students at or below the 50% percentile in all content areas especially in math and science. Deficiencies in education on the reservation can be attributed to a variety of factors including a low-socio-economic level, broken families, inadequate staffing in schools, low expectations, etc. Taken into context, systemic change in math and science in the schools can be the catalyst for long-term change in the reservation community. With that concept in mind, the Turtle Mountain Community College applied for a unique planning grant from the National Science Foundation.

National Science Foundation

The planning grant applied for by the Turtle Mountain Community College was part of a larger initiative by the National Science Foundation in response to the appallingly low achievement scores in science and mathematics by K-12 students in the United States. The Directorate for Education and Human Resources (EHR) was instituted in 1990 for the sole purpose of promoting the health and vitality of science and mathematics education systemically in our nation's schools. Shortly thereafter, State Systemic Initiatives and Urban Systemic Initiatives were implemented with the goal of carrying out the stated purpose of EHR. In 1994, EHR established the Rural Systemic Initiatives with the goal of promoting systemic improvements in science and mathematics for students in remotely located and impoverished locales, especially those that were underserved by the previously established SSIs and USIs.

In 1995, the National Science Foundation awarded four Rural Systemic Initiative Implementation Grants to programs covering

large geographic regions and a student population K-12 of nearly 60,000. One of those first four projects was the Tribal College Rural Systemic Initiative, originally called the High Plains Rural Systemic Initiative, awarded to the Turtle Mountain Community College located on the Turtle Mountain Chippewa Reservation in North Central North Dakota. The Turtle Mountain Community College coordinated with twenty Tribally Controlled Community Colleges and other entities to facilitate efforts to enhance science and mathematics education among K-12 students on Indian reservations in Minnesota, Montana, Nebraska, North Dakota, South Dakota and Wyoming.

During the five years of TCRSI implementation, data was collected from each of the twenty sites on standardized test scores, teacher and student information, and community impact as well as documentation for other requirements of the program. Statistical analysis, assessments and evaluations were completed; all of which did not really tell the story of the major successes and lessons learned or of some of the activities and perceptions which did not fit into a chart or graph.

The following stories from seven of the sites involved in the Tribal College Rural Systemic Initiative and a focused story from National Science Foundation TCRSI staff provide an in-depth view of systemic change perceived by people integral to the process. The stories are based on research of documents submitted by each of the sites and interviews with individuals in the schools, communities and colleges. Each story is a unique reflection of the site's demographics, history, culture, people and how they implemented TCRSI drivers and goals. Throughout the stories are underlying themes of leadership impact, lessons learned and a vision for the future.

History of Tribal College Rural Systemic Initiative

By Paul Boyer

"Drivers defined our message and prevented the sites from being buffeted about. "For the first time, grantees could see what NSF meant by "systemic reform," and could mark progress against these specific indicators of success."
Jody Chase

The Tribal College Rural Systemic Initiative represents an ambitious effort to strengthen the quality of math and science education for American Indian students. Recognizing that Native Americans, as a group, lag behind the nation in math and science literacy, the $10 million initiative was established to promote fundamental, system wide transformation of tribal education. Ultimately, the goal was to help tribes overcome fundamental barriers to education reform, poverty, geographic isolation and low expectations.

How this was attempted is, in part, the story of teachers, schools, and school children. It is the story of individual tribal colleges working to promote reform within their nations. To fully understand this ambitious systemic reform initiative, it must be placed in a larger context. Like most education reforms implemented in Indian Country, the Tribal College Rural Systemic Initiative did not originate within tribal communities. Instead, it is one piece of a larger and older systemic reform initiative within the National Science Foundation which is, in turn, part of the nation's twenty-year-old education reform agenda. The Tribal College Rural Systemic Initiative arrived on reservations already shaped by a particular set of educational goals and assumptions. The larger

story of the initiative explores not only how the initiative was implemented locally, but also how it came to Indian Country and, once there, evolved through the involvement of many different actors, each with their own expectations and constituents.

In this context success of the Tribal College Rural Systemic Initiative is measured not simply by how well a college completes a set of tasks and proves fiscal responsibility. It is also the result of compromise and—ultimately—an ability to find common philosophical ground between the grantee and grantor. Success requires both sides to recognize each other's needs and establish clear definitions of success.

Development of the Tribal College Rural Systemic Initiative

Preliminary discussion of a Rural Systemic Initiative began in 1990 when the National Science Foundation hosted a meeting with tribal educators in Denver, Colorado. Turtle Mountain Community College President Carty Monette was among the small number of tribal college leaders to accept NSF's invitation to discuss program opportunities. While sitting in NSF's conference room, he was shown compelling data documenting the degree to which Native Americans lagged the nation as a whole in math and science literacy. The result was under-representation of Natives in professions dependent on math and science skills. In fact, the number of American Indians represented in these professions was "so small, they didn't even show up on the data," recalled Monette. The phrase then being used was "all children can learn." But all children were not learning, particularly in rural areas and most definitely not in Indian reservations.

What would become the Rural Systemic Initiative was still in the planning stages. The Denver meeting was one of four preliminary conferences. But Monette sensed that several key decisions had already been made. "I was sure it was calculated that they would group the north central part of the United States in any future initiative and use the tribal colleges as the catalyst because they are located in the poorest counties." "Turtle Mountain's eventual role as lead for the TCRSI was, in this way, not only the result of keen interest, according

to Monette, but also pure dumb luck." The tribal colleges were the right institutions, in the right place, at the right time.

The first meeting between NSF and these few tribal college leaders was the culmination of several important forces within the federal government and the National Science Foundation. It began with the Department of Education's Nation at Risk report, which famously identified a "rising tide of mediocrity within America's schools." According to numerous follow-up reports completed by the private sector, students were grossly deficient in nearly every academic area. International comparisons found a wide gap between American students and their counterparts abroad. The gap in math and science disciplines was a special concern in the 1980s.

At same time, a wide range of education programs were cut in the early 1980 sat the National Science Foundation,. "All the exciting programming in the 70's got totally wiped out, said Jody Chase, except for things like graduate fellowships." "It was a tiny amount of money and it only supported research." By the mid decade, as the spotlight returned to public education in general and the needs of minorities in particular, funding for new initiatives emerged. "All of a sudden the budget for NSF started going back up," recalled Joseph Danek, who served as director of education programs until 1991.

A special task force was created within NSF to examine the Foundation's role in promoting math and science education for underserved groups. The commission's 1988 report found a weak and uncoordinated commitment to math and science education for minorities. "If you look at what NSF was doing for minorities, NSF didn't have a comprehensive plan," recalled Danek. It didn't have a coordinated, comprehensive, large scale effort. Compared to other agencies, NSF was about average."

Luther Williams, former president of Atlanta University, also served on the task force. After completion of the investigation he was named Special Assistant to NSF Director Eric Block. Under their leadership, the Foundation developed a variety of new initiatives targeting minority education. Some early programs,

such as the Alliance for Minority Participation, provided funding to numerous tribal colleges. For K-12 schools, NSF supported Comprehensive Regional Centers for Minorities. At the time it was the Foundation's largest program targeting minority education. But Luther Williams argued that these various centers were not as effective as they could be because they lacked coordination with mainstream programs and operated without clear benchmarks for success.

It was within this political and philosophical context that the first State Systemic Initiatives were developed in 1990 within the newly formed Directorate for Education and Human Resources. Its central mandate, according to NSF documents, was "to ensure that a high quality science and mathematics learning environment would be available to every child in the United States, regardless of gender, ethnic background, economic status, or physical ability."

Development of the Rural Systemic Initiatives

Luther Williams was dissatisfied with the State Systemic Initiatives. All students were not being served, he believed. New initiatives were needed to reach those who were left behind. "I strongly decided that we had to deal with two underserved populations and they resided in rural sectors and urban communities. Urban schools were the first to be addressed through the Urban Systemic Initiative. The rural initiative soon followed." According to Danek, inspiration for the Rural Systemic Initiative also came from Wimberly Royster, vice president of the University of Kentucky and state director of another NSF program targeting research universities, called EPSCOR. "You guys are missing something," Danek was told. "He said the state's systemic initiative was not getting into the 'hollers' of Appalachia."

Jody Chase, newly arrived at NSF from Nevada, was keenly interested in the project and was named project director. The first task was to organize the initiative around geographic regions. Chase said her initial impulse was to cast a large net and include as much territory as possible. "We had very little money in the first couple of years, so we wanted to make as many awards as we

could and we encouraged really big coalitions." Five planning grants were funded and four selected: Appalachia, the Four Corners, Alaska, and the High Plains. The High Plains region would eventually focus on seventeen tribal colleges in that region and be renamed the Tribal College Rural Systemic Initiative.

Like other rural systemic initiatives, the TCRSI was given a sweeping mandate. More than a research or demonstration grant, the objective was to transform how math and science was taught and "stimulate dramatic improvements" in student achievement in math science and technology. In this way the Tribal College Rural Systemic Initiative would contribute to the quality of national SMT, (science, math, technology); the number and quality of students succeeding in SMT careers; and, over time, the general scientific literacy of the U.S. citizenry.

In the State Systemic Initiatives, the emphasis was on policy change. But Williams believed that this approach tackled the problem indirectly and incompletely. It proved difficult to transform political institutions and, especially, find ways to reliably implement change within school systems. Taking a different approach, the Rural Systemic Initiative directed resources to the local level. "Schools, not political institutions, were the unit of change," said Danek. This meant that NSF needed to work with institutions that have both the mandate and ability to promote this kind of change. Within the High Plains region, NSF immediately turned to the tribal colleges.

National Science Foundation staff, building on lessons learned from the state systemic initiatives, unanimously asserted that tribal colleges were the only logical choice for such a large and ambitious project. More than public universities, state departments of education or local school districts, tribal colleges appeared to offer the right combination of innovation, commitment to social reform, and credibility within tribal communities. More than other entities, tribal colleges offered what Williams called an "institutional delivery system" capable of both research and implementation. "We decided we should not operate through the

K-12 systems alone, but rather, we had to take advantage of the dedicated tribal colleges. "We were convinced they had a nexus of professionals," Williams said, "capable of fulfilling an ambitious agenda of systemic reform."

Within the American Indian Higher Education Consortium, the tribal colleges agreed to respond to NSF's interest with Turtle Mountain Community College the lead institution. Assisted by Jack Barden, a long-time consultant within the tribal college movement, Turtle Mountain requested and received a small planning grant which allowed the college to develop a full proposal. This resulted in the Tribal College Rural Systemic Initiative. Turtle Mountain Community College served as principal investigator, overseeing the work of twenty sub-awards to tribal colleges in the Northern Plains and the Wind River Reservation of Wyoming.

Assumptions and Early Implementation

National Science Foundation leaders knew that American Indian students were underperforming in math and science. "What I knew was that among minority populations it was a sector that was underserved and, more than that, mis-served," Williams said. But the day to day reality of life on reservations and in schools was unfamiliar terrain. He knew they would face unique barriers and would have to accommodate tribal cultures. He did not have enough experience with Native American communities to anticipate the barriers that would emerge. "NSF was going to have to make accommodations about which it knew very little, which was that beyond the core math and science education program, how does one combine that with the issues that focus specifically on native populations?"

Jane Stutsmen, NSF Program Director, observed that the whole Rural Systemic Initiative was an eye-opening experience for the National Science Foundation, forcing interactions with people, institutions, and communities unfamiliar to most of the foundation's staff. "Nobody much understood the situation around here. The staff comes from rather large institutions of higher education. Some of the staff was from EPSCOR states, usually

from the major institutions within them. Not always, but those who had been raised in rural communities were surely a long, long way from them, and probably preferred to distance themselves." "When you come to NSF, it's a pretty elite place, and proud to be so, thank you very much," Stutsman said. Those who chose to take an interest in the RSI's were those few who came from rural communities, or, for one reason or another, had a strong personal interest in rural needs.

To help the Foundation overcome these various barriers of inexperience, Williams brought in to the project people who had familiarity with tribal colleges and the communities they served. Today, he remains convinced that the project's positive outcomes can be attributed, in part to the arrival of Dr. Jerry Gipp, former president of Haskell Indian Nations University. A member of the Standing Rock Tribe, and longtime consultant to tribal colleges, Gipp served as program officer for five years. "So we had within our staff mathematicians and scientists, but we also had people who understood native populations, and thus the program was implemented."

From the beginning of the project, NSF struggled to balance expectations with limited resources. While the total funding amounted to an impressive $10 million, the amount available annually to subcontracts for individual colleges was not large. For Jody Chase, this was one of the great weaknesses of the project. "Well, if we're giving one award of $2 million a year to a place that is going to award 20 subcontracts, how much is that per subcontract? That's not hard math." What it amounted to was about $110,000 per site, but the amount available to each college for the actual implementation of systemic reform initiatives was considerably less." Chase said. "After the travel, after the central office, after the regional coordination, the individual reservation sites only got about $50,000, which was barely enough to keep an office open with one person, with the phone calls and the connections to the schools. I think the different reservation sites really struggled with how to staff that office, how to keep qualified

personnel." Others within NSF share this assessment. Luther Williams felt strongly that resources were spread too thin. In hindsight, he said, "I would use a smaller set, distributing funds more generously to a smaller number of institutions."

Defining Goals

Systemic reform is about fundamental transformation of student learning in classrooms, schools, and their relationship with communities. But how, exactly, is this accomplished? Once sites are funded, what should they do to begin the complicated process of "systemic change? " "And how will they and NSF know that these activities are closing the achievement gap?"

Joseph Danek recalls an early desire to let the tribal colleges answer these questions. It reflected, in part, the culture of NSF and, in part, the Foundation's lack of experience in tribal issues. "Unlike other federal programs," Danek argued, "the approach was to establish more of a partnership with grantees and ask them what they wanted to do, and what they thought NSF should do for them." The colleges responded positively, Danek believed. "They saw that NSF didn't know what it was doing. They thought "Nobody's telling us what to do...Nobody's telling us we have to do it this way or that way. NSF is saying, what do you think?"

But this early hands-off philosophy did not last. Political reality and concern that other systemic reform initiatives were drifting led Williams to take stronger control. "It's fair to describe it in no way other than the following," said Williams: "We just simply became very prescriptive from Washington. More than in the past, the National Science Foundation was going to establish benchmarks of success with the whole Systemic Reform project and hold sites accountable."

NSF was responding, in part, to the growing consensus in Washington that, as Chase observed, "data defines all." "Survival of the program funding depended on making the grantees accountable and showing measurable improvement in student academic achievement by the end of the initiative, if not before." Recalled Williams, "The whole impression I had in Washington was that I had to deliver math-science outcomes to keep the program in place."

The stakes were high. By the time the first RSI's were funded, the National Science Foundation was engaged in three major systemic reform initiatives, representing a $100 million dollar annual investment. But, said Chase, "We didn't have a whole lot to show for it. Even as the statewide initiatives were coming to an end, NSF had difficulty presenting clear evidence of the grant's impact. From NSF's view, we couldn't get a consistent year to year picture of what they were doing," she said.

Both Williams and Chase believed NSF was at fault. The foundation had failed to articulate, clearly and consistently, what systemic reform meant and how success should be documented. Lack of continuity within the Foundation exacerbated the problem. "NSF has a lot of temporary help," Chase said. "Program directors come and go; one may focus on curriculum development, the next might stress assessment." "The systemics were being whipsawed because of these changes."

Unfocused and shifting priorities within NSF produced confusion among grantees, Chase said. "Systemic reform sounds good, but, in reality, nobody knew what it was; you can't get your head around it." And with vague expectations and no clear benchmarks of success, Williams argued, schools and teachers too easily lower expectations. "I can almost express it mathematically," he said. "If you ask people to operate against the existing system, by definition they are going to drift into a non-systemic one because it's very challenging...to keep in view the fact that you have to simultaneously make progress around multiple variables, as opposed to doing one thing or a few things."

To better serve grantees and to generate the data needed to sustain funding, Williams believed NSF had to clarify what it expected to achieve. "Luther Williams called us in one day," Chase recalled. "He said we have to get consistency." He asked, "What are the top five or six things that drive systemic reform?" Pierce Hammond, the division director after Joseph Danek, convened a meeting of all program directors. "He bought us pizza late one night, and we all sat down and brainstormed 'the factors' that

drive educational reform." After three pizzas and several weeks of refinement, Hammond presented the framework for what would become know as the "Drivers." They were those things that, based on NSF's experience, must happen in and around schools to generate and sustain systemic reform in math and science education. The first four were called process drivers.

1. Implementation of a comprehensive, standards based curricula.
2. Development of coherent, consistent policies that support high quality math and science education for each student.
3. Promote a convergence of resources to constantly upgrade, renew, and improve the educational program for all students.
4. Promote broad based support, support from parents, policymakers, institutions of higher education and other segments of the community to leverage the expertise and resources available within communities.

The final two were called outcome drivers. They focused on the accumulation of data and measurement of progress through student academic achievement, including:

5. Accumulation of a broad array of evidence that the program is enhancing student achievement through measurements that might include achievement test scores, higher level courses passed, college admission rates, college majors...portfolio assessments.
6. Improvement in the achievement of all students, including those historically underserved.

These six drivers were implemented soon after the first RSI sites were funded and provided, Chase argued, a clear set of expectations for all the sites, including the tribal colleges. "They defined our message and prevented the sites from being buffeted about. "For the first time, grantees could see what NSF meant by "systemic reform," and could mark progress against these specific indicators of success. "It gave the colleges a framework for reporting," Chase said, "and that had to be helpful."

With its expectations clarified, NSF's involvement increased. The Foundation developed what become known as "reverse site

visits." Colleges were expected to develop a detailed report, then come to Washington and spend several hours reviewing what was done the previous year. It was a demanding, same day 'grueling' experience for the colleges. Said Williams, "Three or four months before the beginning of the second year of the five year, RSI we asked the colleges to prepare a strategic plan. It's a plan that says, 'We're going to do the following 19 things this year and we'll do them in this order. Here are the benchmarks by which we measure the progress." Interim reports were submitted documenting progress and necessary changes were made. "It became a very edited, hands-on and what I would call collaborative process."

Debates over Data

At the same time NSF was attempting to gather, in a more comprehensive and systematic way, data from all sites. Separate from the Drivers was another and, according to Chase, less successful attempt to track outcomes, called the Core Data Elements.

Core Data Elements began as a brief eleven question instrument distributed to all State Systemic Initiatives. It then grew into 100 questions for the Urban Initiatives, in part because urban schools had the staff and resources to easily respond to a large battery of questions, ranging from the number and variety of science classes to student scores on standardized exams. "Urbans have large data shops, so it wasn't a problem." Chase said.

By the time the Rural Initiatives began, more questions were added. "We went through a painful series of meetings to develop the instrument," Chase said. "None of the urban questions could be given up because they were so valuable. None of the statewide questions could be given up because those were the questions we had been asking from the start. So the result was a massive 99-page document." "The Urbans said 'No problem. But for the Rurals, their heads were spinning." Although it was later trimmed to 66 pages, it remained a daunting instrument.

The Core Data Elements presented a special concern for tribal colleges. Neither they nor the tribal schools have the staff and resources to undertake anything but the most rudimentary data

collection effort. Thus, the instrument was more than a burden; it was an almost impossible task. At the same time, Chase acknowledged, many questions were simply inappropriate for tribal communities. Asking tribal schools about enrollments in advance placement math courses does not make sense when schools do not offer advanced placement courses or when enrollments can be counted on a single hand. Dozens of other questions generated statistically meaningless data. At Turtle Mountain College, President Monette concurred. "The instrument, he recalled, "was about an inch and half thick" and, he added, "did not make any sense."

However, beyond these concerns, Core Data Elements fed into a larger fear that NSF cared only about data. An apparent preoccupation with data collection suggested to grantees that success or failure of the systemic reform initiatives would be measured by numbers alone: If student scores on standardized exams climb, projects are succeeding; if no measurable gains result, projects are failing. This approach would not only fail to capture intangible outcomes, but also impose unrealistic expectations. Jerry Gipp recalled his concern with the growing demand for data: "After the first year, when the tribal colleges were kind of operating on their own, Luther was really becoming very insistent that we start asking for student achievement data. I had a real concern with that." He told Williams that he understood that Congress and OMB wanted to see improved test scores, "but, in terms of Indian communities we're dealing with a long standing problem that was created over many decades. We have unemployment as high as 80 percent, maybe more than that in some cases. We have family structures break down. Those are not excuses; they re the reality of daily life."

In this context it is important to calibrate expectations with reality of tribal life and avoid inappropriate comparisons with other systemic reform initiatives. "We're not going to overturn this problem in two years, or maybe even ten years or fifteen years because of the severe poverty out there. That's not to say these

are excuses, and there won't be gains, but don't be surprised if you don't see the gains you might see in an urban setting where there's a single school district and a single superintendent who can make change almost overnight if he or she chooses to. That's not going to happen with three school systems out there operating independently within a single reservation and the Bureau of Indian Affairs in the middle of all those other complications."

Appreciating the Tribal Context

While Williams viewed the more prescriptive involvement of NSF as the only way to get measurable results, Gipp argued that suspicion of the federal government remains strong within tribal communities. Too much control, or even the perception of control, can backfire. "We're the feds, we're the government coming in saying we have a program that's hoping to help. Indian people have heard that for centuries: "We're here to help." I said, "They're suspicious of us. We can say this is the best program, a major opportunity for you, but they may not believe us."

Similar concerns were voiced within the tribal colleges. Jack Barden, a guiding force behind the TCRSI before his death in 2001, is remembered fondly by Chase for his unwavering criticism of NSF's expectations. "Jack Barden," bless his heart, "slapped me around quite a bit. He told me I was demanding too much and not appreciating the context. So he made it one of his personal missions to help me understand the context."

In fact, both Chase and Williams readily acknowledged that they—and NSF, in general—did not appreciate the larger social, economic, and political context when the initiative began. "Now, if we want to talk about NSF's naiveté," Chase said, "I think they failed to recognize that some of these places that had been so under-resourced for so long, that you could not expect huge gains in student achievement in one or two years."

Unfamiliarity with rural issues was compounded by ignorance of tribal communities, including the social and political context in which tribal schools and colleges exist. Most can describe experiences and conversations that revealed just how hard the

task of systemic reform would be. Chase recalls several "ah ha" moments as she traveled to TCRSI sites: At a high school serving both Indians and non-Indian students, she paused to read names posted on the 'Wall of Fame', the school's honor role. Not a single Indian student was listed. "Did it not occur to the institution's teachers and principal that they were only serving half their students?" she mused.

During another visit to the Turtle Mountain reservation, she learned not to overlook the significance of small, even symbolic, efforts. She was told that because of the Rural Systemic Initiative, superintendents from the reservation's three separate school systems, tribal, parochial and public, were meeting once a month for the first time in memory, to coordinate schedules and discuss the needs of students.

At the same time, NSF staff was discovering that they could not expect tribal colleges to have staff and resources needed to immediately implement their individual systemic reform projects. Unlike the large research universities with which the foundation is most familiar, all tribal colleges work with limited resources and overworked staff. The institutional infrastructure was, in many instances, not yet in place when the grants were awarded. This was one of the greatest surprises for Williams. "What I discovered is that the colleges were not as well equipped as I expected in terms of staff to actually do what we were asking them to do." Williams said. He blamed these weaknesses not on the colleges, but on the failure of previous capacity building efforts. "What I discovered was that the institutional ambiance in which the program operates, I'll describe it this way, suffered from decades of mis-service. I just mean certain straightforward, obvious infrastructure that should have been in place, like an effective counseling program, in these institutions. It wasn't because people hadn't tried." But most efforts were what Williams characterized as "mis-assignments" in terms of making a difference.

However, NSF staff still argued that it was important to establish benchmarks and that data collection was a necessary part of the

effort. Chase was impatient with any argument that measurable changes could only be expected sometime in the indefinite future. "NSF was making five year awards, and initially we were told that it might be 20 years before the impact of those funds would be seen in student achievement. Twenty years is a generation of students. Even I, having no background in this at all, found that unconscionable. How do you justify losing a generation of potential? So we articulated our expectations that measurable results come from these funds. I still think that approach was justified."

At the same time, she agreed with critics who argued that measurable change after a year or two of work was unrealistic and not a fair indicator of the Initiative's impact. "Some people really expected that scores should immediately increase," she said. "I can only say that these people were either disappointed or deluded."

However, Chase argued that fear of NSF's data collection effort was overstated in Indian Country. Contrary to perception, the foundation was, in fact, trying to take a holistic approach to assessment of the systemic reform initiatives that the Drivers were meant to promote. Evidence of systemic change would emerge when it was shown that more teachers were adopting active learning strategies, when more resources were being devoted to math and science education, and when community-wide partnerships were being established. She supported the kind of reporting that captured these incremental changes. The real problem was that the unwieldy Core Data Elements instrument created a false impression that data mattered more than anything else. "The last two Drivers were measures of student achievement and the closing of the achievement gap. At the same time there was an increasing demand for more and more data, culminating in the Core Data Elements. In a lot of awardees minds, they were the same entity. But they never were."

In the end, Chase argued, Core Data Elements failed both politically and as an assessment tool. "They were a nightmare. You can quote me on that. It never worked for the Rurals." "All the data NSF needed was already available, she argued, through the tests

being administered by states." "You need a quantitative measure at the end because how else do you know you are closing the achievement gap? But why not use the measures already in place?"

Standards and Culture

From the early days of the initiative—even when so much about tribal education was unclear—NSF staff accepted the proposition that a tribal college systemic reform initiative must respect the centrality of tribal culture. Programs must be implemented in ways that complemented—not challenged—the values and traditions of Indians nations. To do otherwise would not only be "insensitive," it would be counterproductive to the cause of systemic reform.

Strong effort was made in the planning and early implementation to respect the unique cultural context. The first regional meeting with the tribal colleges in Denver included not only college administrators, but a tribal elder who was invited to lead a discussion session. He left an impression on Joe Danek by insisting the participants sit in a circle around the fire and asking how "this thing called systemic reform" would make a difference to his community. Once the projects were funded, elders were included in the planning role.

Even at the beginning of the Initiative, Joseph Danek recalled tribal leaders asking, "Are you going to come in and force white man's math on us, or will we have the opportunity to incorporate what we call Indigenous knowledge?" NSF was being told by some tribal educators: "We have our own math. We have our own standards." This was not a simple Indian versus NSF debate. Said Danek: "Luther was very much oriented toward benchmarks, and performance measures. Others were arguing against that within NSF and the nation." They believed indigenous ways of approaching math and science would lead to better student performance in the long run. NSF staff found themselves caught between these different expectations. There was a desire to accommodate the expression of cultural values and a desire to give tribes authority to develop their own curricula. And yet, the urge for measurable accountability could not be ignored. After all, the impetus for the Tribal College Rural

Systemic Initiative was a desire to close the achievement gap. Danek said the foundation often found itself struggling to find room for both points of view, and, as a result, sending conflicting messages to tribes. "We said to the tribes, "You get to develop your math and science, but you've got to develop it in accordance with the national standards of excellence."

As principal investigator, Turtle Mountain College President Carty Monette understands why his colleagues react against non-Indian academic expectations and, in particular, the use of standardized assessments to measure progress. For centuries, Indians have been expected to conform to western educational traditions and were then found deficient when measured by the various tests of intelligence, aptitude and skill. Rather than serving as a path to opportunity, a century of experience has shown that assessments reveal gaps, weaknesses, and failure. But he also knew arguing against western pedagogy and standardized assessment was not enough. To have credibility, the tribal colleges also needed to take responsibility for providing NSF with alternatives. "For the first year or so we were making the culture argument, and the sites were making the culture argument. But at some point you have to get past the rhetoric of culture." He believed the individual sites were given leeway to incorporate culture in the manner they saw fit. "However, Monette continued, "that placed the challenge on the colleges. If you have a test that's culturally biased, well, fix it." "The bottom line, said Monette, is that alternatives did not emerge." "None of our RSI sites fixed it."

In this case, Monette said, NSF was right to use curricula and the methods of assessment that were available. "We always talk about how these standardized tests are culturally biased, and they probably are. But we don't have a substitute. They should probably not be the only way to learn about learning. But they give some clear direction."

Outcomes and Lessons Learned

Reflecting its origins in the national education reform movement, the Tribal College Rural Systemic Initiative was created to help

close the achievement gap separating Indian students and the nation as a whole. Grounded in the national movement for equity and accountability, the need for measurable results was the driving force behind NSF's administration of the initiative, especially after the first year. It led to greater accountability through reverse site visits and demands for student achievement data. It also led to what NSF staff acknowledge were philosophical argument and tension over accommodations with culture.

At the same time the Initiative struggled to balance resources with expectations. Complexities of tribal life and fragmented education systems produced what Williams called an unexpectedly slow 'translation rate' within most tribal communities. Equally important and just as unexpected, were barriers within the tribal colleges. Some lacked the staff, expertise, resources and stability needed to effectively develop and implement the initiatives. NSF staffs blame themselves for spreading funds thinly over already under-resourced institutions.

In this context, how do the NSF and tribal colleges assess the outcomes of the Tribal College Rural Systemic Initiative project? At the conclusion of this ambitious initiative, wide agreement that systemic reform was taking place exists. While it was not, for the most part, being reflected in student test scores, a foundation was being established that will yield results that both the NSF and tribal community desire.

Within Turtle Mountain Community College, President Carty Monette stresses the impact of the initiative as one of the first and most important precursors of systemic change, raising a community's expectations. "One of its greatest contributions to Indian Country is that it raised the level of discussion about math and science education while allowing local educators to become part of the discussion. It brought them to the table." he said.

It is difficult to overestimate just how disengaged tribal schools were from the national reform movement prior to the Rural Systemic Initiative. Over the Initiatives course, "we found out that a lot of schools didn't have any science majors or math majors

teaching science or math. We found that some high schools and middle schools didn't even teach algebra. One survey of teachers working in schools targeted on systemic reform found that only three were even aware that national science and math standards had been developed. Now I guarantee that every one of these teachers knows there are standards and a lot are going to know what those standards are. That's a big contribution."

The introduction of innovative curricula also stimulated improvement in the quality of math and science education. The Initiative helped schools get access to prepackaged science curricula that could be used effectively even by teachers not trained in the sciences.

Just as important, the TCRSI fostered discussion about education within communities. In many reservations, teachers, superintendents, college presidents, and community leaders were coming together for the first time to discuss the educational needs of the tribe. Again, Chase recalled the monthly gathering of superintendents on the Turtle Mountain Reservation, hosted by Monette. "It was only one meeting. It was only breakfast. It was only once a month. But it was a huge step in terms of opening up communication, because not only did they talk with 'President Monette, they talked with each other."

Something similar was taking place on other reservations. Jerry Gipp was told that, on his reservation of Standing Rock, superintendents were also coming together for regular meetings. "That's the first time, as far as I know, that the school superintendents, the tribal people, the private schools, sat down at the same table and started talking over common problems. It may be common in other places, but on many reservations it's a fact of life that people don't talk to each other."

Third, the TCRSI helped develop the capacity of tribal colleges and elevate their influence in the communities they serve. While the initiative was not originally intended to be a capacity building grant, it became one out of necessity, according to Luther Williams. When he realized that the tribal colleges lacked the

resources and infrastructure to immediately implement systemic reform initiatives, Williams acknowledged that part of NSF's work was to "build those capacities, which the college then used in a generic sense."

More broadly, the college also benefited simply by being recipients of a major NSF grant. While $10 million initiatives are only one more feather in the cap of state universities, the symbolic importance of the funding for tribal colleges was significant. Within many reservations, tribal colleges still struggle to gain credibility as "real" colleges that are as good as "mainstream" institutions. The TCRSI funds not only provided financial resources, it also offered the prestige needed to become a more influential player in the communities they serve. "It validated that tribal colleges could be responsible and accountable," argued Loretta DeLong. "We always have to do twice as much to prove ourselves." But, she added, "we showed that we, too, could achieve success."

LESSONS LEARNED

1. Establish clear definitions of success. This is one of the strongest and most important lessons. There must be clear and agreed upon definitions of success. Danek argued that NSF was predisposed to let tribal colleges shape the Initiative and define outcomes. But he and others believe this also led to ambiguity and conflicting expectations. In RSI's early days, Jerry Gipp said, the project was "struggling" to define its goals and expectations, and this was felt within the tribal colleges. "We were fiddling around with how to show outcomes, especially in data." The prescriptive approach imposed by Williams remains controversial, especially by those philosophically opposed to the use of standardized achievements tests as measurements of student performance and, by extension, indicators of systemic reform.

However, Monette strongly believes these benchmarks provided needed clarity for both NSF and the tribal colleges. They played a useful role because they "forced communities to define their needs, or to find their needs" by helping reveal gaps in schools and student learning. Without comparative data, it would be much

harder to identify gaps in the curriculum, the absence of an algebra class in a high school, for example. It would be harder to fuel concern among parents, who like all parents in America, want the best for their children. "Because of the emphasis on low test scores and improving them, schools are forced to look at what they teach and how they teach." Monette argued. In other words, test scores help spotlight deeper systemic weaknesses. "They actually do provide a good picture of the way teachers are teaching and the way the schools are operating and how students are learning."

At the same time clear expectations for data provided individual sites a measure of political cover, or what Monette prefers to call "political purpose" for the colleges. It was not the college's expectations that were being imposed on the communities, it was NSF's. Expectations could be higher and more rigorously imposed because they came from outside the community. "I can't help but think everyone welcomed that," said Monette, although, he added, "they won't say that."

2. Every grant to a tribal college is capacity building. Unlike most institutions funded by the National Science Foundation, tribal colleges could not leverage institutional resources and large staff when it came time to implement the systemic reform initiatives. For most institutions, capacity had to be created from scratch; staff had to be hired, expertise developed, credibility established within the community. This reality must be acknowledged by funders and viewed as an opportunity. For young and under-funded institutions, every grant can be, should be, an opportunity to grow and mature in ways that strengthen the college as a whole. The degree to which a college has successfully built capacity is a legitimate measurement of a project's success.

   For NSF staff, this was a lesson learned, although some regret that it was learned too late. "It seemed to me that where NSF missed an opportunity with the tribal colleges was the lack of infrastructure improvement in the program," said Danek. "We're going to do the rural systemic initiative, but there's

no equipment, no building. We should have started with infrastructure." He and others argue that it was precisely this experience that led to the current capacity building initiative, the Tribal College and University Program (TCUP).

3. Funding cannot compensate for instability within tribal institutions. Both tribal college leaders and NSF staff recognize that not every site was equally successful. Institutions that struggled did so for various reasons, but usually because they lacked the resources and, especially, stability needed to make the most of the NSF grant. "For the right site, the right people, and the right commitment, the money was enough," argued Monette. But, he added, "For some, all the money in the world wouldn't make a difference." "Simply put, there are limits to what funding, high expectations and commitment from funders can produce. For tribal colleges the more powerful day to day reality is the political, social and economic context of their work within reservations."

"Stability is vital, Chase said, because it promotes trusting relationships needed to foster systemic reform." If you're going to work in the schools, you need to know who the superintendent of education is, or the principal. And they need to know that about the college, too. And in places where you had a lot of turnover in school leadership or in the top ranks of the college, the school and the college never get that communication established."

Tribal colleges were chosen as leaders for the RSI effort, in part, because they were believed to have the expertise and local trust required to guide systemic reform. Most do, certainly more than state universities, departments of education, or tribal political entities. But tribes that lack this kind of trust cannot be expected to show the kind of results found in more stable communities.

Turtle Mountain Rural Systemic Initiative

By Loretta DeLong

"Star knowledge was not just a hobby for the old ones; it was a way of life. Many of the things that we did were based around the stars, sun, and moon. Today, we call this astronomy, and it becomes our jobs as Native American educators to bring this knowledge into the classroom as a vital hands-on component in our math and science curricula." Gene Meier

The Turtle Mountain Band of Chippewa Reservation located in the north central region of North Dakota is seven miles from the Canadian border. Approximately 11, 000 members reside on or near the reservation with tribal enrollment exceeding 27, 133 according to the 2000 census. The reservation community is considered to be a low economic area with an unemployment rate of 59%. Of the 41% employed adults, 39% have jobs that pay less than $10,000 per year. Over half the students attending Turtle Mountain schools and Turtle Mountain Community College are from low income families. Thirty percent of the population has no high school diploma, and ten percent has a bachelor's or college degree (Census 2000).

The 6 x 12 miles geographic region Turtle Mountain people share as a homeland precludes successful agriculture ventures due to overpopulation of wooded, hilly land. History of obstacles

prohibiting the attainment of an economic base which could lead to self sufficiency and diminish the hardships and health problems of the people on the reservation are recorded. These conditions pose many challenges for the educational system. Loving and concerned parents are hindered by poverty and socio-economic conditions in following the path to educating themselves and their children. In this setting, people are in constant search for survival and sense of community which manifests itself through education. By seeking and being involved in the education process, they are able to attain skills and knowledge to provide a foundation for lifelong learning through the Turtle Mountain Community College (TMCC) and schools on the reservation.

Background

Turtle Mountain Community College chartered November 9, 1972 has sought to provide education and training that meets the needs of people it serves on the Reservation. The founding board of trustees and board of directors stated that philosophy in this way:

> *To involve the Turtle Mountain Community at all levels, governance, personnel and clientele; provide instruction by individuals cognizant of reservation concerns and need; design curriculum directly addressed to the multiple areas of education necessary for community development and a concerted effort to serve the backlog of potential students capable of providing informed leadership to the Turtle Mountain people in the future.*

Through the years that philosophy has been refined to reflect changing needs and accreditation requirements; however, the mission has remained the same: to provide access and opportunity to the people of the Turtle Mountain Band of Chippewa. To carry out that mission TMCC has experienced great challenges, obstacles, adversity and in the end, success in accomplishing realization of a vision for Turtle Mountain people which can be sustained in the future.

One of the greatest challenges and accomplishments for the Turtle Mountain Community College was a once in a lifetime opportunity to apply for, administer, and implement a ten million dollar National Science Foundation Systemic Initiative. In the spring of 1995, as a result of the successful application for the grant, a Cooperative Agreement was entered into between NSF and Turtle Mountain Community College. This was the first ever agreement between the National Science Foundation and a Tribally Controlled Community College. Impact of the cooperative agreement and resulting educational reform was felt through-out the twenty tribally controlled colleges that participated in the first High Plains Rural Systemic Initiative. The initial funding of this project by NSF opened the door to tribal colleges to apply for and be granted other NSF projects to implement at local tribal levels.

Initially called High Plains Rural Systemic Initiative, the name was later changed to Tribal College Rural Systemic Initiative to better reflect the essence and mission of the project, which was to work with tribal colleges and 128 schools with high populations of Native American students in a six-state region. To effectively administer the effort, the initiative employed a three-tiered pyramid structure. Overseeing the project from its headquarters at Turtle Mountain Community College in Belcourt, North Dakota were Dr. Carty Monette and Co-Principal Investigator, Dr. Carol Davis, plus a project coordinator, technology associate, and administrative assistant. On the next tier, reporting to Monette, were three regional coordinators, each of whom was in charge of a two-state area. Three regional coordinators, in turn, directly supervised 20 TCRSI sites.

Turtle Mountain Chippewa

Many tribes have symbols and stories which go back to the beginning of time. One of those symbols is the Dream Catcher. To Anishinaubaug people, the Ojibway Dream Catcher Web represents desire to protect children from negative influences in life, to let only good, positive energy flow to the child. The Anishinaubaug Auntie in the form of spider weaves the web strong

with loving thoughts so the child's dreams are protected. To educate our children is to weave that Ojibway Web. In so doing we protect and allow them to realize their dreams. Turtle Mountain Rural Systemic Initiative was the weaver of that Ojibway Web. This was done through implementation of drivers, goals, objectives, and in outcomes realized in implementation of TMRSI project.

Since inception, a review of history indicates many changes occurred that impacted accomplishment of goals, services provided to schools and management of data collection. While a great deal of work went into achieving the purpose, drivers, goals and objectives as stated, the project was a work in progress as it was evolving. Clearly attesting to the dynamic nature of TMRSI were compulsory change requirements issued by NSF on a regular basis. As a result TMRSI continuously changed in response to those national directives. In spite of, and in some respects because of, the evolving nature of the project, many significant activities and accomplishments occurred.

At the beginning implementation of Turtle Mountain Rural Systemic Initiative, all schools in Rolette County were included. After the first year, those same schools continued to be involved in various ways; however focus was on the five schools located on the Turtle Mountain Chippewa Reservation which are:

- Dunseith Day School, Bureau of Indian Affairs operated school, two miles north of Dunseith, ND with 178 students. DDS offers kindergarten through eighth grade and also has a FACE program. Twenty three (23) teachers teach all subjects including math and science. None of those teachers hold a math or science credential. Professional development in usage of the Full Option Science Study, (FOSS), inquiry based, hands-on-learning was a successful component for DDS.

- Ojibwa Indian, tribal grant school in Belcourt, ND enrolls grades kindergarten through eight numbering 250 students. Nineteen (19) teachers teach math and science. None of

the teachers have a math or science credential. Professional development for staff in utilizing FOSS assisted in accomplishing major improvements in the curriculum for Ojibwa School. Along with that, continued facilitation of a Science Fair over the years has created systemic change with a community wide emphasis.

- Turtle Mountain Elementary School is a Bureau of Indian Affairs operated school located in Belcourt, ND. There is over 700 students' kindergarten through fifth grade. Eighty four (84) teachers, none of whom have a math or science credential provide classroom instruction. Standards based high quality instruction assisted through professional development activities, use of FOSS kits, and STARLAB helped to improve test scores overall.

- Turtle Mountain Middle School is a Bureau of Indian Affairs operated school located in Belcourt, ND. There are approximately 250 students' grades 6, 7, 8. Forty five (45) teachers instruct in math and science. None have a math or science major credential. TMMS implements TMRSI components to a degree highly commendable. Notable amongst achievements is the drive towards a more highly qualified staff demonstrated by review of transcripts and by scheduling courses through TMCC to address needs of staff in becoming academically more advanced to improve education for students they teach.

- Turtle Mountain High School is a tribal grant school. There are over 600 students' grades 9, 10, 11 and 12. TMHS employs 53 teachers, eight of whom teach math or science and have majors in those content areas. As the feeder school for elementary and middle schools on the reservation, TMHS continues with systemic reform efforts with cooperation and transition work of TMRSI.

All five schools work cooperatively on standards based curriculum, professional development, sharing of resources, technology access, data driven decision making, inquiry based learning and education goals set for pre-school through post-secondary education. This accomplishment can be attributed to efforts of TMRSI in continuing to be involved, and participating in achieving goals within the education system.

NSF Process and Outcome Drivers

Turtle Mountain Rural Systemic Initiative realized successful completion of original objectives/drivers of the project. Throughout five years of implementation many accomplishments were celebrated as outlined in the following synopsis:

Student Achievement

- Foremost amongst those accomplishments was increase of achievement on standardized test scores in math and science satisfying the requirement of NSF Outcome Drivers 5 & 6. At the time TMRSI began, schools were searching for ways to improve student scores on standardized tests. Composite test scores for Turtle Mountain Schools in all content areas were at or below 50% prior to implementation of TMRSI. Numbers of students in advanced science and math classes were low. Advanced courses offered at the high school level were minimal. In addition, achievement, on standardized tests in math and science was abnormally low for girls. Major questions were: "What could we do?" "How could we make improvements?" Is re-educating the staff the way?" Would that then impact all the students?" "Are Native American students hands-on learners? auditory? visual learners?" (Comments from teachers, administrators 1995-2000) The fact remained that all improvements started would have to result in something important and sustainable. Compiling data, analysis of that data and recommendations based on results needed to be implemented in the overall systemic education reform plan. In planning for remediation

of problem areas, staff attended workshops, became involved in Operation SMART, a hands-on method geared toward getting girls involved in science and math, and implemented methods to improve test scores for students.

- A teacher at Ojibwa Indian School, Bernadine Gagnon demonstrated how she successfully met the challenge of incorporating Ojibwa culture into her first grade math and science curriculum. Students standardized test scores improved in math and science as well as overall when utilizing cultural concepts such as dance and language into core content areas. TMRSI completed a documentary video of classroom teaching and student progress. This resulted in Ms. Gagnon receiving a 'Presidential Award for Excellence' from the National Science Foundation.
- North Dakota and school districts prior to implementation of No Child Left Behind, (NCLB) were focusing on mandated standardized testing of grades 4, 8 and 12. It was difficult to determine whether or not all students were actually receiving course content required to raise test scores based on composite scores of testing only those three grade levels. With assistance of TMRSI, schools now test each year at every grade; resulting in comprehensive tracking of students throughout the system.

The increase in achievement on standardized test scores can be attributed to factors of: analysis of scores on a yearly basis in relation to each content area, remediation in areas of need, and continuance in areas of strength. Schools weren't able to accurately determine what was needed to improve in terms of instructional content areas prior to that. The new way of testing differently allowed major systemic reform to occur.

Convergence of Resources

- TMRSI was able to assist education reform efforts by providing resources for improving math and science scores. Resources from TMRSI paved way for technology

awareness and usage in schools. A focus to increase use of technology in early elementary grades was instituted.

- Professional development for school staff was attributed a major factor in realizing success for TMRSI. Turtle Mountain Teacher Re-Education Initiative became one of the most outstanding accomplishments of Turtle Mountain Rural Systemic Initiative.

TMRSI, five schools on Turtle Mountain Chippewa Reservation and four public schools in adjacent towns participated in the professional development component. The ultimate goal was to create educational success for all students. Existing teaching and learning methodologies, as practiced in the education system were to be altered, changed, and edited resulting in far reaching implications for students, families, and perceptions. Initially TMRSI partnered with schools that used Goals 2000 funds to provide the Professional Development Institute. A week in August prior to school start-up was considered the most opportune time to schedule the Institute. Courses were offered for undergraduate and graduate credit in areas of math, science, technology, literacy, assessment and affective teaching strategies identified as "a need" by staff in schools. Constructivist teaching philosophy was the web weaving through content and methods utilized in this re-education including hands-on techniques, holistic teaching stressing thematic teaching, inter-disciplinary approaches and coaching from education experts through e-mail, web sites, distance learning and classroom visits.

Materials used in courses were viable, organized resources teachers and staff could use in classrooms. Teachers were given strategies that could be tried immediately. Assessing student's responses in a timely matter not done before occurred on a regular basis.

Staff interest in Professional Development was sustained. Initially staff was not comfortable with and actually feared change in teaching math and science. Most of that fear was alleviated through actual hands-on concepts experienced in professional

development courses implemented. Courses allowed them to become better, more confident teachers.

In the last three years, additional courses were offered for paraprofessionals working in pre-school through post-secondary areas. The courses offered were designed to assist them in becoming more competent, and also better qualified to retain positions. The paraprofessional institute proved invaluable to all individuals involved.

Evaluation of each institute provided feedback on value and importance of courses provided. Written comments, in regards to presenters and overall evaluations from Professional Development Institutes, over the years, indicated content was "great". Teacher comments included: "It was nice to take coursework." "It was nice to get material to use in the following week to use in the classroom." "It was nice to get credits to renew your credential." (Comments from Professional Development Institute 1995-2000)

TMRSI was instrumental in planning, implementation, evaluation and follow- up for each institute. Funding was provided for instructors who taught in areas of math, science and technology. Surveys sent to staff to indicate areas of need for professional development continually referred to math, science and technology as a great need. Now, because of impact of TMRSI, majority of returning staff responding to surveys indicate they no longer require as much assistance in math, science, and technology content areas.

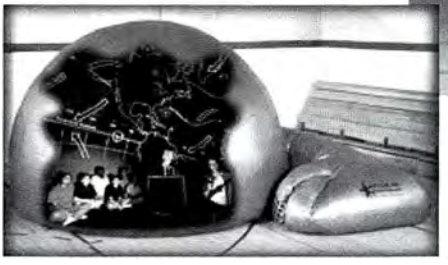
In 2004 the ninth Institute will be held at Turtle Mountain Community College. One goal articulated by the steering committee for the Institute was that it would become self sustaining. That goal has been accomplished successfully. "To create systemic change, you need to provide training and in-service for the instructors who are teaching children." "You need to provide the means to improve the methodologies and knowledge base used by those teaching staff to educate students." (DeLong, 2004)

Standards-based curriculum

- Curriculum implemented in schools was systemically impacted in many ways that reflected satisfaction of requirements of NSF Driver #1. Administrators from schools indicated that initial impetus for teachers to become involved with TMRSI was partially to gain access to materials, resources, professional development, and math/ science training to assist in classroom teaching. Teachers then went to meetings and brought information back to other staff at schools.
- Research studies were conducted and remain a component of Science curriculum. Examples include a water quality study effort. Students conducted research on water quality in school buildings, homes, lakes, and lagoons around the reservation. One teacher commented, "Prior to that time these research activities were just something you read about in the Science textbook." "Now that students study science the way it pertains to their own geographic location, it has more meaning" (Gourneau 2003).
- Other statements included, "Science or Math does not have to be a complete bore." Teachers, who, in the past stated they were afraid of teaching science are now making comments like, "You don't have to fear science if you can make it interesting for learning." "You don't have to be scared of it."
- Schools schedule activities on a regular basis for parents, staff, and students to learn more about science curriculum. Students and teachers set up science demonstrations in schools and explain research processes to parents during evening activities in schools. Teachers explain how science activities after school are related to the curriculum being taught. Students explain how demonstrations and research projects were accomplished. Sessions on Wildlife Management, Entomology, Astronomy, Medical Science, etc. are included in evening activities with parents, students and staff.

- A process was established for curriculum alignment and revision to occur on a continual basis. That allows schools to absorb and be able to adjust quickly to changing requirements of national, state, and local mandates, and especially to address the curricular needs of students. Cognitive Guided Instruction, Inquiry Based Learning, and local environmental issues research occurs on a regular basis with classroom instruction.

- Implementation of the Star Lab was comprehensive enough to satisfy the requirements of all six NSF drivers. It began to be seen as an integral part of science curriculum content in elementary and middle schools. Star Lab is a portable planetarium comprised of an inflatable dome capable of accommodating up to 35 students. Inside the dome, a cylinder projector takes you on a journey from the South Pole, to the Equator, and on to the North Pole. The galaxy can be observed, and solar system studied. You can observe deep beneath the Earth's crust to see tectonic plates, and study cause and effect of earthquakes and volcanic eruptions. Egyptian, Greek, Chinese, African and Native American cultures can be explored through their stories of how constellations were formed.



For the first time astronomy, a unique and complex science became an attainable hands-on subject. Within the scope of astronomy is encompassed history, literature, mathematics, physics, biology, chemistry, languages and art which added to comprehension of students participating. By implementing Star Lab, schools and teachers were able to allow students to explore beyond their imagination, and to look into the past as a way of learning about the future. By utilizing Star Lab, Native students in schools were able to relate to the sky in the same way their ancestors did, and science takes on new meaning and depth.

Another way schools continued use of Star Lab was in physical education classes and gifted and talented programs. Star Lab caused more children and parents to become interested in working together on projects involving astronomy and use of telescopes. During parent events at schools, Star Lab was set up to enable children and parents to learn about constellations and cultural stories related to each of the star formations.

Nearly every student in Rolette County was able to experience Star Lab. Prior to Star Lab becoming available to schools, the only other similar activity involved traveling over two hundred miles to the Museum of Man and Nature in Winnipeg, Manitoba, Canada. Students now have access to this activity at Turtle Mountain. More children than at any other time became involved in science, math, and technology.

- Full Option Science System, (FOSS) was implemented at Turtle Mountain elementary and middle school at no cost to schools. This provided a means by which hands-on science could be taught in a consistent manner using resources provided. Kits storing items to conduct experiments and hands-on activities are replenished as needed. FOSS is a research –based science curriculum for grades K-8 developed at Lawrence Hall of Science, University of California at Berkeley.

Technology

The major accomplishments for the projects technology component occurred in two areas: a study of computer technology needs in schools and a study examining extent of technology and computer use by teachers and staff. Results from the study assisted TMRSI in prioritizing use of resources to assist schools. Resources were allocated for inclusion of technology in instruction. Mostly, questions elicited from discussion with school staff focused on how a distance learning system could be implemented for students and staff, as well as questions regarding purchase of computers and other technology equipment. All schools had access to internet, computers and teachers who taught in a computer lab prior to implementation of TMRSI. What they didn't have were resources to provide professional development to classroom teachers in delivery of curricula using technology. TMRSI provided resources to work with staff in schools through inclusion of technology instruction in professional development.

Policy

- Governance and policy was an important component of TMRSI which became essential in enabling success of the project and in accomplishing NSF Driver #2. A goal was to meet with tribal councils, school boards, and advisory committees to show importance of TMRSI. The hope was that governing boards would draft policies for teaching math, science and technology. Those policies would then be implemented in schools. The year of 1998 was designated "Math, Science and Technology Year" by the Turtle Mountain Tribal Council, and that hope was realized.
- TMRSI instituted a Steering Committee comprised of stakeholders from each school and community organization. "It worked really well at the beginning. Teacher aides were involved as well as administrators." (TMRSI Staff 2003) This provided a time when

representatives from each educational entity could give reports, share insights and ideas for improvement, and feel a sense of connectedness to the community.

- Governing boards at each school were involved throughout project duration. Resolutions were passed by boards in support of TMRSI, and in order to assist in realization of goals and objectives.
- The Belcourt School District Board allocated funding for a line item in the budget to cover costs of testing at every grade level. The testing of students at every grade assisted in collecting valid data. Evidence of commitment exhibited by the board was the decision to fund the assessment, and lack of questioning importance of completing the project goals.
- "When Turtle Mountain school boards had a retreat during the project duration, overheads of standardized test scores were shown to indicate that is where we've been, this is where we are, and we're not where we need to be yet." "We need to sustain all improvements." "You have to make big strides to get where you need to be by 2014." Henderson, 2003
- The response of school boards was very positive. In some cases, contracts for teachers had to be increased by five days to cover five days of professional development held each year at TMCC. School boards had to take a hard look and say, "This is important; it's beneficial to the kids, we need to get training in these areas, and test scores may go up as a result." (Henderson 2003) It was a positive decision for school boards. They were very open to it and now professional development is continued on an annual basis.

Broad Based Support

Many partnerships were coordinated as a result of the effort by TMRSI to accomplish NSF Drivers #3, Convergence of the usage of all resources designed to support science and mathematics education in a focused and unitary program to constantly upgrade, renew and improve the educational program for all students. & #4, Broad-based support from parents, policymakers, institutions of higher education, business and industry, foundations and other segments of the community. Some partnerships were particularly effective in ensuring that systemic reform would be continuous and sustaining including:

- Native Schools for Academic Excellence (NSAE), a network of Office of Indian Education Program (OIEP) schools committed to systemic change for improved teaching and learning in partnership with North Central Accreditation (NCA). The vision of NSAE is to create a preeminent educational system for all students; to educate all students to high educational standards under a common set of performance goals and accountability framework; and to establish a common process of school improvement criteria, policies and beliefs based on a commitment to high performance standards, research-based decision making and collaborative problem solving.
- Turtle Mountain Community College programs working on systemic reform in various capacities coordinated to become an umbrella organization called 'Schools and Community Reform Office'. SCRO representatives meet on a regular basis to address needs and to be a catalyst in meeting those needs through combined resources of different programs participating.
- The First Annual Turtle Mountain Tribal Education Summit was held in 2001 at Turtle Mountain Community College. The Summit effort was coordinated with TCRSI, OIEP and area schools. Time and thought invested in the Summit is showcased through wonderful presentations

and willingness to share stories of systemic reform, and technological efforts from each school, TMCC, Headstart and pre-school. It was a major success requiring efforts to create a seamless education system exhibited during the summit and afterward. Media expertise exhibited by presenters was colorful, musical, and touches emotions of the community. Information shared, ideas exchanged, and communication lines re-established exemplified the success of the summit.

- Collaboration effort among TMRSI, OIEP and Turtle Mountain Schools resulted in a comprehensive system of aligning Bureau of Indian Affairs funded schools in North Dakota, 'Turtle Mountain Center for Education Statistics'. That system responded to need for an efficient program for collecting, inputting and retrieving data and information from schools involved in the project. Planning for the program involved analysis of data needs of schools and TMCC, based on reports required of tribal, state and federal organizations. Input was generated from all entities with a stake in the final product. What resulted was a system continuous in scope which enables schools and TMCC to have ready access to data and information required for reports. The center also assists NSAE schools with formulating baseline data required for NCLB mandates and determination of adequate yearly progress.
- The objective of the Leadership Development for Master Teachers' program is to train local teachers in science, mathematics and technology. The program delivers an intensive, program-specific, long term, science, math, engineering and technology (SMET) instruction program in area schools. Teachers acknowledged as Master Teachers from colleagues and administrators were nominated from each school to receive coursework, professional development training and in turn to work

with staff. Once selected, Master teachers, receive comprehensive, intensive coursework on site at TMCC, and also at regional and national institutes of educational excellence. Master teachers then train local teachers in integrated math programs, and effective methodologies of teaching. The project reimburses each school for costs of each master teacher's salary to employ another teacher. Several individuals have stated that it would have been really great to have a master teacher component in TCRSI during initial five year implementation. The scope of what could have been done and how communication could have been enhanced through master teachers at schools would have had a tremendous impact on level of understanding.

- TMRSI, formed a partnership with NASA called NASA/ ND Connect. Through this partnership, technology in schools was enhanced. Installation of an Interactive Video Network System in three Turtle Mountain schools, K-8 occurred. Courses were provided to grades 3-5 on NASA Science News Network, and NASA Science Files. Courses provided instruction on methodologies regarding scientific method, inquiry and problem solving based learning. Grades 6-8 were provided NASA Connect Courses in learning middle school math concepts and integrated MST strategies for teachers. Two courses were provided for life long learners called Destination Tomorrow. NASA Live-Videoconferencing series connected NASA researchers with Turtle Mountain, and provided research on NASA past, present and future.
- Seventh Generation Technology Education Implementation Project is a collaboration of tribally controlled colleges and several K-12 schools located on four Indian Reservations in North Dakota: Turtle Mountain, Standing Rock, Fort Berthold and Spirit Lake. Seventh Generation Technology Education

Implementation Project mission is to close the digital divide existing on North Dakota Indian Reservations by educating teachers at tribally controlled colleges on integrating technology into classrooms. The project focuses on education curriculum redesign using National Educational Technology Standards (NETS) for teachers, professional development in technology integration, greater accessibility for Native American students to teacher education programs, and an enhanced relationship with K-12 systems through utilization of mentor teachers for pre-service students.

- TCUP is a five year project funded by National Science Foundation. Overall mission of TCUP is to broaden participation of underrepresented minorities in the Nation's Science, Technology, Engineering and Mathematics (STEM) workforce by enhancing quality of undergraduate STEM instructional and outreach programs, with an emphasis on leveraged use of information technologies at Tribal Colleges and Universities.

Several accomplishments happened that could not be measured through a standardized test or assessment. Included was what was considered one of the greatest successes **"attitude change".** Perception of attitude change was exemplified through integration of educational entities coordinating systemic reform with TMCC as lead. There was risk taking by all staff involved; sharing ideas, uniting on issues.

Years of working together to change and improve created stronger staff in schools who became more comfortable, and more knowledgeable about science, math and technology.

At some schools this marked the first time working with TMCC to improve education. In other schools, collaboration had begun to some extent and TMRSI helped to cement partnerships already in place, and allowed it to become more intensive and comprehensive.

Teachers perceived themselves as needing to "learn more" to improve. There is now an understanding that "content" knowledge also needs to be enhanced. TMCC is now viewed as a change agent in improving education.

LESSONS LEARNED

1. TMRSI was too broad in scope of work. Any one of the goals included in the project would have been a full-time task to accomplish; however the project was focusing on many tasks. TMRSI was trying to accomplish too many things and while not a negative, that broadness posed obstacles, especially when each school site was different and geographic distances created problems with communication. There were too many goals and too many criteria to fulfill in five years.
2. Several of the people interviewed thought the biggest obstacle was the time factor. "You would get started on a component and then things would change." "In order to accommodate the change, activities got shelved." "There just was not adequate time." "Developing ideas on how to enhance technology in classrooms was started, but not continued; there was not enough time for schools to set it in place." "The assessment plan proposed was too time consuming." "The amount of reporting required for the sites was too unwieldy for the schools to accommodate adequately within their schedules." (Staff and School Interviews, 2003-2004)
3. Several people involved with TMRSI stated that a new round of projects ought to be funded. "The first five years were just a starting point; now we can learn from mistakes made and truly implement a program that will create even greater systemic change." "An assessment that would actually measure could be developed based on the research from the first five years and curriculum development to

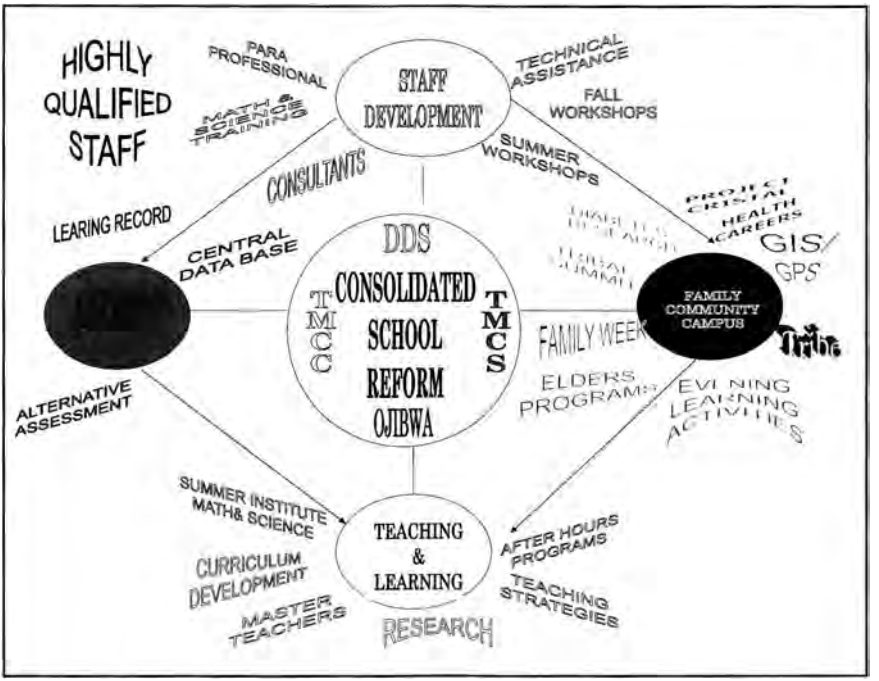
integrate hands-on assessment could be a part of the next TMRSI." (Interview Comments, 2004)

4. For many of the colleges and schools, this was the first time an involvement of this extent with the NSF, TCCC's and Schools working together was implemented. There was not a clear concept of what is was all about. "We were looking locally for ways of improving. For me, it was kind of scattered. It was new to me and it was kind of hit and miss. We would go gung ho with something else and then something else. Eventually we became more focused." "Given the opportunity, based on our experience, we could do wonders with a new round of funding for TMRSI." (Project Staff, 2003)
5. There was a pervasive feeling expressed by staff that the importance of the project should have been stressed by the NSF staff continuously to instill a sense of validity that an institution like the National Science Foundation imparts. "If NSF staff would have pushed importance of systemic reform, to the local schools more, from their level; and if the project expanded to five more years." "If we could've helped the schools implement the assessment." (Project Staff 2003)
6. "It appeared as though NSF was treading the water." "Something that we should look at for future projects is the extent of the involvement of the NSF." "They have such a tremendous reputation for excellence; it would do wonders to have them directly involved in the schools in some capacity." "What kind of message would that send? "Involvement by NSF staff, yes, this is important; this is what we want to meet the need, that's the message the college and schools would get." (Interview 2003).

TMRSI was successful in creating systemic change at Turtle Mountain. The achievements exceeded initial expectations

trancended by an enhanced perception of all entities involved that tribal communities could accomplish goals and succeed despite obstacles. Overall TMRSI was a major catalyst for improving education for Native American students, and especially in math and science.

Miigwetch




TURTLE MOUNTAIN COMMUNITY COLLEGE
AN EXPERIENCE IN SELF-DETERMINATION
TMCC
P.O. Box 340
Belcourt, North Dakota 58316

Blackfeet Community College Rural Systemic Initiative

By Wayne Stein

"Close cooperation and being flexible in accomplishing your goals are the key to a successful partnership and creating a win-win situation where everyone benefits" *Patrick Weaselhead*

In 1996 the TCRSI invited Blackfeet Community College (BCC) in Montana into the project as part of the second cohort and began a four-year relationship with BCC the SMT goals of NSF, the RSI project, and TCRSI on the Blackfeet reservation. Two school districts near the college, Browning and Heart Butte, became partners with BCC in implementing these goals on the reservation.

Brief History of the Blackfeet Nation

The Blackfeet nation is the largest American Indian tribe in Montana and has played a significant role in Montana's development. Up until the mid-19th century the Blackfeet were the premier military and political force in the region until the introduction of smallpox and other foreign diseases led to their eventual subjugation by the United States government. Today there are some 15,000 Blackfeet tribal members, and about half of them reside on their 1,525,712-acre reservation in north-central Montana, which borders the Rocky Mountain front (Bryan, Montana's Indians, p.54). The Blackfeet have struggled with poverty on their reservation throughout the twentieth century,

even though they have a reservation rich in oil, gas, timber, and agricultural resources. One of their principal problems has been the educating of their human resources in such a way that the tribe could shrug off the colonial bonds of the federal government and its minions. The slow but steady progress by tribal members in gaining control of the public school districts on the reservation has led to progress in providing a K-12 public school education that better fits the needs of the tribe's children. In addition, the founding of a tribal college in 1974 has increased the tribe's overall ability to take control of its business, political, and educational future.

Blackfeet Community College

The Blackfeet Community College (BCC) was chartered by the Blackfeet Tribe Business Council by executive action in October of 1974. BCC grew rapidly in the years between 1976 and 1979 in student population, educational programs, and the securing of a solid faculty under the guidance of the Mission Statement:

> "It is the Mission of the Blackfeet Community College to provide transfer of equivalent academic and relevant vocational programs of high quality that lead to appropriate associate degrees and certificates. Further, the college provides a core of general education instruction that results in identifiable student competence in written and oral communications, quantitative reasoning, critical analysis and logical thinking, with literacy achievement in discourse or technology appropriate to the student's program of study. It is also the Mission of Blackfeet Community College to serve as a living memorial to the Blackfeet Tribe, in preserving the traditions and culture of a proud and progressive people" (Blackfeet Community College Catalog, 2000-2002, p. 5).

BCCRSI 1996-2000

In 1996 BCC's administration and board of trustees, led by President Carol Murray, decided that BCC, in conjunction with the TMCC-based HP-RSI Project should enter into a one-year planning sub-contract. BCC would undertake work to prepare for a future subcontract to conduct a systemic initiative involving as

many schools (K-14) on the Blackfeet reservation as feasible. The subcontract called for the following activities:

- Provide on-site coordination for data collection and planning activities to prepare for the year in which the recipient will receive its major funding.
- Provide local coordination for a study of telecommunications capability and plans at all local educational institutions.
- Carry out the data collection plan for system and student data as required.
- Provide supporting documentation for financial transactions consistent with good accounting practice and keep an accurate, up-to-date inventory of materials purchased under the subcontract (Subcontract, Apr., 1996, p.1).

However, after the RSI subcontract was signed and its first part-time Site Coordinator, Carmen Marceau, BCC's Director of Teacher Training was appointed, problems began to appear. Several participants connected to BCC's planning RSI subcontract stated that, while BCC leadership recognized the need for vast improvement in science and math education in the Blackfeet reservation's K-14 educational systems, the BCC RSI Project funds were often treated as extra or found money. The leadership of BCC didn't seem focused on carrying out the activities called for in the RSI planning subcontract. This left the project drifting and rudderless for much of its early period. The essential duties and responsibilities called for in the subcontract such as data collection required by NSF, survey of existing technology in the schools; obtaining community input, and collaborating with educators, cultural leaders, tribal government, and the private sector to ascertain needs in math and science languished.

A second subcontract was agreed upon by TMCC and BCC to continue the BCCRSI project in March of 1997, even though not

much had been done in the previous year to carry out the duties of the set-up subcontract. The lack of effort on the part of BCC personnel was explained as a personnel issue (no one person was really responsible for the RSI) and also as the result of the small amount of funding awarded to carry out the duties of the first subcontract. One important task that had been completed under the first subcontract was the formation of an active advisory steering committee for the BCC RSI project. The advisory steering committee would become the steadying and guiding force of the BCC RSI as the BCC RSI struggled to find its way on the Blackfeet reservation. A serious set of problems, hidden until the second subcontract from the HP-RSI to BCC got under way in the fall of 1997, began to make their presence known after BCC hired Mr. Jim Higgins on September 2, 1997, as the first full-time Site Coordinator of its RSI Project some 5 months after the second subcontract was awarded. Mr. Higgins was given a scope-of-work to carry out by BCC outlined in the subcontract that was directly related to the "Drivers" put forth by NSF as its goals when awarding TMCC the initial HPRSI. Project.

Mr. Higgins's work for BCC as the site coordinator started with a flurry of activity during his first several months on the job. Much was left to be done to complete the assignments set forth in the scope-of-work but only about half the allotted time remained in the subcontract. He immediately began by attending several orientation sessions provided by BCC and HP-RSI, writing and issuing newspaper articles for the local newspapers, meeting with the Advisory Steering Committee, meeting with delegations of local math and science teachers from reservation schools, visiting several local schools and providing information and demonstrations, attending BCC sponsored meetings of related projects, working with the evaluator for TCRSI, ORBIS Associates, and meeting several times with Dr. Patrick Weasel Head, the TCRSI Project Director (Quarterly Report, Chronology of Key Events, Sept.-Nov., 1997, pp. 1-5). Mr. Higgins states that his primary directive from BCC leadership and the advisory steering committee (which he helped reorganize) seemed to be to

operate as a change agent and to raise public awareness concerning the need for much better math and science education to be provided by educational institutions on the Blackfeet reservation.

He also found that the administration style of the BCC leadership was one of hire a person for a project and then turn that person loose to fulfill the goals of the project. He quickly found himself feeling somewhat adrift in the organizational structure of BCC with little local guidance from supervisors at BCC. He did receive help and mentorship from Mr. Joe Coburn of Salish Kootenai College. Mr. Higgins spoke highly of Mr. Coburn and of the time and effort Mr. Coburn was willing to share in helping Higgins understand the goals and Drivers of NSF and the HP-RSI (Higgins Interview, Nov. 22, 2003). Mr. Higgins states that, as he worked through the fall of 1997 and into the winter of 1998, BCC's RSI Project experienced several successes that were encouraging, such as the administration and teachers of the Heart Butte School District becoming very cooperative and active in trying to fulfill the Drivers of the RSI, and the exceptionally dedicated work of the Advisory Steering Committee for BCC's RSI. However, on a personal level he was experiencing great frustration with a number of issues and events arising out of his understanding (or lack of clarity) concerning the overall goals of NSF's RSI Project. For example, the NSF Drivers and much of the advice he was getting from the advisory steering committee on how to work with and influence the local community were not meshing. Mr. Higgins said, "Dr. Weasel Head visited BCC and laid down the law in that, there would be no deviation from NSF's way of doing things." Even if, in the opinion of Mr. Higgins and the advisory steering committee, modifications had to be made to NFS's directives if they were to be effective on the Blackfeet reservation (Higgins Interview, November 21, 2003). Dr. Weasel Head stated that at the time Mr. Higgins was site coordinator of the BCC RSI, he got the impression that the goals and Drivers of NSF's RSI hadn't really been accepted by BCC and other educators on the Blackfeet Reservation (Weasel Head Interview, November 12, 2003). By late spring 1998, Mr. Higgins and Dr. Weasel Head were each feeling that the other was just not understanding the real

problems facing them concerning how the Blackfeet educational institutions ought to carry out the NSF Drivers, as they tried to work out their differences so that the systemic changes resulting in improvement in math and science education could take place on the Blackfeet reservation (Weasel Head Interview, November 12, 2003 & Higgins Interview, November 21, 2003). A problem that Mr. Higgins couldn't overcome was the estrangement he had with the Browning School District's administration. He and the administrators had an unworkable relationship based on past and current differences that hindered his ability to secure data and other forms of cooperation from the school district. Since Browning was the largest school district on the reservation, it was clear that much of the work needed to implement the NSF Drivers wasn't going to get done. Something had to give and so it was agreed in mid-1998 that Mr. Higgins would leave the position of site coordinator of the BCC RSI and a new person would be sought to carry forward the objectives of the program (Higgins Interview, Nov. 21, 2003; & Weasel Head Interview, November 12, 2003). Mr. Higgins did state that it wasn't a total wasted effort as he looks back on the experience because he now can see the successes that came about from his and the advisory steering committee's efforts. They had managed to secure a proclamation from the Blackfeet Tribal Council in support of the BCC RSI and its goals. A strong advisory steering committee for the BCC RSI was created; the Heart Butte Public School District had become an active RSI partner, and the level of public awareness for the need to improve math and science education on the Blackfeet reservation was raised beyond what it had been prior to the BCC RSI. He went on to say that the major short comings that he couldn't overcome were too little funding

from the HP-RSI, programmatic differences between him and the HP-RSI leadership, and problems between him and the Browning School District's administration in 1998 (Higgins Interview, November 21, 2003).

It is interesting to note that in 2003 Mr. Higgins, Ms. Helen Augare (the current BCC RSI Site Coordinator), and to a lesser extent, Dr. Weasel Head have each said in their own way that maybe that first year under Mr. Higgins's guidance of the BCC RSI had to be suffered through. The lessons learned in 1997-1998 made it possible for the community, local school district personnel, the advisory steering committee, and BCC to gain the necessary experience to succeed in instituting real systemic improvement of math and science education on the Blackfeet reservation.

It was about this time that a major change was instituted by NSF and TMCC concerning the management of the HP-RSI. TMCC renamed the project, calling it the Tribal College-RSI and became the technical advisor of the project, while NSF began to award contracts directly to the project participants. These changes in BCC's RSI project coupled with the hiring of Ms. Lori Falcon as the new site coordinator marked the beginning of a slow but steady improvement in the BCC RSI project's ability to meet the objectives of the NSF Drivers on the Blackfeet reservation.

Lori Falcon was recruited in the late summer of 1998 for the position of site coordinator after BCC again found itself without a person directly responsible for the BCC RSI project. Her background was in language and education rather then math or science education. She had returned to the Blackfeet reservation to work in the Piegan Language Immersion School. The immersion school had experienced some funding shortfalls over the summer of 1998 and she found herself looking for another position when she was recruited to direct the BCC-RSI. Ms. Falcon states that again Mr. Joe Colburn of SKC was a big help in her gaining a fairly quick understanding of what NSF and the TC-RSI wanted to accomplish with the Drivers of the project. She also said that her relationships with the TC-RSI representatives, Dr. Weasel Head and Mr. Ivan Small, as well as with the BCC faculty

and administration were good ones. Unlike Mr. Higgins she found Dr. Weasel Head helpful and easy to work with, even if he was a bit rigid about accomplishing what the NSF Drivers called for in the contract (Falcon Interview, Dec. 20, 2003).

By October of 1998, Ms. Falcon was able to report a number of successes concerning each NSF Driver to the TC-RSI, NSF, and BCC administrators.

After a short stint as site coordinator Lori Falcon resigned and left BCC. She says, " I saw the real potential of the RSI and enjoyed working with the advisory steering committee and the folks at BCC, but I just didn't see the RSI working the way it was configured and run by administration at BCC" (Falcon Interview, November 20, 2003).

After the departure of Lori Falcon in the spring of 1999, Ms. Debra Davis, Dean of Academic Affairs, took responsibility for the BCC-RSI. She says, "If I'm going to be responsible for a program here at the college it's either going to be good or gone" (Davis Interview, November 21, 2003). Academic Dean Davis immediately did a review of the funding of the BCC-RSI and compared it to what was being asked of the project by NSF and found that too much was being expected BCC for the funds available. The next thing she did was to search for and hire a new site coordinator. The new site coordinator would be directly responsible to her and the BCC President and could count on her office for support and guidance, both of which had been in short supply for the previous two site coordinators. Academic Dean Davis hired Ms. Helen Augare, a recent university graduate with a degree in business. Ms Augare said, "When I came on board as the new site coordinator of the BCC-RSI, I found a project in real distress. Much of the major work needed to implement the NSF Drivers was not done, the data needed for the project was incomplete, relationships with the Heart Butte schools was good, but the Browning schools weren't really in the mix, and I had about a year to straighten it all out. Interestingly enough, though the project was under-funded there were surplus funds available because of project staff turnover. So I put my

business school education to work and did a complete evaluation of what had been done, what needed to be done, and then drew up a plan to accomplish what we could with the time left in the contract. The one saving grace I found throughout the evaluation process was that the previous BCC-RSI site coordinators had put together a very talented and dedicated advisory steering committee that still wanted to get the job done concerning math and science education here on the Blackfeet reservation" (Augare Interview, November 21, 2003). Another fortunate event that took place in the summer of 2000 was a complete overhaul of the Browning school district administrative structure by the Browning School District Board of Trustees. Ms. Augare was able at this point in time to finally begin a cordial and productive relationship with the Browning School District, much like the one BCC-RSI had with the Heart Butte School District.

Year 2000 of the BCC-RSI is the clear demarcation year in which the RSI Project began to make a positive and significant impact on math and science education in the whole of the Blackfeet reservation. The BCC-RSI continued to hold a strong position with the Heart Butte School District and gained much support for its efforts from the new Browning School District's administration. A new site coordinator with solid BCC administrative support and direction, combined with the guidance of the steadfast advisory steering committee, led to its most productive year in reaching the goals of the TC-RSI and NSF's Drivers. Each Driver saw some advancement in reaching its stated goals:

Driver 1: Comprehensive Standards-Based Curriculum Activities

- Ms. Falcon scheduled and presented national standards for the Heart Butte and Browning school districts. She also worked with the advisory steering committee and Blackfeet resource people and kept them informed of the activities of the BCC-RSI. It was also about this time that NSF and its project managers across the country began to see the wisdom of using local, culturally relevant math and science curriculum to enhance and promote what NSF was trying to accomplish with the introduction of national standards in math

and science education (Weasel Head Interview, November 12, 2003). Ms. Falcon brought an archaeologist of Blackfeet descent to present at Heart Butte schools, Browning schools, and Headstart to demonstrate a Blackfeet approach to science inquiry. The audiences at the presentations included students, parents, school staff, teachers, and community members. Ms. Falcon and the advisory steering committee considered this activity a major success for the BCC-RSI (First Quarterly Report, October 6, 1998, p.1).

- Nine major events were sponsored and /or run by the BCC-RSI such as BCC-RSI organizing a culturally based activity for all math and science teachers and administrators on the Blackfeet reservation. The activity used math and science for the construction of a lodge. The information shared is now used in the curriculum of each of the schools on the reservation. Another positive move, assisted by the BCC-RSI, was the adoption by the Heart Butte and Browning School Districts of national math and science standards for their elementary and high school math and science curriculum.

Driver 2: Policies

- The site coordinator attended a BCC Board of Trustees meeting and secured a letter of support from the board of trustees in support of the goals and activities of the BCC-RSI. She worked on polices within BCC that would promote the ideals of the NSF Drivers, especially among BCC students who at the time were enrolled in very low numbers in math and science classes at BCC (First Quarterly Report, October 6, 1998, p.2).

- Schools in both districts developed technology plans with policy manuals attached and additional plans to provide teacher development in the best use of their technology. The advisory steering committee met monthly to advise on the best policies to move math and science education ahead on the Blackfeet reservation.

Driver 3: Coordination of Resources

- The site coordinators attended numerous reservation-wide meetings with advisory steering committee members, Heart Butte School District and Browning School District personnel, tribal college math and science faculty and program directors across the state and region, and with financial managers and supervisors of BCC and the TC-RSI (First Quarterly Report, October 6, 1998, pp. 3, 4, 5) Each meeting was an attempt to marshal the resources necessary for a successful BCC-RSI Project. Ms. Falcon, looking back said, "These efforts to establish an effective BCC-RSI had some success, though they were very slow in coming to fruition for BCC and in being recognized as such by TC-RSI and NSF." (Falcon Interview, November 20, 2003).
- The BCC-RSI met with and/or coordinated six meetings with other entities responsible for the furtherance of math and science on the Blackfeet reservation.

Driver 4: Broad-based Support

- The site coordinators and the advisory steering committee spent much of their time promoting the NSF ideals of math and science to a broad constituency on the reservation, but they had mixed success. Both Mr. Higgins and Ms. Falcon said that once they had good acceptance from all that to whom they spoke to about the RSI project concerning the ideals and values of what NSF was trying to do in the promotion of math and science for all students. However, that didn't always correspond with BCC-RSI directives for action in implementing the RSI Drivers in the various school curricula (Higgins Interview, November 21, & Falcon Interview, November 20, 2003). A real success that both Higgins and Falcon were able to point to in 1998 was the cooperation of Principal Elizabeth Cox of Heart Butte School District. Ms. Cox worked hard during this period to implement the national math and science standards of NSF and the Drivers of the BCC-RSI in the schools' curriculum.

- The advisory steering committee was made up of some of the most influential teachers, community members, and administrators on the reservation concerning math and science curriculum. They, and the site coordinator, made it a point to bring together teachers and community members so they could participate in a number of science fairs and other events throughout the year.

Drivers 5-6: Student Achievement

- Data was not available in 1998 that reflected the impact of BCCRSI on increased High school graduation rates. Also not available in 1998 was any data that illustrated the influence of BCCRSI on increased application by reservation youth to post-secondary institutions (First Quarter Report, October 6, 1998, p.9). In fact in 1998, of the 1,900 students attending reservation schools on the Blackfeet reservation, 73% tested below the proficiency level in math and 64% tested below the proficiency level in science (Augare, Project Description Report, 2002).

- There is little doubt that by the fall of 1998 and spring of 1999, the BCCRSI was struggling to fulfill its mandate from the TC-RSI and NSF. The BCCRSI had started with a reduced timeline for planning and implementation of the program goals, inadequate funds to carry out its mandate, and less then active support by central BCC administration for the personnel brought on as site coordinators. All of the above led to a project very much adrift and in need of firm leadership and support from BCC.

- Cooperation from Heart Butte School District and BCC itself was good during 1998 and some data was gathered illustrating the accomplishments of students in math and science so that a base line could be developed for these two educational institutions. However, a barrier faced by both Mr. Higgins and Ms. Falcon was the antagonism that existed between themselves and the administration of the Browning School District. Ms. Falcon like

Mr. Higgins before her had gotten into disputes with administrators of the Browning School District over curriculum and various other matters. These disputes led to mistrust and a lack of cooperation just as the BCCRSI site coordinators were requesting of the Browning School District necessary student achievement data for the BCC-RSI project and its success on the Blackfeet reservation (First Quarterly Report, October 6, 1998, pp. 8 &9).

- Data about the status of students on the Blackfeet reservation was submitted to the central office for the first time in a format that could be used to project the future of Blackfeet students in math and science (Augare & Davis, Tribal College RSI Report, pp.1 & 2, December, 2000).
- The beginnings of a foundation for the success of the BCCRSI in reaching its most important goal, promoting the success of the local school districts and college in developing solid standards, policies, and curriculum in math and science for its students, had been established by the BCC-RSI.

LESSONS LEARNED

In every story such as the one told about Blackfeet Community College and its struggle to develop a solid RSI on the Blackfeet reservation, a number of important lessons are there for future institutions of education to study and possibly learn from. They are as follows:

1. An educational institution that takes on the responsibility of a project such as NSF's RSI must totally "buy into" the project's goals and ideals. It cannot see the project as only an extra potential source of revenue. Before committing to the task of carrying out the projects goals and ideals, the institution must judge the project as one that it would like to institutionalize or one that, even in the short run will enhance its ability to serve the community.
2. Once an educational institution takes on a project such as the RSI, which demands much community coordination, it must

appoint a full time site coordinator in a timely manner. An active and productive site coordinator is the key to the project's eventual success within the community.

3. The educational institution that accepts the responsibility for a project such as the RSI must then dedicate a substantial amount of administrative support to that project. By its very nature, the RSI project must have strong institutional support for its many outreach functions into the surrounding communities' educational systems. Without strong home institutional support, the project will drift and languish as it attempts to get others to take it seriously when its own home institution doesn't do so.
4. The central funding agency must fund projects such as BCC-RSI adequately if they hope to see them succeed. By under-funding BCC from the "get-go" as a member of the second cohort of participating TCCC's, NSF was setting it up to fail.
5. A well throughout planning cycle should have been a part of BCC's first contract year to help insure success of the project. By overlapping the planning cycle and the first year of implementation of the RSI, too much may have been expected of a single person.
6. The host institution and its site coordinator must strive to develop cordial relationships with all the local school administrators and other important community persons. Without such cordial relationships, a project such as BCCRSI cannot succeed. The very success of such a project demands much cooperation from those outside its direct control, yet who have the same desire to see students succeed in math, science, and technology.
7. A major part of the success of a project such as BCCRSI hinges upon the organizing and nurturing of an active advisory steering committee made up of knowledgeable and dedicated members. BCC was able to forge such an advisory steering committee and much of its current success is in part due to the advisory steering committee supporting the various site coordinators and BCC even when RSI activities weren't going well.

8. A national initiative such as the Rural Systemic Initiative implemented by the National Science Foundation must recognize the potential for regional and cultural creativity when it puts forth national standards in SMT curriculum, especially when dealing with populations such as American Indians. One size doesn't always fit all communities in a country as diverse as the United States. When striving to establish national standards and reach acceptable goals in math, science, and technology, flexibility must remain a part of the equation.

Si Tanka Rural Systemic Initiative

By Patrick Weaselhead

"The initiatives's presence, availability, and readiness to become involved in the areas of math, science, and computer technology is widely recognized and requested." *Guy McDonald*

Cheyenne River Sioux tribal members are descendants of the Tetonwan Division of the Great Sioux Nation. The four Tribes include the Minneconjou, Itazapcosni, Sihasapa and the Oehe Numpa. The Reservation is located in north central South Dakota and borders the Standing Rock Reservation on the north. The Cheyenne River is the southern boundary of the reservation. Dewey and Ziebach County lines are the western border with the Missouri River as the eastern boundary. The total land area of the Cheyenne River reservation is 2.8 million acres with 1.6 million acres owned tribally or individually. The land is an integral part of Lakota culture and the economic base of the reservation and home to Si Tanka College (formally Cheyenne River Community College).

The Cheyenne River Community College located in Eagle Butte, South Dakota, was chartered in 1974 by the Cheyenne River Sioux Tribal Council. Like many of the tribal colleges, CRCC became a Land Grant institution in 1994. In the year 2000 through the backing of the college's board, and the Cheyenne River Sioux Tribe, a university was purchased and the name of Cheyenne River Community College changed to Si Tanka University. The university consists of two campuses; one located in Eagle Butte

and the other in Huron. Although this acquisition caused pain and agony (according to some staff, the acquisition of the Huron campus put the tribe and the university into financial difficulty). Si Tanka University was accredited by the Higher Learning Commission of the North Central Association of Schools and Colleges in 2000. Si Tanka University offers a unique higher education opportunity for people of all cultures. It prides itself on being a multi-cultural university with a mission "to provide education and cultural development for a diverse student population and to provide an education that leads to certificates, associates and baccalaureate degrees, which fosters intellectual, social, and cultural development for a diverse multi-cultural student population, some of whom may have unique education needs."

STRSI

Si Tanka University received its first subcontract with the Tribal College Rural Systemic InitiativeTCRSI through Turtle Mountain Community College (TMCC) in March, 1996 for the Tribal College Rural Systemic Initiative. The initial process between TMCC and Si Tanka University was to gather data and set the stage for further interaction between Si Tanka University and their schools which seemed a straightforward task. However, as a result of NSF's stringent attitude toward data collection, they were left with the increased task of gathering many kinds of additional school data in their service area. Initial meetings with Si Tanka and TMCC helped set the stage for developing services to area schools. For the first time Si Tanka University understood that they were to develop activities in four broad areas based on drivers developed by NSF. The areas were to include:

- Mathematics and science standards-based curriculum for all students
- Mathematics and science standards-based assessment for all schools
- Mathematics and science standards-based professional development activities for teachers, school administrators, and community leaders

- Local Native culture curriculum integrated into mathematics and science standards-based curriculum

During their second year Si Tanka University was required to coordinate with all the schools and colleges in their service area. This coordination was to bring about specific changes that would be long lasting and sustainable in science, technology, and mathematics education through high quality and challenging instruction.

A regional coordinator, Gene Meier, was hired by TMCC to assist the Tribal College Rural Systemic Initiative with this effort. A Site Coordinator, Greg O'Connell, was hired locally to direct the program. After these individuals were in place, Si Tanka pushed to meet the grant requirements. In a report written after the first year, the Site Coordinator indicated that "only base-line data was collected and it will take years to see any impact as a result of infusion of activities." At this point, throughout the TCRSI project, it became apparent that standard data collection was complicated because standardized testing information was different amongst schools and could not be compared as required by NSF.

After several months of on-going activities, teacher and administrator turnover in Cheyenne River schools became a problem. Even though Si Tanka University was working at creating systemic change, keeping new players on the same page and helping new players understand the efforts of the overall grant was difficult. Schools that had problems keeping math and science teachers (or did not have certified teachers teaching these subjects) did not have a focus on math and science education. Just staying ahead of the teaching effort, they did not have the luxury to focus on curriculum and standards-based education.

Si Tanka University at this point became the "poster child" for other tribal college sites. They wanted to fulfill their contractual effort, but with the numerous problems plaguing them, were hard-put to show any substantive changes attributable to the grant. An example of the problems faced was the question

of, "whose standards?" Public schools are required to meet state-wide standards while tribal schools were using a national standards-based system. This was very confusing, especially for the site coordinator who was trying to fit data into an NSF data definition that did not fit the definition of data being collected. Data Collection was also complicated by the fact that the state revised their curricula to meet standards three times during the TCRSI project, and each time the schools were required to establish criteria to indicate if they met those changing standards. Teachers and the site coordinator at the time noted that, with all the confusion, all they wanted to do was wait and see if this settled down so that they could get back to teaching.

Si Tanka University was also faced with indifference from the schools. Several well-planned workshops had to be cancelled due to no-shows or low attendance. Even though there were promises to attend sessions, many teachers and administrators were so exhausted after a full day of work that they did not want to engage in another educational activity. They felt close to being "burned out" in the course of their normal days. RSI grants did not provide enough resources to even begin to address this challenge.

When Si Tanka University finally secured a school site, Tiospye Topa Tribal School, willing to be a model RSI school, the surprise was that the school did not have any science curriculum nor were there any teachers to teach science. To address this challenge, standards-based curriculum of FOSS and Connected Math, soon became fodder for professional development for teachers who had some experience with science and math.

Si Tanka University was involved with several grant funded projects at the time of the first RSI effort, many of these still on-going. One is the W.K. Kellogg foundation grant to assist in raising bison and to "slaughter bison in a traditional manner". This project helped to provide science instruction using hands-on activities that had some cultural relevance. This effort started many collaborative arrangements as the Si Tanka University RSI project required "convergence of resources" as a systemic approach.

Through the Oyata consortium with another tribal college, Oglala Lakota Tribal College, which also had a NSF funded project, Si Tanka was able to leverage its professional development activities. No long after the project began many people and institutions were knocking on the project door to offer assistance. One was Black Hills State University (BHSU) in South Dakota that had a Center for Excellence grant. This project had some overlap with TCRSI program activities. Both the Oyata Consortium and BHSU were connected to the Full Option Science (FOSS) system of science standards based curriculum and Connected Math, another standards-based curriculum.

In the middle of Phase I of the Si Tanka University and TMCC effort, a regional meeting was convened to address math, science, engineering, and technology (SMET). The regional meeting agenda had an emphasis on the unique infrastructure of five native Indian colleges, Oglala Lakota College, Sinte Gleska University, Cheyenne River Community College, Sitting Bull College, and Sisseton Wahpeton College. This regional meeting provided the beginning of a unified template for all tribal colleges to gather data. Systemic Research Institute (SRI) and Dr. Kim the Principal Investigator was brought in to help develop the effort. The data collection instrument developed was a godsend for tribal colleges as it put everything on a common template that addressed most of the issues tribal colleges were expressing about the difficulty of gathering data.

Standards-based Curriculum

Because many changes occurred in the definition of standards-based education during the STRSI effort, the site was overwhelmed with these changes and trying to do an adequate job. Changes in standards, changes in teachers, changes in administrators, and changes in data collection led to early confusion of the project staff and in many cases some just went their way and did what they thought was right. Issues and some of the lessons learned about the impact of the STRSI and success in accomplishment of the driver requirements in specific areas are as follows:

- After the programs third year when the overall project was ending, those involved in the STRSI were able to connect with all of their service schools. The project was beginning to make major contributions in understanding standards-based education in coordination with the state department of education. The schools were beginning to set high standards and high expectations for students. Although schools were now addressing standards, the standardized test scores remain low, and the gap in test scores when compared with other schools was not declining in the way postulated at the beginning of the TMRSI project. Even with standards in place, some teachers continued to teach the way they had always taught without making any connection to the standards or benchmarks. Teacher and administrator turnover did not allow for an on-going systemic approach championed by systemic reform standards as there was too much instability in some schools.
- Courses for many of the schools were derived from books that were used by schools in the past. When new concepts were introduced, such as FOSS and Connected Math, these were incorporated within existing courses. Special courses, such as Ecology with Technology and Water Education for Teachers (WET) were widely accepted for hands-on activities as was the FOSS kits. Teachers preferred more hands-on activities for students because it "kept their interests high."
- New course offerings were minimal, as most were aligned to existing standards. One new approach widely implemented was to infuse projects like FOSS and Connected Math into regular courses. Because teachers were presented with state standards and their benchmarks, they tended to refocus classes to reflect these changes or to heighten key points as indicated as to what students should know at a certain point in their academic year.
- Because cultural relevant curriculum was not available, many teachers wanted to know what they could do to

incorporate cultural aspects into the curriculum and still meet state standards. This was one change STRSI experienced in working with teachers.

- For place bound students, local flora and fauna activities were used. This allowed teachers to use the extended classroom of the outdoors to their advantage for hands-on activities, learning about local sites, and creating a high level of interest for students.

Student Achievement & Assessment

Assessment was always an issue because of the federal and tribal schools involved in this project. Standards, either state or federal, were always an issue, pitting some teachers against the standards of the state, and the national standards. Although there were some similarities, their differences just seemed to create havoc in the effort to measure project effectiveness between the two sets of standards.

- During the TCRSI project, NSF always wanted to know how academic grades changed as a result of activities undertaken to address systemic reform. Sites were asked to see if, through their involvement and intervention activities, grades and standardized test scores improved. Different standards and assessments used by the federal schools, tribal schools and public schools could not be compared to each other in a valid, reliable sense and the data collection and analysis required became a frustrating task. STRSI was involved in an initial NSF assessment effort that looked at gathering data and shipping it off to California to be put into a big data hopper designed to show success or failure of RSI efforts, aligning change to program involvement. This effort was so time intensive and expensive that STRSI pulled out. Available data was sent to California but was insufficient to produce results and no feedback was received by STRSI.
- Impact as a result of RSI was realized in small doses. Some grades improved, some attendance patterns were improved,

some professional development helped teachers to teach better, but overall the gap in educational achievement did not change dramatically and was not sustained.

- If any real change came about, it occurred in individual students who now have additional resources to help them gain knowledge that was not provided before. The Tiospaye Topa School now had some basic science and math curriculum where as before it was very minimal.
- Interaction between cultural (including language) knowledge and instruction in mathematics, science, and technology at both K-12 and higher education levels increased during the project. A major change achieved by STRSI is that NSF re-thought culture and curriculum so that they became a part of the agency's focus with systemic reform

Policy

At this point schools at Cheyenne River were writing "School Improvement Plans". The STRSI project was allowed to intervene and assist. This intervention gave the schools some insight into standards-based education, whether it was for tribal, federal or public schools. Cheyenne River schools also did not have any policy relating to academic achievement in specific MST curricula. STRSI intervention allowed schools to refocus and start to look at policies that might help this effort.

- The Cheyenne River tribal government had an educational creed, but did not have any policy in place to assist the systemic math and science reform effort.
- STRSI Steering Committee was comprised of local school teachers and administrators. This group continually processed an informal assessment of the program efforts. Utilizing standards-based curriculum was important to them. When they saw more student opportunity to participate in hands-on activities, they concluded that the STRSI effort was successful.

Convergence of Resources

Another challenge at Si Tanka University project site was that the college went through some difficult times with administrative and board changes. This left several staff members wondering what would happen to their positions since they were not tribal members. As the project developed, instability led to basic focus. First, because of the great need on the reservation for professional development, STRSI staff found that an easy issue on which to focus. Second, since the reform effort was hitting the country's schools, but not reservations schools, standards based curriculum such as FOSS and Connected Math was an obvious step forward. Math was a key focus since no standards-based curriculum in Math was identifiable. Once the NSF 'drivers" were in place, Si Tanka University had a clearer overall focus. Before the "drivers" STRSI activities were hit and miss.

Because the RSI involvement included FOSS and Connected Math, simply because they were both standards-based, professional development was sought by teachers for "how to use" these two products. Training teachers did not result in the systemic reform expected because of the teacher and administrator turnover that worked against such reform. New teachers were taking advantage of training each year. Some of the previously trained teachers, knowledgeable about FOSS, for example, took teaching positions elsewhere.

Community involvement and support

Initially the STRSI program focused on community activities, but later project leaders learned that in systemic reform they had to address a litany of other project aspects so they lessened their community focus. Time and effort spent on gathering data for reports was intensive. That gave little time for community activities and interaction.

- Support from the community came in small doses, especially when teacher aides were involved. Teacher aides were a major part of the community, and the eyes

and ears of many teachers to what is happening in the communities. Many wanted more cultural activities in the new effort, but there was no way to draw a parallel between cultural inclusion and meeting STEM standards.

- Partnerships were important to the success of the STRSI project. As a result schools during the project were inclined to seek assistance from local tribal elders or culture specialists as partners.
- Si Tanka University works closely with South Dakota School of Mines and Technology (SDSM&T) in Rapid City and with other tribal colleges and universities in the region to increase degree offerings and transfer opportunities for students.
- Tribal college partners include Oglala Lakota College, Sinte Gleska University, and Salish Kootenai College.
- Si Tanka University is involved with the Oyate consortium which offers programs in math, science, and technology through articulation and transfer agreements, joint course offerings and distance education.
- Si Tanka University offers classes for tribal members as well as for non-tribal members in their service area. A majority of students are enrolled in the Cheyenne River Sioux tribe, and many are first generation college students.

Evidence of impact and effectiveness

- According to staff, administrators, and some of the teachers, the biggest impact of this grant was a focus on science and mathematics and how the schools were not doing justice to Indian students.
- However, teachers also mentioned that the project caused an awakening among community members. Communities need to be a major part of this effort. Part of the evidence that stands out that systemic reform was taking place was

that communities began to talk about why their students were scoring so low on tests and why they were not meeting standards.

- Administrators, who knew of their school's short-comings in math and science education now request assistance from STRSI to help address problems. Teachers and administrators were able to use additional resources to help them teach. Immediate impact in the schools came from the professionals that worked for the project. They learned about reform efforts and the roadblocks one faces. They also came to understand that the whole reform effort is not easy; partners needed to be on the same page with the same resources.

LESSONS LEARNED AND RECOMMENDATIONS

A project with good intentions requires a lot of organized effort. Its activities need to include tribal governments, communities, schools, school boards, administrators and teachers. Without involvement of all these groups, the effort will falter and fail.

1. You can lead a horse with water, but you cannot make it drink. There might be good programs developed, but if the teachers are not ready to accept them, or do not have the time to implement them, the effort will be wasted.
2. Required data is not easily acquired. Significant effort will go into getting data. This effort is then applied to achieving program goals. This is not a good use of resources and does not lead to fulfilling objectives.
3. Administrators need to be continually reminded about the goals of the program, and the effort needed to achieve goals. In some cases administration was asked project staff to do tasks outside the grant objectives.
4. Trying to effect change at a number of schools with different players at each school requires continuous attention. STURSI did not allow enough effort to individually provide one-on-one interaction continuously.

Sites were geographically far apart at Cheyenne River. The office was not centrally located, and at times the program was not seen as major project within the context of the university programs. A K-12 project did not have a significant place in a higher education institution such as STU, which had other mission issues.

5. If the Tribal College Rural Systemic Initiative were to begin over at Si Tanka University, the first year should be spent on understanding the importance of reform, the need for assessment, and the time commitment necessary to the effort.

6. SiTanka University faced many issues in its first phase of the RSI effort; yet for all the challenges, it came out a winner. The project was a success because those involved understood systemic reform and the importance of using the drivers to address a focused approach with a focused goal. They can now use words and understand their meaning and what it takes to accomplish tasks associated with the words. As the institution matures, and maintains stable administrative and board structure, they will become a great site to promote change, see results, and be a key factor in positively impacting unemployment, economic stability, and cultural preservation, while, at the same time, competing in a global environment.

Fort Berthold Community College Rural Systemic Initiative

By Paul Boyer

"The Tribal College Rural Systemic Initiative, through its focus on implementing the highest standards in our educational systems, has assisted our schools in improving methodologies and academic content for our students."
Loretta DeLong

The goal of the Tribal College Rural Systemic Initiatives was to harness the resources of whole communities to promote higher academic achievement in math and science. Elected leaders, school teachers, parents, and elders were to join hands and share a common vision. This is a major undertaking for any tribal community. But the unique history and topography of the Fort Berthold community presents a special challenge. The reservation is not one unified community, but several distinct communities. In this context, the challenge of systemic reform is especially great. Here, the first step is not the implementation of programs, but the construction of relationships so that, perhaps for the first time, a sense of common educational purpose can be nurtured.

The Fort Berthold Reservation sits in the northwest corner of North Dakota. It was formed in 1870 as the permanent home of the Mandan, Hidatsa, and Arikara—three tribes that once occupied a large portion of the northern Plains, hunting and farming in a

region of limited rain and extreme temperatures. However, Federal recognition offered little protection from further encroachment; construction of the Garrison Dam by the Corps of Engineers in 1954 submerged 152,000 of the reservation's 930,000 acres, burying towns, spiritual sites, and making travel from one side to the other difficult. Although the confederated tribes are a single political unit, the reservation remains culturally diverse and geographically fragmented.

Background

The Fort Berthold Rural Systemic Initiative began in 1996. As envisioned, the goal was to promote math, science, engineering, and technology education in all reservation schools. Initial planning documents focused on the importance of building connections among all schools and with other partners outside the school system. Most of the Initiative's work was to focus on developing a consortium of math and science teachers working on the reservation, sponsoring joint training sessions and creating an electronic network across the reservation and among other reservations involved in the HPRSI.

Culture was viewed as a centerpiece of the effort. In curriculum development, instruction and assessment, the integration of native culture and learning styles was to be the vehicle of systemic reform. In this view, development of effective math and science education could only be achieved through a curriculum that reflected and validated Native knowledge. Culture and science were to advance hand-in-hand so that, collectively, the whole Fort Berthold community could advance economically.

As with any systemic reform effort, however, the project demanded almost constant compromise and adaptation. While leaders within Fort Berthold Community College believe a foundation of systemic reform was achieved, it was nurtured under difficult conditions.

Early Implementation

During the project's first months, the Initiative "met with more than a warm reception," recalled Site Coordinator Jill Gillette. She felt that the first criteria for social change—public awareness of a problem—already existed in the community. "Acknowledging that the math and science areas are problem subjects for the Native students through the reservation," she wrote in her first quarterly report, "teachers, support staff, and parents believe the RSI is part of the solution to the deficiencies for Native students here on the Fort Berthold reservation."

The work of systemic reform began with efforts to collect baseline data from regional schools and award several small grants to community environmental education projects on and off the reservation. One teacher was funded for a four week summer school with the Twin Buttes School. Responding to a request from a college math and science instructor, a culturally-based curriculum development workshop was planned. Individually, each project was small and not obviously systemic in its approach, but Gillette argued that they provided a meaningful way to show the Initiative's value within the community. It was a way to "institute and ensure its presence and availability to the Fort Berthold Reservation," she reported.

At the same time, the college started organizing a Science League, a consortia of math and science teachers working to develop science kits for use in local schools. Development of curricula was a key task of the Initiative and reflected the college's guiding philosophy that excellence in math and science must be achieved in a way that validates the community's values and needs. By creating their own kits, Gillette argued, teachers would take greater ownership of the material, and local adaptation of the material would be encouraged. "All assessment and re-designing will be done by the local teachers from in-class use and recommendations," she said. "At the same time, curriculum would be designed around state curriculum guidelines and benchmarks."

During the first year the college sponsored a variety of curriculum development workshops, with special emphasis on the integration of culture. Gillette frequently expressed the belief that the goals of systemic reform could not be achieved if educators did not understand the tribe's histories and integrate cultural-based knowledge into the curriculum. 'People in the local communities are aware of education and its possibilities," she asserted. Yet many are ignorant of the tribe's past and don't see it as a "living history." One school principle asked her, "Did the flooding really affect you people here?" When educators fail to understand even the outlines of the reservation experience, Gillette believes, the foundation of the tribe's identity begins to erode.

When an evaluation team from ORBIS Associates arrived on the reservation at the end of 1996, their report was upbeat. "Significant groundwork has been laid in the areas of curriculum, professional development, integration of culture in the curriculum, community involvement, resource center development, and resource convergence. The project's activities have opened the door to systemic and long term change in math and especially, science instruction in schools that serve Ft. Berthold Reservation children."

Challenges Emerge

Before the end of the first year, however, several barriers to systemic reform emerged. First was inconsistent participation by two of the five reservation schools. The first on-site assessment by ORBIS Associates found that the site coordinator "has a good relationship with administrators from most of the schools and with the tribal college staff." Yet Gillette was often frustrated. The K-12 school at Parshall, she said, was refusing to participate in the systemic reform effort. "Frankly, this school has the opportunity and option to apply for the varied funding sources available because of the Native enrollment figure and their other eligibility factors, but the school refuses to."

Liz Demaray, who served as president of Fort Berthold College throughout the Initiative, knows the school well. Before serving

as President, she worked at Parshall for two years—the first tribal member hired by the school, she said, in "at least" ten years. Eighty percent of the elementary students are Indian, she said, but nearly all teachers and all administrators are white. She characterized teachers primarily as the wives of prominent men in the local white community. Few tribal members were represented in the high school; many drop out. Only three or four Native students lined up for graduation in the senior year. Hired to direct the bilingual program, Demaray faced stiff resistance from white families. When she taught one of the tribal languages, parents complained: "They said, 'I refuse to let my son take Hidatsa."

Resistance to Gillette's work with the rural systemic initiative was, therefore, part of larger and much older tension between this school and the reservation community. Gillette acknowledged; "This non-responsiveness is not limited only to the RSI but other efforts of inclusion and input by the Tribal Education, the Administrators Board, and the Fort Berthold Indian School Board Association." She concluded, "This school's attitude and stance is a challenge. To draw them into a relationship with not only the RSI but also the school board will be one of the more successful outcomes of the RSI."

Geography became another barrier. Distances on this sprawling reservation can be substantial, made longer by circuitous routes required to get from one side of the reservoir to another. In addition teachers—especially non-Indian teachers—may not even live on the reservation. Before the end of the first year, Gillette was facing difficulties bringing the science and, especially, math teachers together for Science League meetings. "Contacting and drawing the math people in has been difficult," she said.

More broadly Gillette was confronting one of the most pernicious barriers to reform on this and many other reservations—the conviction that nothing will change. For decades tribal members watched the arrival of optimistic reformers eager to 'help the Indian." A parade of federal development programs set up shop, only to quietly pack up and leave a few years later when

their grants ended and political priorities shifted. In this climate new programs are viewed with understandable skepticism as another temporary and inconsequential effort. As Gillette attended community meetings and talked with leaders throughout the community she found broad agreement that "the schools have to change." But, she was challenged as well. This change has to be change that is "really done," they told her. It's not enough to hold meetings, complete surveys, and write reports that end up "shelved in the funding agency and the school."

This attitude exacerbated the problem of encouraging attendance at key planning meetings. Gillette noted that both Parshall and New Town schools were not participating in meetings of the Fort Berthold Indian Controlled School Board Association, a key organization in any systemic reform effort. These meetings were being held in Bismarck—more than two hours drive off the reservation—and administrators at both schools felt attendance was not worth their time or money since, Gillette was told, "the same ground has already been covered and has not produced results."

Finally, the task of building trust and momentum was made more difficult by a high turnover among administrators and teachers within the tribal schools. "Sometimes change is good," argued Demaray. "The thing is that it changes so often—sometimes over the course of a single school year." Nurturing a cohort of educators in support of systemic reform in a climate of instability is difficult.

All this conspired to slow progress on some of the initiative's long-term projects. An ambitious schedule of in-service workshops was maintained, and the college continued to sponsor student participation in science fairs and summer camps. Two schools joined The American Indian Science and Engineering Society, and two students from these schools placed in their presentations and speeches at the Society's fall conference competitions. Yet Gillette also noted that work of the Science League had "noticeably slowed." An initial outline and mission statement was completed, but "time, distance, commitments, and weather" continuously interfered with work.

The Role of NSF and the "Central Office

Even as the college attempted to prove the FBTRSI value to the local community, it was also attempting to satisfy expectations of the National Science Foundation and the principal investigator, Turtle Mountain Community College—what Gillette called the "Central Office." Both written reports from Gillette and the comments by Demaray suggest that Fort Berthold staff were, at times, confused and frustrated by what they perceived to be shifting goals and unclear reporting requirements.

College staff clearly worked to show how their work connected to the Drivers, and Demaray believed they strengthened the Initiative. "They, (the drivers) were very good," she said, "because we were able to document what did." However, they did not immediately resolve uncertainty over the goals and outcomes of the Initiative. What specifically were NSF's priorities? What constituted acceptable progress? These questions would vex the college for much of the Initiative.

From the start, Gillette worked to collect baseline data. She was cautiously optimistic that improvement in student performance would be seen. "The NSF wants numbers to show some type of change or reform," she said. "I see that this can possibly begin to happen in these beginning months." But there was concern that more progress was expected than could be realistically achieved. "Timing is important," Demaray said. "They needed to know that we cannot change things overnight, although there was real progress."

The degree to which NSF understood and supported culturally-based outcomes was a special concern to Gillette. While culture was a centerpiece of the college's effort, she soon decided that NSF did not believe it was a priority. "What this Site is aware of is the definite possibility that NSF will decide that "a culturally-based curriculum is not a priority or does not truly fit into with TCRSI/ NSF objectives." This, she implied, would significantly weaken the local systemic reform effort's effectiveness, turning it into what local critics assumed it was all along, a "band-aid project" and "fix-it effort."

By the third year Gillette was told that culture was, once again, "an allowable consideration." This was "more than pleasing," she said. By then, however, she and others at the college suspected that the tribe's social and cultural context was not fully understood and appreciated by NSF. This inspired an impassioned defense of culture as an integral part of any tribal educational system in one of her quarterly reports. Education, she asserted, cannot advance as long as it remains modeled on an alien system, disconnected from the daily experiences of tribal members. She continued: "Logically, how can there not be culture within a school's daily function, purpose and existence? We all move daily between different cultures. The alienation felt by students in the math/ science/technology fields...comes from an educational system that relied upon a corporal disciplinary system, memorization, and Euro-centrism. Educators did not imagine a lab school, alternative program schools." Education is more than classroom study, she added. It also includes knowledge of "how to raise a garden, care for horses, hunt, use weather signs, trapping, or how to start a fire."

"NSF needed to understand the culture and what was needed to reach its goals," Demaray concurred. For her, the harm was not that NSF prohibited the integration of culture. Instead, tepid support of culture revealed ignorance of the community and its needs. She felt that, in general, NSF should have asked, "What can we do to help?" While not critical of NSF staff, she only wished for "more direct contact with people making decisions." If they better understood the local context, she believed, the Foundation would express more support for cultural goals and have more realistic expectations.

This climate of uncertainty was fueled, in part, by the administrative structure of the TCRSI. Turtle Mountain College acted as principle investigator, overseeing the work of individual sites, and helping guide NSF through the unfamiliar terrain of tribal education and reservation politics. However, this multilayered approach inadvertently promoted miscommunication with Fort Berthold Community College and "he said, she said"

disagreements over the submission of reports and data. Beginning in the second year and beyond, this tension rose to the surface and was freely expressed in Gillette's reports. She argued that site coordinator meetings were opportunities to publicly chide colleges for their failings; there are too many grammatical errors in site reports, they were told, and their data reporting is incomplete. By the third year, Gillette was clearly exasperated. "Question: why are Sites not providing completed data/survey not being notified? This Site Coordinator would like to know if FBCC's data collections are not complete, rather than being berated about incomplete data/ surveys as in Minneapolis."

The problem was not merely administrative. Demaray said there were simple personality conflicts between Gillette and some Turtle Mountain College contractors. "Jill is a strong personality," Demaray said. "She's older and knows what she wants to do."

Moving Forward

During the five year initiative, doubt, frustration and setbacks were experienced in the Fort Berthold Rural Systemic Initiative. Yet as the years passed, lessons were learned, relationships were nurtured and a foundation for educational change was in the process of being constructed when the project ended.

As the Initiative matured it gained greater coherence and focus. Less time and money was devoted to piecemeal community development projects. More resources were going to collaborative projects and in-service training. Curriculum development was the unifying focus, along with the promotion of an aligned curriculum across all of the reservation's five schools. By the second year Gillette lamented that "awareness about curriculum is only just now occurring. How curriculum comes about is not easily grasped." Educators too frequently assumed curriculum comes from beyond the reservation and "just is" rather than something that can be created and controlled locally. But as the Initiative entered its final year, there was evidence of change. "All schools are in some way working at improvement of their school's curriculum," she said.

Limited participation by some schools remained a concern, but Gillette took great pleasure in the college's strong relationship with schools that were eager to benefit from the RSI, especially Twin Buttes, which embraced the need for curricular reform with special zeal. "Outstanding possibilities with the specific school," Gillette reported, adding: "They especially want cultural infusion." Strong collaboration was emerging with this school as it worked to overhaul the curriculum in general and strengthen math and science, in particular.

By the third year the value of FOSS kits was acknowledged by the staff who repeatedly mentioned them in their comments. This prepackaged science curriculum distributed by NSF is easily used by even inexperienced teachers and adaptable enough to incorporate inexpensive, locally obtained materials such as rocks or local plants. It was also accompanied by strong training. When Mike Kelly presented a workshop on using FOSS kits to advance educational standards for the White Shield and Twin Buttes Schools, Gillette reacted with enthusiasm. "Mike Kelly is wonderful to work with and learn from. He knows the FOSS system, Period."

More broadly, slow and persistent discussion of educational standards through workshops and in-service programs over the years was helping to bring focus to the debate over education across the reservation. After extensive discussion, the tribal education code was reviewed and revised, providing an opportunity to formally incorporate educational standards.

What Was Achieved?

After more than five years of effort, college staff believed real progress was made toward the goal of systemic change. Demaray cited measurable improvement in standardized test scores. "When I attended site coordinator meetings I saw scores at different points, and we progressed," she said. "I was very pleased to see that."

But the specific activities that achieved these results are not easy to identify. Demaray believed FOSS kits made a difference, but at any given moment, the initiative also seemed besieged by

roadblocks. Some of the early projects, development of local curriculum through a Science League, for example never really bore fruit. "The effort was there, and the work began, but what began to happen was there were changes in personnel," Demaray said. "The principals were there one year, but then gone the next, teachers, too."

However, seemingly against the odds, change was taking place. Expectations were increasing and at least some curricular reform was taking place. While rapid turnover of teachers and administrators is, as Demaray said, not conducive to stability, she also argued that replacements were often more supportive of educational reform. Even Parshall began to join in the work of the RSI during the final months under the leadership of a new superintendent.

What made the difference was not any one project or workshop. Instead, Demaray said, it was more the cumulative influence of what can be seen, in hindsight, as a sustained reservation-wide conversation about the importance of education on the Fort Berthold reservation. The most important work, she said, "was that liaison with high schools, with the science teachers in the schools." While not all participated willingly and defeatism was not erased, the scope of this conversation was unprecedented and, inevitably, elevated expectations, at least incrementally.

These outcomes were accomplished, Demaray stressed, with severely limited funding. In the end, the work of nurturing systemic reform was entrusted to one person. "There were a lot of things we could have accomplished with more resources," she said.

Although not discussed in the college's reports, Demaray believed the concurrent development of a teacher training program at the college also supported the work of systemic reform. Tribal members, already working as teacher aids, were earning credentials as elementary school teachers. Twelve graduated and, Demaray said, many are now working in schools. Although funded under a separate grant, it both benefited from, and strengthened, the college's RSI.


FORT BERTHOLD
COMMUNITY COLLEGE

Sisseton Wahpeton Community College Rural Systemic Initiative

By Larry LaCounte

"The Tribal College Rural Systemic Initiative program provides the means for County-wide staff professional development, which assures that area schools improve their math and science curriculums through the use of inquiry-based instruction and employ systemic change." *Larry Henry*

Sisseton Wahpeton Community College was chartered by the Sisseton Wahpeton Sioux Tribe in 1979 and provides Associate of Arts and Associate of Science degrees in selected fields of study. SWCC is a rural institution situated in the extreme northeast corner of South Dakota on the Lake Traverse Reservation. The college is located at "Old Agency" seven miles south of Sisseton, South Dakota.

On March 1st, 1996 a subcontract was signed between Turtle Mountain Community College (TMCC) and Sisseton Wahpeton Community College (SWCC) in the educational reform effort of the National Science Foundation's Rural Systemic Initiative (RSI). SWCC committed to "undertake work to prepare for a subcontract to conduct a systemic initiative involving as many schools (K-14) on the Sisseton Wahpeton Sioux Indian reservation as is feasible".

The subcontracts initial charge indicated that SWCC "coordinates planning and data collection efforts in preparation for

conducting a tribal initiative sponsored by the High Plains Rural Systemic Initiative". SWCC would perform the following duties:

- Direct work to obtain (a) data required by the National Science Foundation from schools which may participate in the Initiative, and (b) data required by a survey of existing technology in these schools.
- Obtain community input and collaborate with educators, cultural leaders, tribal government, the private sector, and others with a stake in science, mathematics, and technology education to ascertain needs in science and mathematics education, develop goals, and determine the most appropriate means for the community to achieve them.
- Develop cooperation between public, civic, professional, and other agencies.
- Promotes discussions in schools, industry, and community agencies. (Contract between TMCC and SWCC, 1996)

A tribal college providing leadership in elementary and secondary educational reform was a new paradigm in the Sisseton Wahpeton area. Public and tribal schools for that matter had to be convinced that this was to be a viable undertaking. Barely seventeen years old, with limited funds and a history of high turnover in administration SWCC struggled to become a viable institution. There was a maturation process, roughly a century old in other institutions of higher education serving area states into which SWCC and other tribal colleges were literally thrown.

During the first year of the project, instability in project administration resulted in a slow project start and uncertainty on the part of local schools however with the hiring of Scott Morgan in December of 1997 the project gained momentum and activities with the schools proceeded.

An example of these struggles was an earlier attempt at a pre-RSI collaborative project with the Wilmot, SD School District and SWCC. The School District allocated office space at the school to house the project. The District waited in vain since the project

was not funded for SWCC. Not surprisingly, when approached by SWCC regarding RSI, Wilmot was reluctant and was not an early participant in the project. Fortunately, the story does not end there. SWRSI established credibility, and Wilmot became an active member of the training consortium. Initially four local schools formed a consortium committed to the concept of RSI as promoted by SWCC. Under SWRSI leadership, Browns Valley, Enemy Swim, Tiospa Zina, and Waubay schools sent representatives to the first Steering Committee meeting held on January 14, 1998.

Profiles of Schools & Driver Outcomes

Browns Valley is a small 155 student, 44% Native American, K-8 public school located just east of the South Dakota – Minnesota border. Browns Valley has been involved in the project from the outset and epitomizes all that the project has been to area schools.

Brent Jacobsen, 5th, 6th, and 7th grade science teacher at Browns Valley was not at the school when the SWRSI was active. However he is aware of the project impact. He stated in an interview that, "RSI has changed how we present science here, no doubt about that. It has changed the thinking." RSI curriculum initiatives are infused throughout the curriculum and have had a major impact on the school. Several math teachers received training that has made the programs infused into the curriculum a success. He feels the relationship with the college is very positive. He indicated SWCC college administration and staff, from the president on down, have been very cordial and eager to work with school teachers. When asked if he had heard any negatives about the project, he indicated only that there had been some concern expressed when reimbursements to the school or teachers had been slow in coming.

Brenda Reed, a school administrator at Browns Valley, indicated that one significant benefit of being included in the teacher training was that she came to realize the importance of a teacher having additional paraprofessional support at certain times to facilitate individualized lessons. RSI communicated with school boards through administrators. As a result, all participating school boards

adopted relevant curriculum policy that proved to be far sighted as states later mandated the very policies that RSI promoted.

Ms. Reed expressed a downside to Connected Math in that it "is very user unfriendly." She feels it has been difficult for parents because they are only familiar with traditional methods of teaching mathematics. "Parents have difficulty helping kids because the pedagogy is so different. If you can get parents involved that is half the game." She continued that she sees no downside to FOSS. However, to provide better service using the kits, the schools need a better accounting of availability of kits shared among districts. They also need to report the time teachers have given for training.

There is much evidence in the schools served by the SWRSI that the program resulted in considerable positive educational reform. Teachers feel strongly that the project contributed to improved scores in math and reading achievement. Browns Valley has shown some of the highest increases in standardized math scores in Minnesota, which the school attributes directly to the activities begun by RSI. Math and science scores, particularly of native and low-income students steadily improved.

Amy Haanen is a math teacher in the Browns Valley School in grades five through seven. Ms. Haanen has been in the school for seven years. When she began she had no labs and no manipulatives to teach with. The district had a very small budget for the entire science program. She felt the school science program was very much in need of materials and training and thus was open to the RSI's offer to consider the FOSS program. She indicates, "FOSS opened up the curriculum so much." "Connected Math" followed the FOSS initiative. The training was excellent, according to Ms. Haanen. The success of the curriculum is directly related to the quality of the RSI training in the school. The curriculum has proven to be perfectly aligned with the new Minnesota state standards. Teachers who earlier heard kids proclaim a hatred for math now hear how much they like it. Ms. Haanen credits much of the success or failure of programs impacting student achievement to student attitude. "Kids now have a far more positive attitude toward math."

"It's been awesome; I feel RSI has transformed our school. It's been great to have for teachers and for paras also."

The school has continued to utilize additional FOSS kits as they become available and will continue to utilize the services of Gene Meier to assure teachers are adequately trained. The school holds "FOSS parent nights" where parents can come and experience the kits with their children. FOSS provides materials to enable students to do actual water and soil testing rather than just reading about it. This aspect ties in very well with the Project WET curriculum. The FOSS Program includes "parent letters" which are available on-line. These can be printed and given to parents explaining various components of the program. Keeping parents informed about and involved in their child's education is a significant part of the SWRSI effort.

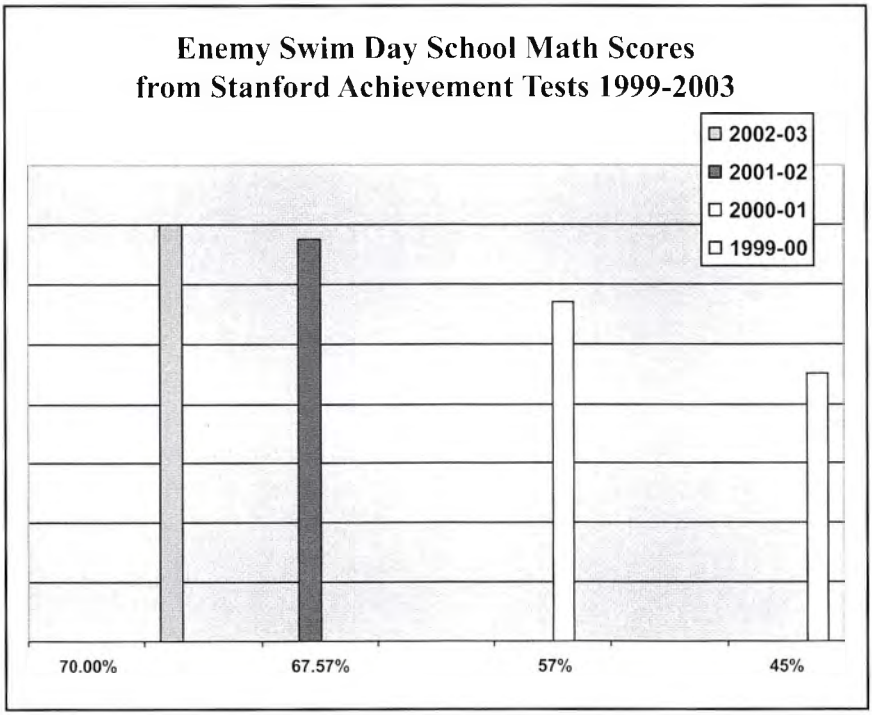
Faculty at Browns Valley reiterated the importance of the professional development model having evolved from a "one-shot" in and out process to an on-going service model. During interviews they attribute the success to the SWRSI adoption of this model. They stated it was a direct and major benefit of the original RSI program to have been brought teachers together, created a forum within which teachers could share ideas, ask for more information, and ask for specific training to address specific problems. Inter-school networks have been constructed to assist and support new teachers that come into the schools.

Enemy Swim Day School

Dr. Sherry Johnson, Superintendent of Enemy Swim Day School, was a teacher in the Tiospa Zina School when TCRSI began. During the project, she finished her doctorate and assumed the superintendent position at Enemy Swim. She indicated that Enemy Swim is extremely poor. Teachers did not even have paper and certainly have no money to purchase teaching materials, nor could the school provide professional development. She called RSI a "god send" because it provided FOSS training and kits. She credits hands-on, interactive teaching materials with greatly improving the science program enabling students to score high in

science testing. She feels the FOSS program is very user friendly and engages kids in learning like nothing else the school has tried.

Dr. Johnson feels the professional development provided by RSI was excellent. Without that support there would have been no training available to teachers. Dr. Johnson feels that the high achievement scores of Enemy Swim students are sound testament to the fact that the program has been well worth any effort made. It is very much a success. Math and science scores have improved each year with science being the highest. The following chart reflects the considerable improvement in math scores at the school.



After implementing FOSS, Enemy Swim became engaged in the training for Connected Math and Everyday Math. The Math programs are supplemented with textbooks which provide more diagnostic work and additional practice work for students. Staff members in all the schools expressed agreement that these Math programs were not stand-alone programs, but were excellent as supplemental to the curriculum. The Connected Math training has

provided teachers with expertise in the "how" of teaching math, but they are now looking for training in the "why" of math skills.

Early in the program teachers did not understand what SWRSI was about. They thought it was only FOSS and referred to it as "the FOSS program." Information on the programs was not filtering down from the school administration and because Enemy Swim began to participate after the program was off the ground, they had no input into initial training efforts. That has changed, and the role the school is able to play in determining activities for the teacher training program is considered a major strength of the RSI program. The school is involved in meetings and has input into what specific training is being provided and when. All teachers are encouraged to participate in the FOSS training. Every year the school has requested training in the use of specific kits and has kept abreast as new kits are developed.

Also considered a major strength is that, given the consortium of schools involved and the manner in which the program is administered, RSI provides for a forum in which administrators and teachers have an opportunity to share information, discuss common problems, seek solutions and provides opportunities for teachers to have someone else in their grade level to talk with, share, and seek help.

In the Enemy Swim School the hands-on curriculum has resulted in good after-school and summer programs that take students into the field to do studies on water quality, traditional medicines/ plants, etc. This program includes tribal elders involving them in the instruction and learning that occurs.

"RSI has provided the school with the opportunity to extend their budget and obtain training not otherwise available to them", says Dr. Johnson. Opportunities to attend national conventions in science and math have been an extremely valuable benefit to teachers. This, combined with bringing high quality training to the local area that is accessible to everyone is invaluable to teacher and thus student improvement. However, struggles to find and bring in good math people who will come in and work with local teachers continues.

Tiospa Zina Tribal School

Tiospa Zina is K-12 with a student enrollment of 380, 100% Native American is located one mile from SWCC. Tiospa Zina Staff was not in attendance at early meetings when RSI was getting underway because of internal communication. As was heard in interviews at other schools, information simply was not getting down to the teachers, and thus they were not involved in the planning stages. The first involvement for Tiospa Zina came at the implementation of training for Connected Math. All K-5 and one middle school teacher at this point have been trained in FOSS. They continue to be involved as new FOSS trainings are available. All K-5 teachers utilize the FOSS program.

Student success, according to interviews, is very dependent on the teacher. Teacher turnover is a major deterrent to continued school improvement in science and mathematics and Tiospa Zina has had a problem in finding and keeping trained math teachers.

Nadine Eastman Johnson, Tiospa Zina, Director of Curriculum and Instructional Support Services and Algebra and Geometry Teacher, is a strong advocate of the SWRSI efforts and credits the biggest success story of the RSI project to this –a teacher on staff, who committed to staying in the district, and agreed to begin work to attain certification in math. Through the RSI training and related work at the college, she was able to achieve her certification. The school is now seeing a big difference in the math program as the teacher has begun teaching a higher level math as she becomes more comfortable with the curriculum. She has provided much needed stability to the position.

Ms. Johnson states that Tiospa Zina operates as a "basic" school. Teachers work in a collaborative setting to present curriculum in thematic units. FOSS fits perfectly into the context of a basic school concept. She also feels, as others interviewed, that the college has been made more accessible to area elementary and secondary teachers for class work, and availability of labs as RSI and the college have become integral to the overall education network in the region. College instructors and materials are now

more accessible to elementary and secondary teachers. With respect to the value of conferences and training she stated, "What has been learned will outlive RSI, and that is important."

Sisseton School

Sisseton School is a public school located 7 miles north of the SWCC College. It serves a total of 1136 students including a 440 student elementary that is 70% (330) Indian, a 330 student Middle school that is 70% Indian (231) and a 366 student high school. Sisseton High School serves as a feeder school for several small elementary schools in the area.

Sisseton School doors were always considered by Indian parents to be "locked tight." ORBIS reported in an evaluation submitted on 10/21/1997 that "... strained relations between the Indian and non-Indian communities were cited as the reason for excluding ..." the Sisseton Schools from the project. Given that the school is by far the largest in the area and has an enrollment of about 70% Indian students, this is very important to the educational success or lack thereof of Indian students on the reservation. The RSI program is credited with beginning to create access to the Sisseton Schools. Administrator meetings showed that the SWRSI project was not a threat to the Sisseton Schools, and had something to offer in the educational network serving the area.

Initially the project staff expected to expend funding on equipment for participating schools, but was informed that the concentration was to be on professional development and equipment could be purchased. While not the institution's fault, this incident was damaging to the college's thin credibility. SWCC, however through the structure of a steering committee, began to develop a model for professional development that would result in some lasting and meaningful changes in education in the local schools.

Professional Development

The first attempt to provide professional development followed a traditional model in that it brought in a presenter for a two-

day period of time, after which teachers went home, were left to their own devices, and had no follow-up. Any benefits from the presentation were soon lost as teachers became engrossed in the duties of teaching. No motivation or assistance was provided to assist teachers as they struggled through the learning curve of the new curriculum the SWCCRSI had developed. In spite of this shaky start, for the first time teachers with similar duties from several school districts were brought together in a forum where they could become acquainted, discuss similar problems, exchange ideas, and share in a professional development situation. This residual benefit has proven to be one of the most valuable results of the professional development model that has endured throughout the life of collaborative professional development through SWCCRSI.

- The first teacher training workshops were on Projects WET and WOW. Teachers were excited about these projects, there was no follow-up. As an effort to begin systemic reform, teachers began to develop water quality monitoring projects as a means to get students into the field in a practical, locally engaging project. Area teachers wanted to implement curriculum to which students would be able to relate.

- TCRSI then asked project and schools to focus their efforts and were introduced to the FOSS program by the RSI Regional Coordinator, Gene Meier. Because of the slow start, the SWRSI project had unspent funds available. SWRSI had already purchased a set of FOSS kits and had begun to develop a program for teacher training to utilize the FOSS program. The project, at the same time, began to look at addressing the math curriculum with current funding while continuing development of FOSS training.

- The next professional development seminar retained the multiple-district concept, but modified the presentation to include a new approach. The workshop presenter returned periodically to participating schools to reinforce lessons, observe teachers, discuss progress and challenges, and assist with problems in a non-threatening, constructive situation.
- Given the benefits and success realized from bringing teachers from different schools together, the project then brought school administrators together in a problem solving forum and began to discuss some problems that simple coordination among and between districts could help resolve. Students in the area, as in most Indian reservation cultures, are fairly mobile. Considerable movement among schools by a significant number of students occurs on a daily basis. This is a typical situation for Indian students in Indian country where students move with parents. Parents move for employment or to facilitate changing living situations that result from economics or other social or familial challenges. Movement between school districts causes problems for schools, students, and teachers who have to figure out where student's knowledge and skills are in each class. They then have to find a way to relate curriculum to the students. After the administrative meetings, schools began a cooperative move to more common calendars, and collaborative transfer policies. As the curriculum began to change and become somewhat more standardized among schools, math and science education achieved more of a commonality that made learning skills and concepts easier for students.

Standardized Curriculum

At this time in the evolution of the project involvement of SWRSI was still limited to the first four schools. After considerable discussion and looking at hands-on math programs, the consortium decided to use the "Connected Mathematics" Program. The September-November 1998 program report states, "The Connected

Mathematics system is purchased and the site coordinator and the Steering Committee will begin to schedule training sessions for the teachers. The lessons that we have learned with FOSS should make the implementation easier. Using the insight gained from Foss we will begin the evaluation process of Connected Mathematics prior to its use, thus establishing a baseline to help assess its performance."

The steering committee did not feel it was a viable option to attempt to implement the curriculum in all grades at once. It was decided to begin with sixth, seventh and eighth grades. One eighth/ninth grade teacher from a participating school had experience and some training in Connected Mathematics. This teacher helped convince other teachers of its effectiveness. Even with that encouragement and support, it was much more difficult to implement than FOSS. Hands-on math instruction was a big change for teachers educated in and practicing the teaching of math with traditional methodology. It was going to take a very well designed and thorough training program was going to be needed to accomplish the reform in math education desired.

The Connected Mathematics training program was presented by Dr. Larry Hines, of the Black Hills State University College of Education, to sixth grade teachers in the spring. They were given materials to view at their leisure during the summer. In August, before school started, the presenter again met with teachers and reviewed the program. Teachers were trained in the program's philosophy and methodology. During this workshop they developed the lesson plans they would utilize for the first six weeks of the school year. Before the six-week period was up Dr. Hines presenter came back to the consortium and worked with teachers to address problems, discuss solutions, and to develop the next six weeks of material. This format was repeated for the duration of that first year.

Teachers received graduate credit through Black Hills State University and also received a small, but meaningful, stipend for Saturday workshop time. Having lesson plans done far in advance, receiving needed credit for salary schedule advancement and

recertification, and receiving a stipend created a strong motivation for teachers to participate in the training.

While insufficient funding in the original TCRSI project prohibited many things that the districts wanted done, the program continued to expand under subsequent RSI efforts. Some districts were better positioned financially to contribute to professional development. Others had virtually no financial means to assist. The second in-service model had proven to be very successful and was continued. Teachers were able to receive help on-line from Dr. Hines and other web sites specifically serving this purpose. Supplemental student work was also available on-line.

As the project continued districts were feeling as though they still were not where they needed to be with the math curriculum. They searched for another tool that would be consistent with, and enhance, the Connected Math curriculum efforts and selected "Everyday Math." This adoption was begun in first, second and third grades the first year and fourth, fifth and sixth the second year in three project schools – Wilmot, Enemy Swim, and Browns Valley. The initial startup of this program was under TCRSI and has continued under subsequent RSI funding.

LESSONS LEARNED

Scott Morgan reflected on some major problems and recommendations for improved implementation of a similar program. He talks freely about problems associated with the implementation and administration of the RSI Program. He was frustrated because not enough input came initially from the central office on the goals and objectives of the program. An assumption was made that everyone just knew what was supposed to happen and how. Administrative procedures were not clarified. In general there was too little professional development for site coordinators. They were not trained to administer this program and struggled with the mechanics of administration, communicating with and coordinating schools, data management, report writing, obtaining funds, etc. Few people have experience in administering a component of a large multi-state program. While TCRSI could not

have controlled who was hired, it could have prepared them better. That may have reduced coordinator turnover.

- Early in the project, no report format was available, and directors were expending a lot of energy just trying to get reports done in an acceptable manner. Had a format been provided it would have greatly simplified the reporting task and also helped to inform program administrators on their responsibilities to Turtle Mountain. Activities were implemented, and then directors were told that those activities were not allowable. An example was when programs were told to purchase equipment for schools and then, after they had begun to work with schools to identify needed equipment, the central office for TCRSI at Turtle Mountain informed them this was not permissible.
- Each school has a unique schedule for purchasing texts and materials for each core subject. One year might be "reading and Language Arts", the next might be science, the next year math, and so on. A difficult problem resulted in instances where, for example a district had purchased science texts and materials one year, and then RSI came in and worked with science the following year. The district was not able to respond because the acquisition of significant additional science materials would not be possible for several years.
- There was insufficient communication among the various sites. Site coordinators were not able to find out what had been done elsewhere, what had worked and what had not, so there was duplication of unsuccessful effort. Better communication would have eliminated some programs wasting precious time and resources only to discover what another program already had found out.

- Similarly, the central office did not act as a clearing house for resources, i.e. each project was trying to find its own trainers for the same programs. Had a list of trainers been available for Connected Math, FOSS, etc it would have helped considerably.
- A major problem at the local level was teacher turnover. The project would work to train a teacher. In one or two years they would leave the district. RSI would have to start over with a new teacher. While there is no real solution to this, Mr. Morgan feels this is a factor that must be considered in any discussion of the effectiveness of the RSI program.
- Setting of goals, he thinks, was done backwards. Goals were set from the top down administratively. Goals were set as deemed appropriate and then TCRSI looked to project site implementation efforts to accomplish those goals. This led to communication and coordination difficulties.

SWRSI was clearly a help in the facilitation and improvement of science fairs in area schools as well as providing resources for the implementation of the Star Lab. Small communities that had run science fairs had a very limited base from which to draw judges. RSI involvement provided an expanded pool with SWCC staff often serving as judges. One school science teacher stated that RSI promoted the integration of parents into the science fairs. The annual science fair project in the school now includes a parent's night where parents are encouraged to come and see their child's project and participate in the awards ceremony. RSI "enlarged" the science fairs so that more people are involved. College personnel, Native people, and other professionals are now involved.

One difficulty has been in obtaining qualified trainers that have the connection with an institution that enables the granting of credit for teacher in-service. Former TCRSI Regional Coordinator, Gene Meier, has continued to be involved and is an excellent,

certified trainer for FOSS. During interviews, Mr. Meier was credited with having had much to do with the overall effectiveness of the FOSS training. He continues to serve as the trainer for the consortium as new kits are being made available and new series of training planned.

The relationship between the schools, including tribal schools and the college, has matured significantly during the life of the project. The college's development as a stable, credible institution has been important. Many non-Indian staff in the schools currently attends or attended SWCC, for all or part of their education. The success of the RSI project and the significant and positive impact on teaching and student achievement has gone a long way to improve relations among education providers in this region. The former RSI Program Director credits administrative stability with the successes the program has had. He believes instability of leadership in RSI programs resulted in limitations. He told of being one of two new directors at a RSI meeting in Bismarck, North Dakota when he started. Two years later he was only one of two continuing directors at a meeting in Billings, Montana.

Chief Dull Knife Memorial College Rural Systemic Initiative

By Janine Pease

"With the evolution into a world economy and the aging of our population, it has become difficult in securing people within technical engineering education. This effort would increase the supply of talent available to us and other businesses as well as assuring employment opportunities for our children."
Amoco Petroleum Products

Chief Dull Knife Memorial College (CDKMC) began a four-purpose school based project with the High Plains Rural Systemic Initiative in June 1996. Extending implementation through 2000, the Chief Dull Knife addressed academic standards in mathematics and science, standards based curriculum, school infrastructure and policy enhancement, identification of resources impacting school math/science, and development of a data collection system to measure project impact. The project's story unfolds through a series of topics that narrate achievements, activities, and challenges of administrators, teachers and students in the Chief Dull Knife Memorial College Rural Systemic Initiative Project (CDKMCRSI):

CDKMCRSI

The Rural Systemic Initiative of CDKMC began its work with four schools: St. Labre, Ashland, Lame Deer Public Schools, and Northern Cheyenne Tribal School. By the project's third month,

Colstrip Schools, grades 3 – 5, were brought into the project (November 1996). Schools serving Northern Cheyenne children, within the region served by the Dull Knife Memorial College RSI Project, included:

School Name	Location	Type of School	% Indian
St. Labre Catholic School	Ashland	K-12 private school	93% Indian
Northern Cheyenne	Busby	K-12 tribal school	97% Indian
Colstrip Schools	Colstrip	K-12 public school	40% Indian
Ashland Public Schools	Ashland	K-8 public school	48% Indian
Lame Deer Elementary	Lame Deer	K-6 public school	100% Indian
Lame Deer High School	Lame Deer	7-12 public school	100% Indian

The schools' participated in the project at varying levels. Ashland Public Schools and Lame Deer Elementary and High School fully participated in the RSI Project, while participation from St. Labre, Northern Cheyenne Tribal and Colstrip Schools focused on specific project activities. Several schools' experienced problematic circumstances (e.g. financial constraints, indebtedness or teachers strike) that negatively affected participation in the RSI Project These schools typically chose to participate in RSI activities, in which a specific and positive advantage for one or two teachers, such as the science curriculum modeling existed.

Collaboration of school leaders formed the project's Steering Committee. The first year of activity concentrated on identifying appropriate representatives and possible organizational strategies. In the second year, the Committee met, organized, and operated with a diverse membership from collaborating schools, including two members of the Northern Cheyenne Tribal Council.

The RSI model called for Steering Committee participation from business and industry. The Dull Knife Memorial College location is extremely rural, distant from Montana centers of commerce. For RSI it was not easy to obtain collaborators from this sector. However, the Colstrip Power Plant, Colstrip Mine and Range Telecommunications Cooperation were approached for RSI Project support and participation in the Steering Committee.

Classroom Activities

Starting with the project's first year, the RSI Site Coordinator demonstrated and modeled hands-on instruction in science classrooms. The routine for modeling was to demonstrate the learning unit; the classroom teacher would then take over the activity, and the Site Coordinator would observe the teaching/ learning and provide critique to the teachers. Learning units originated from the FOSS curriculum in grades K-6.

During the fall of 1999, the FOSS teacher professional development session was attended by eight elementary teachers and the principal. CDKMCRSI retained former RSI Coordinator Bob Madsen to conduct the training. Immediately after the training, six FOSS kits were delivered to Ashland Public School for implementation: Balance and Motion, Landforms, Food and Nutrition, Insects, Models and Design and Measurements. In the spring of 2000, two FOSS kits were implemented, including Fire Works and the Ground Water Flow Model.

Ashland School's seventh grade students participated in a career shadowing project during 1997 to enhance career exploration through working two days a week with a local science professional.

Ashland and Lame Deer Schools initiated the new Connected Math curriculum in the Fall of 1999, at the 6th grade level, with the intention to add the 7th and 8th grade years during two subsequent years. Extensive teacher and administrator professional development in Connected Math was coordinated through the Black Hill State College – Center for Excellence, located in Spearfish SD.

The Dull Knife RSI entered into a broad role in the MSGC/ NASA "Student Research Project 2000 – Flight Bee-havior and Root Tip Growth Adaptation in Reduced and Enhanced Gravity." Local RSI schools; students and teachers participated from Lame Deer Middle School, Ashland Public School, Northern Cheyenne Tribal Schools, and Colstrip Middle School. Four additional schools serving Montana's Indian children were

in the student research project. Presentations were made in classrooms to provide discussion of alfalfa leaf cutting bees, model demonstration of onion root tip growth and root tip slide preparations, and to overview the research process. Students in selected and participating classrooms were provided with materials to conduct pre-flight research. The goal was to establish methods of maintaining live alfalfa leaf cutting bees, determining alternate food types that would work as bee attractants, and identify which colors and geometric patterns alfalfa cutting bees were most attracted to. School participants formed mentor groups with MSU-Billings and MSU-Bozeman college students.[1] DKMC and MSU college students carried out a journey to the Johnson Space Center for two weeks where they boarded the KC-135A ZERO-G aircraft up to 34,000 ft and experienced 1.8 and 2.0 gravity. Taped data was returned to participating schools, and data analysis involved RSI schools' students.[2] In sum, the NASA project gave RSI schools' students an opportunity to experience scientific procedures, observation, and documentation and analysis of data.

The Packard Foundation Internships Project at DKMC supported student interns primarily in the areas of natural resources management in the summer of 2000. RSI teachers became associated with the interns in a mentoring relationship, and in return, teachers acquired orientation to, and information about tribal natural resources. Interns were also concerned with the cultural context of natural resources on the Northern Cheyenne Reservation.

Summer Learning

Two summer camps offered in 1996 and one in 1997 served Northern Cheyenne reservation schools' children. The two Dino Camps were field-based learning in fossil beds located in southeastern Montana. Forty-two students from St. Labre Catholic, Lame Deer and Colstrip Schools, and Northern Cheyenne Boys and Girls Club viewed a Late Cretaceous dinosaur site and explored sediments near Vananda, MT. Organized in learning teams, children discovered fossils, and placed their finds on a geologic age timeline. Dinosaur diversification and extinction were

featured in an interactive game that utilized feeding strategies of three dinosaurs in outgoing and incoming ocean shorelines. Other geologic ages were explored during Day 2, including the Tertiary, Jurassic. Mississippian and Cambrian.

Near Broadus, MT, students participated and explored four environments: River, Soils, Grasslands, and Cottonwood forest. Through observation and specimen collection, students studied plants, animals, and biotic factors. "Imprinted Leaves on Plaster" modeled fossil making; "Post Card from the Past" depicted a fossil animal in its environment; fossil and specimen collections were identified; and "Insects in Amber" illustrated conditions under which amber is formed. The fictional movie *Jurassic Park* was viewed as an expansion to learning about fossils and dinosaurs. The Northern Cheyenne students journeyed to Museum of the Rockies at Montana State University in Bozeman. They saw *The Making of a Planet*, in the museum planetarium. The Museum curator is Jack Horner, renowned paleontologist (whose studies were fictionalized in *Jurassic Park).* The museum was a natural culmination of the summer camp, expanding student knowledge about fossils and geology.

Summer camp faculty included RSI Coordinator Robert Madsen, an etymologist, and Jeff Hooker, a paleontologist. Partnerships with local school faculty members were made with Ashland Public School, Lame Deer Public School, and St. Labre Indian School. The summer camp was co-sponsored by several community organizations: Northern Cheyenne Boys and Girls Club, St. Labre Indian Schools, and Colstrip Public Schools JOM Committee.

Dino Camps of the CDKMC involved Northern Cheyenne children in field and discovery learning that focused on fossils and geologic ages. Camp experiences enhanced student interaction with fossil rich locations near the college, and expanded with lab based learning for specimen identification and modeling. The museum field trip afforded students with world-class exhibits on dinosaurs, planets and stars, and fossils in general. The *Jurrasic Park* video and *Making of a Planet* enriched student interaction

with all this information, sparking curiosity and imagination in these subject areas. The faculty team provided a low faculty student ratio and allowed the Northern Cheyenne students firsthand relationships with scientists, both in the lab and in field-based experiences. Local teachers were partners in instruction and discovery learning, and were essential in making the Dino Camp function. For teachers, Dino Camp gave them hands-on experience with the field and lab learning units for transport into their own classrooms. Finally, the camp expanded the students' points of reference beyond their hometowns, into the nearby counties, and further into the region of south-central Montana.

St. Labre Catholic School sponsored a summer science camp, in 1997 which was funded locally. The RSI Coordinator lent assistance to the camp.

Summer term internships in 2000 were made possible by a grant to the RSI Project from the Packard Foundation. Six high school and six college students participated, along with two high school science teachers. Interns and teachers participated in fish and wildlife management, air quality, water quality, GPS-GIS, and forestry. Federal, tribal, and state Natural resources management agencies served as the placement sites for students.

RSI and Teacher Inservice

The RSI Project depended primarily on teachers in all schools serving Northern Cheyenne children. In 1998-1999 the Core Data Elements Form acquired a profile of the teachers that was reported to the HPRSI. In a survey, required by HPRSI, the DKMC RSI Project acquired information on standards-based professional development. Lame Deer Elementary and Ashland Public Schools' participation included thirty-four teachers and one administrator.

A discussion on standards-based curriculum was held with teachers in the St. Labre, Ashland, Lame Deer Public Schools, and in Northern Cheyenne Tribal School. Teachers interviewed (in year 1 and 2) applauded the Site Coordinator's extensive knowledge of advanced math and science and viewed him as a valuable resource. Elementary level training for the use of FOSS

kits was emphasized in the project's professional development opportunities. In 1999, as school started for the year, the RSI Project sponsored a professional development workshop for eight teachers at Ashland Public School, particularly for newly hired teachers in K-6. The workshop presenter was Bob Madsen, former RSI Site Coordinator. In the week that followed the workshop, Ashland Public School teachers implemented six kits, on Balance and Motion, Landforms, Nutrition and Foods, Insects, Models and Designs, and Measurements.

The RSI Project supported other professional development activities for teachers in science and math. In the second year two teachers from Lame Deer High School attended a 9-week summer physiology research lab, for mastering content and participating in research. The American Physiological Society offered workshops for fifteen teachers from the collaborative schools in two 1-week sessions.

The Prairie View Curriculum Consortium was formed in Eastern Montana for purposes of curriculum development, assessment, and staff development. Two RSI collaborative schools joined this consortium, Lame Deer and Northern Cheyenne Tribal Schools. The consortium mission is "to provide students with an academic program that prepares them with the necessary skills to be successful." An effort to draft curriculum began in 1998. By Spring 2000 the final document was complete, and scheduled for use in the Fall of 2000 at Lame Deer Schools and Northern Cheyenne Tribal School.

Criterion based assessments were studied during the PI/PD meeting at the National Science Foundation meetings in November 1996. First year conversations with the collaborators indicated an interest in alternative assessment methods in both science and math. In September 1997, two teachers and the RSI Site Coordinator attended HPRSI sponsored training in Bismarck on HPRSI standards, with the purpose of sharing their expertise upon their return.

Professional development opportunities included courses and workshops each term, enumerated in the chart following.

SEMESTER	# OF TEACHERS ENROLLED	COURSE TITLE	COURSE DESCRIPTION
Fall 1999 Fall Semester	9	Chemistry for Teachers	A 3 credit course (45 hours) Measurement systems, atomic structures, chemical periodicity, bonding, chemical reactions, acid-based chemistry, gas laws, and electrochemistry.
Summer 1999	2 teachers in science and math	American Physiological Society Workshop 9-week Workshop	A research lab, for the content and research experience.
Fall 1999 October	14	American Physiological Society Workshop (APA sent two professors to conduct the 5 day workshop).	A physics workshop to develop a method of determining the effect of tube length, tube diameter, and fluid viscosity on the rate of flow.
Fall 1999 September	9 8 teachers 1 principal	Foss Workshop, 1 day workshop conducted by the former RSI Coordinator	Two purposes of the workshop were to review FOSS with teachers currently using the program and reinforce methods of use and to demonstrate FOSS to new teachers recently hired by Ashland Public School, to integrate FOSS into their curricula.
Academic Year 1999-2000 Spring 2000	6 Teachers, teachers aides, principals	Introduction to Ecology Full semester Course 3 semester credits	This course included demonstrations of FOSS and SEPUP kits on Fire Works and Project-Wet Trunks.

SEMESTER	# OF TEACHERS ENROLLED	COURSE TITLE	COURSE DESCRIPTION
Academic Year 1999 - 2000	3 Middle Schools and High School science teachers and 1 DKMC instructor	Environmental Assessment Using Fish 2 week Workshop	This course for middle and high schools science teachers focuses on the principles and applications of using fish health assessment as a measure of environmental quality. This is a study of fish anatomy and physiology and a necropsy method of assessing fish health.
Academic Year 1999 - 2000	Elementary Teachers	Training in implementation of FOSS and SEPUP kits	
Academic year 1999 – 2000 Dec 99–Apr 00	Middle School Teachers	MSGC/NASA Student Research Project 2000– Flight Bee-havior and Root Tip Growth Adaptation in Reduced and Enhanced Gravity	The goal of the project was two- fold: to provide outreach to local middle schools and genuine research opportunities for college students using the unique facilities provided by NASA's Reduced Gravity Flight Program.
June 2000	12 teachers, 2 teachers aides and 1 principal	Creating Web pages with Microsoft Front Page, two 1-week workshops, In collaboration with the T5 Teacher Training with Teams, Themes and Technology at Minnesota State University Billings	This training provides professional development for teachers and methods for implementing technology into their curriculum. The course is designed to integrate technology into the very fabric of the day-to-day curriculum.

SEMESTER	# OF TEACHERS ENROLLED	COURSE TITLE	COURSE DESCRIPTION
August & September 2000	Teachers, teachers aides and administrators; guests from Fort Belknap College, and two teachers from Harlem Public Schools	Workshops for implementation of Connected Math, two workshops, 2.5-days each, at DKMC	Connected Math workshop presented by Larry Hines of the Black Hills State University's Center of Excellence, dealt with eight of the 6th grade modules (detailed discussions and overviews).
September 2000	Teachers at Lame Deer Elementary School	Workshop on Investigation Math for K-5	Curriculum training was provided for implementation of the Investigation Math, which is preparatory to Connected Math for Grades 6-8
Spring Semester 2001	Middle School teachers from all RSI schools	Science Methods for Middle School, 4 credit course	This course trained middle school teachers in the FOSS MS kits for content and implementation methods.
Spring Semester 2001	21 elementary teachers (60% of the elementary teachers in the collaborative)	Physical Science Methods, 4 credit course, SC 299	The course provided content and methods for implementation of the FOSS kits that pertained to physical science.

Northern Cheyenne Culture

The RSI Coordinator, in consultation with RSI committee members, determined that work on the cultural components of the math and science curriculum would follow standards-based curriculum. The RSI Coordinator expressed to evaluators that, "HPRSI has sent mixed messages about whether or not culture should be addressed in the sites' activities. By the second year a commitment from the Acting President of the College, Richard Little Bear, was received. The college would provide assistance in the effort to culturally adapt FOSS materials to Northern Cheyenne

cultural content. The Site Coordinator cited interest among the schools' teachers in culture curriculum workshops and suggested use of a Northern Cheyenne ethno-botany resource and a Crow ethno-astronomy book for adaptation to the secondary level. By the second project year the Site Coordinator met with DKMC Vice President for Cultural Affairs and other Northern Cheyenne nativists on ways to integrate tribal culture into FOSS standards-based science curriculum.

Packard Foundation supported interns were retained in the summer of 2000 and assigned to tribal resources management offices. Among learning activities were the cultural contexts of tribal natural resources. Each intern was paired with a teacher from RSI schools for training purposes related to natural and cultural resources management.

Curriculum

A routine for curriculum committee meetings was established during the initial quarter of the project with participation of school personnel from four schools. Lame Deer Public and Northern Cheyenne Tribal School committee members, including the NCTC Principal, reviewed potential standards based curriculum materials for grades 7 to 12, but did not make purchases. They sought broader based information on curriculum options and their standards based models. Several school administrators had confidence in their chosen curriculum and only marginally entered into these discussions.

The RSI Project purchased FOSS Kits and established a central resource center at DKMS. Schools began using the kits during the first project quarter. RSI representatives met with the FOSS Kit developers and reviewed a kit approach to science learning, called SEPUP, in 1997. Units in use at the Ashland Public School in the fall of 1999 included Balance and Motion, Landforms, Food and Nutrition, Insects, Models and Designs, and Measurement. Commitment to the FOSS approach to learning science was expanded to include middle school during the fifth year project extension, called FOSS MS. The U.S. Forest Service Trunks

provided excellent local application of ecological and resource principles and concepts: the Fire Works and Ground Water Flow Model trunks. Trunk kits from the Project Wet were incorporated into the FOSS and SEPUP training during the academic year 1999-2000. In the fifth and final year of the RSI Project, Brian Stiff spent half days in collaborating schools to assist teachers with class setup and delivery of FOSS kits. This approach promoted extensive kit usage in every grade level among all schools.

The curriculum choices in math varied among the collaborators. Several schools made a school-wide commitment to SIMMS math from a regional and statewide emphasis. But, SIMMS high school graduates enrolled at DKMC, took math placement tests, and enrolled in "Pre-college Math." SIMMS math was a regional and statewide model touted as systemic reform; the model fell short of its goal, preparation for college level math. It was therefore abandoned, despite extensive dedicated resources. Family math was suggested by collaborators, as this initiative was already established in their schools. Family involvement in math was designed to encourage the school's students to "do more math."

In 1999 the Lame Deer Elementary and Ashland Public Schools implemented the Connected Math Curriculum for the 6th grade. Connected Math is a 6th through 8th grade math curriculum, listed number 5 among sixty-one programs reviewed by the U.S. Department of Education, and rated exemplary. Curriculum implementation for Connected Math began in the fall of 1999 for all the 6th grade students in Lame Deer Elementary and Ashland Public Schools. Project Coordinator Brian Stiff related that the implementation plan for Connected Math included a leadership role for DKMC/TCRSI in professional development and teacher training. Black Hills State University's Center for Excellence provided extensive teacher and teacher aide training for Connected Math implementation. During the academic year 2000-2001 Brian Stiff – RSI Project Coordinator, reported module specific based training during workshops held in August and September of 2000. Each workshop was two and a half days in length. In the final RSI

Project Year, a 5th year extension, the Lame Deer School chose a K-5 mathematics curriculum, Investigations Math, while Northern Cheyenne Tribal School in Busby adopted the K-6 curriculum Everyday Math. Implementation commenced in 2001.

RSI curriculum meetings were highlighted by "curriculum alignment" discussions. This reflected Montana Office of Public Instruction correspondence with RSI schools. Standards based curriculum meetings included a discussion about transition from middle school to high school. Collaborative members conceptualized "bridging activities" to assist middle school students in their preparation for high school math and science.

The MSGC/NASA Research Project, in the spring of 2000, gave RSI teachers and staff from the college mentoring opportunities with actual research scientists in a research project to promote inquiry-based learning.

POLICY

The RSI Project Curriculum Committee held key discussions on policies and infrastructure that supports quality science and math education in the first quarter deliberations. The Northern Cheyenne Tribal Education and Natural Resources Departments leaders and Northern Cheyenne Boys and Girls Club engaged in this policy discussion as well. RSI Coordinator Madsen narrated that, "the schools are interested in aligning curricula reservation-wide, because of student transience. St. Labre is the acknowledged school leader in this effort." Schools curriculum work, in year one, indicated Lame Deer Schools had begun work on a standards-based curriculum tied to National Science standards, while Colstrip Schools had flow charts on science learning objectives in the elementary grades. RSI sponsored discussions on standards based curriculum met with positive response, partially because Montana had begun performance based accreditation standards that imply curricular alignment. Further, the Northern Cheyenne Education Department opened deliberation on a tribal education code, during the project's first and second year although the RSI Project was not directly involved in this process. Tribal fiscal support and a tribal

resolution were sought by the project leadership, but neither of these was realized by the second project year.

Policy discussions during the second project year began to turn toward standards based curriculum in Ashland Public School, St. Labre Catholic School and at Lame Deer. However, neither Northern Cheyenne nor Colstrip would engage in this policy consideration. Increases in school support for curriculum selection and implementation and professional development time and costs were noted by the RSI Coordinator and acknowledged as forms of systemic change. A case in point is the depth of commitment shown by Lame Deer Elementary to the use and implementation of FOSS kits. Two reasons for this commitment cited in the RSI Project Report in May 2000, were the extensive training in their implementation and the standards-based science in the curriculum.

RSI schools developed a broad-based commitment to the math and science standards based curricula, and its application to all students across all grade levels. The science hands-on and discovery FOSS and FOSS MS kits were fully implemented during the project period. Connected Math for grades 6 – 8, and the acquisition, preparation and implementation of the K-5 curriculum "Everyday Math" (at Northern Cheyenne Tribal School) and "Investigation Math" (at Lame Deer), made the elementary school curriculum complete. These curricular choices applied to all students in the schools.

Technology for Learning

The RSI Coordinator began informal assessments of classroom technology as the first curriculum committee meetings were held. During the project's second year, TCRSI required a technology survey of RSI Project schools; DKMCRSI completed four surveys, at Ashland, Lame Deer Elementary, Northern Cheyenne-Busby, and St. Labre Catholic School. Among the collaborative partners, St. Labre Schools were the best equipped in technology with classroom computers and multiple Internet sites. Colstrip, Ashland, and Lame Deer have installed fiber optics interactive video systems in their schools, connecting them with a larger

network of schools. The class, "Using the Computer to Enhance the Science Curriculum in the Elementary Classroom," was developed by the RSI Coordinator and offered for two semester credits at the St. Labre Indian Schools for elementary faculty development. Teachers exhibited this technology training by using it in classroom presentation techniques, interactive digital technologies, and through the operation of programmable graphing calculators.

Convergence of Resources & Broad Based Support
A great deal of planning and coordination effort resulted in realizing positive outcomes for achieving NSF Drivers 3 & 4.

- The Minorities Science Improvement Program of the U.S. Department of Education was targeted as a potential project expansion resource for DKMC math and science programs. In the first year resource planning included data collection and curriculum purchase costs analysis. The MSIP grant proposal was developed and submitted on behalf of DKMC in November 1996. The goals were to upgrade college science labs, support mathematics and science faculty members, and expand the transfer course offerings in science and math areas.
- A Technology Challenge Grant was developed and submitted for funding during the spring of 1997.
- Optional resources for the Summer Science Camps were explored and included Johnson O'Malley Grants from member schools, and Montana State Eisenhower Grants. Additional National Science Foundation grant competitions were reviewed for the support of the RSI Plan, year 2.
- The RSI Project encouraged collaborative school members to review special grant support for math and science. Ashland School committed Title I and Eisenhower Funds to math and science instruction enhancement in year two, through this process.

- RSI invested in a number of FOSS kits. These were held in a central resource center at the college for checkout by DKMCRSI collaborative members. Member school representatives assessed the cost of kit maintenance and replacement during the second year of resources planning. Lame Deer Elementary School opted to purchase FOSS kits and science lab equipment for their classrooms with Eisenhower Grant support.
- The 1998 – 99 Core Data Elements showed the level of funding acquired to support additional RSI Project activities. Five separate sources of support, in addition to the RSI Grant, contributed approximately $70,000 to the project, and DKMC contributed professional staff time valued $15,000.
- Participant schools supported professional development through provision of support for teacher substitutes during courses and workshops. For example, when Ashland Public School sent their teachers to the FOSS kit Workshop in September 1999, the school paid $504 of the teacher salaries. Special costs of the physics workshops, $6,500 were paid by the American Physiological Society.

Data Collection

Dull Knife Memorial College RSI received a visit from the National Science Foundation leadership with the High Plains RSI Director Jack Barden. This visit included a consultation on data collection among schools, and the criticality of standardized test scores (October 1996). The Core Data Elements acquired collaborating schools information on teachers, enrollment of students by gender, ethnicity and grade level, test data and professional development by the hours (math and science).

Resources analysis was significant in the collection of RSI Project data. The 1998 - 99 Core Data Elements included "Additional Funds" that supported the RSI Project activities in 1998 – 99: Eisenhower Elementary and Secondary Funds – $

1,425; Individual Schools - $ 620; Federal Funds - $ 16,000; Packard Foundation – $ 39,300; and the Montana Space Grant Consortium - $ 7,000. In 1999 the cost sharing indicated a total of $14,246: Eisenhower Elementary and Secondary Funds - $ 3,056; Individual Schools Support – $ 990; DKMC In-Kind - $ 3,700; and the American Physiological Society - $ 6,500. Cost sharing data in May 2000 showed $14,560: U.S. Department of Education Grant T5 at MSU-Billings - $ 8,000; School Funds - $ 360; Packard Foundation $ 2,500 and DKMC In-Kind $ 3,700. Quarter three of RSI 2000 found a cost sharing total of $ 37,700: U.S. Department of Education T5 at MSU – Billings $ 8,000; Packard Foundation - $26,000; and the DKMC In-Kind - $ 3,700. "Uses of Funds" core data form showed distribution of project funds by project line items. "Institutional Cost Sharing" was documented to indicate contribution of Dull Knife Memorial College in terms of professional staff time.

Four DKMCRSI schools pilot tested the California Systemic Initiative Assessment Collaborative standards-assessment items. Following the pilot testing, RSI sponsored a series of one-half day Units-Based Assessment Workshop presented by CSIAC Director. Students in grades 5, 7, and 10 participated in the pilot test. The Site Coordinator received news that fourth grade science scores were higher that the previous year's scores in locations the Site Coordinator modeled science instruction.

The "Standards Implementation" Core Data Element form recorded the extent of implementation of standards-based math and science curriculum in the DKMC Project schools. Questions elicited teacher implementation information in both math and science.

Project Leadership and Coordination

The Dull Knife Memorial College RSI Project was initially coordinated by Robert Madsen, formerly a science faculty member and NSF Project Coordinator at Little Big Horn College. Mr. Madsen was instrumental in founding the DKMRSI Project, and was with the project from June of 1996 to August 1997. When Mr. Madsen became a science instructor at DKMC in the Fall of 1997, Mr. Jeffrey Hooker was appointed to the RSI Project Site Coordinator position. Also formerly of Little Big Horn College, Mr. Hooker served in this position throughout the academic year of 1996-97. The Quarter four 1999 Report from the RSI Project recognized a new Project Coordinator – Mr. Brian Stiff.

LESSONS LEARNED AND RECOMMENDATIONS

The fall evaluation visit in 1996 resulted in a number of recommendations: An expansion of project focus to become more community based through committees and working groups among the collaborating schools; and the use of mentor or lead teacher approaches in teacher development opportunities. The second year evaluative visit made several challenges to the project management: first, there was a recommendation to include non-participating schools (those without written commitment) in project activities; and second, that working sessions with school personnel could be organized to implement standards-based curriculum. Work in science education was commended; but work on math needed to begin.

Sicangu Rural Systemic Initiative

By Gene Meier

"The philosophy is that if the significance of cultural values is emphasized within the initial course, then the students will learn how to apply this way of thinking for themselves in other classes and within life in general."
Priscilla Fairbanks

I turn south on highway 83 outside of Kadoka, South Dakota. The wind chills are now exceeding minus fifty below, and snow is winding across the road in a ground blizzard that impairs vision. I am enroute to the great nation of the Sicangu, people of the Rosebud. Although I have been down this road many times, this trip is different. I am going to end the chapter of a story about change and to see how it affected the Lakota people.

I reflect on Claude Two Elk standing on a hill, looking to the west. We are outside of Rosebud. "That is Leonard Crow Dog's place." I look in the general direction in which Claude is looking, knowing that he will not point with his finger, but will give a detailed description of what he is looking at. "That Leonard, he sure is a good guy. It's people like him who need to be talking about reform and change."

We get back into my car, a small Ford Contour. This car had just finished a journey across the Rosebud reservation, traversing over dirt roads, a sage field, and across a washout in the lower portion of Rosebud hill. Distances are great from the center of this nation; so much so, a mere fifteen-minute visit to a local administrator may take up the whole afternoon. We get back in the car and head to the coffee shop.

Claude is nearing his mid 40's; his peppery hair is braided and tied down with rubber bands. He complains about his tooth. Claude's wisdom and knowledge of his culture is evident as we talk about things. I learn things about my own people and the ways of my ancestors listening to him speak. Every now and then, he pauses, tells a joke, and continues where he left off. We see an old man on the side of the road trying to change a tire in an older Ford F150 pick up. We stop and lend a hand and see that the old man is back on the road.

Background

In the infancy of the Rural Systemic Initiative, before the National Science Foundation released the 'request for proposal' a group of Indian educators met in Denver to discuss the business of science and math reform. This was a brainstorming meeting that included leaders from Sinte Gleska University like President Lionel Bordeaux, Leland Bordeaux, and Claude Two Elk. Included in this NSF sponsored meeting were visionaries like Carty Monette, president of Turtle Mountain Community College and the principal investigator of the High Plains Rural Systemic Initiative. Also included were Jack Barden from Sitting Bull College in South Central North Dakota, and Jerry Gourneau from Turtle Mountain, Community College, both of whom would lead the TCRSI, Abbey Willetto, a researcher from the University of New Mexico in Santa Fe, and other tribal leaders from the high plains and the desert plateau.

Upon their return to Rosebud meetings with stakeholders at Sinte Gleska University ensued. Included in the meetings were community elders representing the various regions of the Sicangu Nation. At the same time, in North Dakota, at Turtle Mountain Community College, the proposal had been drafted and approved by the National Science Foundation for five years totaling ten million dollars to serve twenty affiliated tribal colleges in the high plains.

On February 7, 1996, the subcontract between Turtle Mountain Community College and Sinte Gleska University was signed for

a twelve-month period to be renewable at the end of each year for the following five years. The Sicangu Rural Systemic Initiative (SRSI) was borne with a guarantee of initial funding of $110,366 to start. Five months later, on June 3, 1996, the site coordinator, Claude Two Elk, was hired and was immediately sent to Billings Montana for a meeting with other sub awardees from the project.

In October 1996 the SRSI steering committee was formed. On this committee were people representing the various reservation educational entities. Leland Bordeaux, who at the time was the Dean of Education and Tribal Studies, currently Vice President of Sinte Gleska University, facilitated this first meeting. Two key members who truly understood STEM reform were Cheryl Maderis from the Sinte Gleska Teacher Preparation program and Dorothy LeBeau the curriculum director from Todd County School District. Elders, parents, and community members were also in attendance. Invited and present were two leaders from the TCRSI: Jack Barden and Jerry Gourneau from the central office. A leading consultant, Perry G. Horse, was there to help direct the vision of the meeting and establish how the SRSI would utilize its limited funding to accomplish its goals.

Sinte Gleska University

A part of Sinte Gleska University, the SRSI offices are located in the Marcus building in Mission, South Dakota. Also housed in this office is the Vice President of the University, Leland Bordeaux, his support staff, and other grant directors and their program staff. The building is small and cluttered and once you sit down, you quickly understand a lot of work is going on around you.

Sinte Gleska University classrooms are located about a mile east of the Marcus building. On campus you will find similarities with other education centers with the exception of size. Like most Tribal Colleges, Sinte Gleska is still building capacity and uses whatever space is available. Offices are small, desks are cluttered, and student services are tight and cramped. The administration offices of the University sit sixteen miles west of the Marcus building in the center of the Rosebud agency. According to

Claude, this building was, at one time, the Indian Health Services. The beautiful brick building is crowded and bustling with the daily business of a Tribal College.

I pull up to the Marcus building, look at my partner and tell her I am not sure how long I will be. The wind is whipping around us, and her teeth are chattering. I give her directions to the bead store owned by an elderly woman. "I'll give you a call when I am done."

For almost five years I had made monthly visits to this place to renew our endeavors as agents of educational change. Today was different because I was here to listen to people talk about the RSI program and the effects that it had or didn't have. It had been almost a year since I had been back. I remembered there used to be a cowbell on the door and wondered if it was still there. I opened the door and entered a darkened building. In the back a light was on, and as I hurried to shut out the winter, the cowbell on the door clanged like a Bronco' mounting his steed. I stood for a moment letting my eyes adjust. My ears sensed loneliness. I looked at the space dedicated to five years of hard work and the desk that now sat empty of the previous SRSI staff. Emotion washed over me, knowing that this once bustling office now lay still like the winter that surrounded us.

"Hau," I called. From the back a man peered from the doorway. It was Leland Bordeaux. He was on the phone and pointed to me with his chin and lipped that he was on a conference call and that he'd be right with me.

As I stood there, I remembered Claude telling me that he was having a hard time telling the elders about his job and that now he was rewriting the National Science Foundation's Drivers for Systemic Reform in Lakota, a daunting task to say the least. The SRSI philosophy stated that in order for reform to be effective, the grassroots of change had to start with the elders. However, the Drivers for reform were unapproachable and standoffish because the Drivers were riddled with technical education language that mirrored that of a doctoral dissertation. For speakers of English as a second language, the Drivers made little sense. In fact, to most

educators, they made little sense. But these were the objectives set forth by the NSF to create change.

Claude is a full-tongued speaker and is part of a larger group of people who are reviving the language and traditions and archiving them onto mediums for all to be able to share. "English is our second language. When you talk to me, I have to take your words, translate them into Lakota, think of a response in Lakota, and then translate that back into English." Claude slapped an eighty-three-page document on the table and, as I thumbed through, I saw the enormous amount of work that went into it. "These are the first two drivers out of the six," I looked up, and he was lighting a piece of sage for us to smudge with.

Drivers & Outcomes

The creation of a local philosophy that permeated all levels of education became the model for change within the SRSI. Because this program was intended for people of the Rosebud Sioux reservation, creating a program that was culturally sound echoed throughout the entire system. For instance, the Lakota words *wounspe* (balance and harmony) and *wakanyeja* (children, those who stand sacred) are the focal point for preparing students in science, technology, engineering, and mathematics. Contemporary learning strategies are also kneaded into the system. Thus the constructivist approach to learning and teaching was incorporated into the system.

The SRSI project relied on the NSF's drivers for systemic reform to determine the outcomes to be achieved in the five year program. The SRSI would help develop standards based curriculum through professional development activities, help effectuate change in standards-based education by examining local education policies, and making specific recommendations to those setting and dictating policy. At the forefront of driver implementation was a creation of broad-based support that included elders, community, parents, schools, higher education, tribal government, and business and industry. Supporting and sustaining a program with a need to converge all resources, including those who could contribute both

in-kind and monetarily to the system of change, was essential for effectuating change. Last, equity through student achievement would be an indicator of success.

Over the five-year period the Sicangu Rural Systemic Initiative achieved eleven outcomes:

1. Established a planning board/advisory board.
2. Conducted needs assessments.
3. Established a culturally responsive curriculum.
4. Implemented a standards-based science and math curriculum.
5. Created a student centered learning environment.
6. Created greater student understanding and achievement in science and mathematic.
7. Facilitated parental/community/tribal involvement.
8. Recommended policy
9. Promoted the concept that all Lakota children can understand and achieve in science and mathematics.
10. Established ongoing evaluation and refinement of program improvement.
11. Created plans for the institutionalization of science and mathematics change.

Schools

Schools that SRSI focused on were the Todd County Public Schools headquartered in Mission, South Dakota and included the St. Francis Indian School, a mission school funded by both the tribe and the BIA. In total the SRSI was serving nearly 1,200 high school students, 400 middle school students, and 4,200 elementary students (data does not include St. Francis Indian School student numbers which are estimated from regional coordinator reports). One report estimated that there are nearly 18,000 Sicangu Lakota students on the Rosebud reservation (Quarter Report, 1996). Teaching staff included 250 certified staff members not counting aides and other support staff (Core Data Elements 2001). Also included in this focus were staff members from Sinte Gleska University's teacher development program and education department.

Understanding the complexity of schools on the reservation was a daunting task. Travel to each district was extensive, time consuming, and had to be well organized upon arrival. School administrators were busy with the everyday business of educating children and had little time to spend talking about science and math reform. School calendars differed between districts, and professional development for staff had already been set for the entire year. Offering something to districts was almost a moot point. Gathering needed student and teacher data was tumultuous because schools either did not have one database for student information, did not have time to gather it, or felt that SRSI should not be privy to this confidential information. In time, SRSI was looked at by districts as a potential funding source and they began cooperating extensively with the program, but it took time. It was no secret. In order to get schools to participate and integrate SRSI into schools, a carrot would have to be dangled, enticing them to become active in SRSI activities.

By the end of the first funding year, the SRSI was well established in each school. Although each district had varying degrees of participation, you could walk into every school, and talk with staff that had a sense of what SRSI was. Even though schools were working with the program, gathering data still seemed an impossible task. Upon closer examination of why this was the case, what becomes evident is that schools did not have the data requested by the TCRSI who ultimately had to respond to the National Science Foundation. Another problem was that schools did not warehouse student data. In many cases previous school year information had either been stored in some darkened corner in the recesses of a basement and/or it had been destroyed. At the end of the five-year period, this problem began to get better because both the schools and NSF understood the need to change the way student data was handled and being reported. From the TCRSI central office perspective, management data, like budgets and reporting were untimely and often delayed.

Both Todd County School District and St. Francis Indian School adopted the Full Options Science System (FOSS). Research based, the FOSS curricula provide built in assessments that are both formative and summative. This assessment model worked very well with the portfolio assessment system in place at both St. Francis and Todd County Schools. Workshops ensued in Everyday and Connected mathematics with services being provided by Black Hills State University. Also, Math Investigations and ideas about research-based mathematics were beginning to surface as themes in professional development. As a direct result of these efforts, SRSI became instrumental in helping schools develop their school improvement plans. These combined efforts brought SRSI back to a level of reliability and validity that schools could lean on.

Standards & Policy

- Sicangu educational standards were established by SRSI and the Education Committee.
- The Rosebud Tribal Council aligned policy to endorse and support change for science and mathematics within the reservation schools.
- In collaboration with the MIE (Minority Institutions for Excellence) program out of Oglala Lakota College, a Water Algebra Workshop was hosted along with summer-long sessions for professional development in the STEM curricular areas.
- NSF's Drivers for systemic reform were adopted by Sinte Gleska University's education department and were meshed into the "Service Learning Model", a program for all reservation teachers on the reservation.
- Administrative workshops were established to increase the awareness of school administrators of STEM reform.

Professional Development

Because the SRSI didn't hire a Site Coordinator until five months after signing the contract, developing professional

development was difficult; however, not impossible. At the halfway point of their first year, SRSI offered many high quality workshops that had lasting effects.

- Parent meetings
- Math Standards hosted by MCREL (Mid-Continent Regional Education Lab)
- National Indian Education Association (Rapid City)
- SKILLS (SDSM&T)
- Technology in Education
- Science Fair planning
- Problem Solving Project
- Science Knowledge for Indian Learning Workshops

LESSONS LEARNED

We have now come to the point of interviewing the primary people involved throughout the SRSI's implementation. Answers are to be elicited regarding the lessons learned, the impact and the vision. For this, I meet with Leland Bordeaux and Dorothy LeBeau. As I near the SRSI section of the university, Leland emerges from his office; we shake hands, discuss the weather, and sit down to talk about the lessons learned from the previous five years of the Sicangu Rural Systemic Initiative.

What Impact did the SRSI have on your students?

"It gave teachers better ideas on how to teach science and math reform. For the administrators, they all knew that the RSI existed for professional development, and because of that, they were able to coordinate their current efforts with RSI. There was no direct impact with the school boards except for that information administrators were taking to board meetings. Above all, the

Tribal Council was the first to know that the RSI existed. Culture was and still is very important in the things that we do, and it was important to have the Council on board."

What were some of the activities that occurred in the schools as a result of the program?

"Most of the activities that occurred always dealt in someway with the standards and with those who talked about science and math and how to merge the standards into the classrooms. It was collaboration with other groups. It was part of the systemic change movement that was occurring here on the reservation. SRSI really complimented this movement."

How was the culture of the community included in the implementation of the math and science curriculum as a result of the RSI?

"This was done through local standards that had been developed that the SRSI had to work within. All of the standards that were in place had a very strong cultural component. In fact, we re-wrote the NSF drivers for systemic reform into Lakota."

What can we glean as building blocks of success for the possible future efforts from this initial RSI?

"We needed to have better planning. We need to take a look back at what we did and where we are now. Did we truly learn anything? We need to tie into the needs of the schools and not dictate what they need. There also needs to be more innovative ways of dealing with the improvement of science and math. For instance, Todd County wanted to bring in Marilyn Burns to consult; however, that was a step higher than what the RSI was ready for."

What were the mistakes and how did that impact the project implementation?

"Originally, the program was so centralized at one spot. Some of the people from the central office did not necessarily understand our needs, nor did they offer any technical assistance for science and math improvement. We need more help in school improvement."

Did the RSI impact pedagogy in the schools?
"The SRSI reinforced what was already happening in the schools and amongst the teachers. This is the pedagogy of constructivism, which we believe is the cornerstone for science and math improvement. The RSI exposed teachers to curriculum such as FOSS. That can be very important for science and math achievement here on our reservation as long as teachers understand how the pedagogy works."

Leland and I chatted for several hours about the nature of systemic reform, and all the things associated with it. "We are in crisis now with the No Child Left Behind Act. In the Junior Highs and High Schools, there is a lack of professional development to get our teachers credentialed to a level of "highly qualified" as required by NCLB. Now the schools are reacting blindly trying to meet the new laws. But the potential is there to meet all the mandates that are coming. Our K-6 systems are doing pretty good, and when you look around in the high schools, you'll see good equipment, great stuff for teaching math and science. In the elementary schools almost every classroom has everything needed to teach good science. It's just that now we lack the credentialed teachers." Leland stated that, "All people involved from the top to the bottom, including higher education, arts and sciences, students, teachers, community, and elders have a better understanding of systemic reform. In the future, there needs to be more time given by funding entities to really get things done."

It was time for Leland to go. Family members were waiting for him outside. We stood, shook hands, and bid each other a farewell. Cold air hit my face as I stepped outside. I stood there for a moment and, in a flash, five years of RSI history replayed in my head and was stored for some later date. My partner was sitting in the car waiting for me. "Where to now," she said. "Let's go see Dottie LeBeau. Turn right here," I added.

IMPACT & VISION

Dorothy LeBeau is the School Improvement and Curriculum Director for Todd County Schools in Mission, South Dakota. As stated previously, TCSD accounts for over eighty percent of the students on the Rosebud Sioux reservation. Dorothy was on the SRSI steering committee and helped bring SRSI into the circle of educational expertise that TCSD was offering to their staff. This was key to the success of the SRSI system.

I was honored to be able to sit down and talk with Dorothy again. Every time I have had the opportunity I have always walked away with a better sense of what I was doing in my own job to promote systemic change.

As we talked about the SRSI and its impact on her district, it became clear that SRSI was instrumental in implementing the Full Options Science Systems into every school. "Teachers were trained in using FOSS kits when the middle school FOSS kits were developed; the SRSI helped us purchase the kits for the schools and provided the ongoing training. FOSS was culturally responsive. For example, the hands-on and collaborative learning of science concepts is important in the way our children learn. Also the way FOSS focuses on big concepts rather than discrete skills really helped."

SRSI was also a vehicle for the Tribal College to become a resource for teachers to use. It helped forge a working relationship between teachers, students, and administration at every level within the school district.

Dorothy reflected, "teachers who had not worked with a tribal college before were exposed to tribal values and were able to witness the Tribal community in a leadership role. Teachers felt more comfortable with the tribal community. They felt that they could use the tribal college as a resource."

SRSI did have an impact on the TCSD system in that it helped integrate standards-based science into the classrooms and helped

effect change within the community of educators in how they looked for resources. We ended our discussion and agreed that there had to be more communication between schools and resources like SRSI.

REFLECTIONS

Communication between each site and the TCRSI central office was primarily done through email. However, at the Marcus building where the SRSI office was located, one phone line served several programs. A fax line, and data lines were non-existent. Thus, when an email from the central office was sent out to all site coordinators, sometimes, it wasn't received This hindered the relationship between the SRSI and TCRSI central office. By close of the fourth year, the Marcus building became wired with data ports, and SRSI was able to maintain communication with the TCRSI central office.

Midway through the second year reports showed that a high turnover of teachers existed within the reservation schools (ORBIS, 1997). This was a critical factor when trying to implement systemic change. John Goodlad in his book, Access to Knowledge states that a critical factor in reform efforts within minority schools is to reduce staff turnover (Goodlad and Keating, 1994). Knowing this, SRSI began to work with schools, in particular, Todd County School District, which serves 85% of the students on the reservation. This work, combined alignment of standards and assessment, policies on teacher retention, and partnership activities with each school designed to help SRSI become part of the larger Sicangu Nation education system.

Within two years of SRSI operations, the Site Coordinator resigned, taking another position in education. This had a powerful effect throughout the community for several reasons. First, the training that had been provided to him would have to be repeated with his replacement. Second, projects already in place were put on the backburner until the new person familiarized herself with the project. Last, a lack of paperwork about the project had been filed so the new coordinator faced difficulty in picking up where

things were left off. In essence, SRSI dropped the ball and became unreliable. So, the forward momentum stopped abruptly and did not proceed until Dina Begay was named Site Coordinator. Through extensive training from the TCRSI regional office, Dina had the program back on track and reestablished within the schools in a short period of time.

Into its fifth year, SRSI began working towards the development of a phase II grant. At first, a concerted effort was made to work as a region to include all of the sites in South Dakota, Wyoming, and to include Sitting Bull College in North Dakota. However, as NSF developed the Request for Proposals for phase II funding, it was evident that each site would develop their own proposal and compete with existing TCRSI sites. As a result SRSI begin to develop their proposal.

At the end of the five-year period, SRSI was able to continue with carry over funds and other grant dollars to last into the seventh year. Today, Dina Begay is the principal at St. Francis Middle School, and from what I heard last, "is doing well." I drove around, looking for Claude Two Elk, but to no avail. I went to Sinte Gleska's new technology center and sat in on a lecture by a local elder on how we need to preserve our language. I walked around this impressive building, looking into the various rooms. As I came to one, I noticed the all too familiar black and white boxes of FOSS sitting in the corner. On the door, a hand written sign said, "FOSS TRAINING."

As I left the Rosebud, I was full of emotion because behind me were people who had worked with a passion to see that change in STEM would occur. We are Indigenous, we are dedicated to our children, and we are proud of what we have done. I turn north, into White River, turn the radio on and tune it to KILI radio where the Black Lodge Singers are drumming a sneak up song. This is the Voice of the Lakota Nation!

Mitakuye Oyasin

About the Authors

Louise Erdrich is an enrolled member of the Turtle Mountain Band of Chippewa, an internationally acclaimed author of eleven novels as well as volumes of poetry, children's books, and a memoir of early motherhood. Her novel **Love Medicine** won the National Book Critics Circle Award. **The Last Report on the Miracles at Little No Horse** was a finalist for the National Book Award. She lives in Minnesota with her daughters and is the owner of Birchbark Books, a small independent bookstore.

Dr. Paul Boyer is the author of several books on American Indian Higher Education. He has also co-authored and participated in researching and publishing many reports on education, two of which were published by the Carnegie Foundation for the Advancement of Teaching. His most recent book is College Rankings Exposed. One of the major contributions to American Indians was serving as the founding editor of the Tribal College Journal.

Dr. Loretta DeLong is an Associate Professor in the Department of Educational Leadership at Minnesota State University, Mankato, Minnesota, and an enrolled member of the Turtle Mountain Band of Chippewa. Her professional life has been committed to K-12 and Higher Education with expertise in areas of leadership, administration, curriculum and assessment. This publication was the first in the role as editor of a book.

Dr. Wayne Stein is the Director for the Center for Native American Studies at Montana State University in Bozeman, Montana. Dr. Stein attained an Ed.D is in higher education from Washington State University and is renown for his expertise in tribal college and Native American education. An enrolled member of the Turtle Mountain Chippewa, he is the author of numerous books, articles and reports.

Dr. Patrick Weaselhead is an enrolled member of the Blackfeet Tribe of Montana and has extensive experiences working with national and state educational

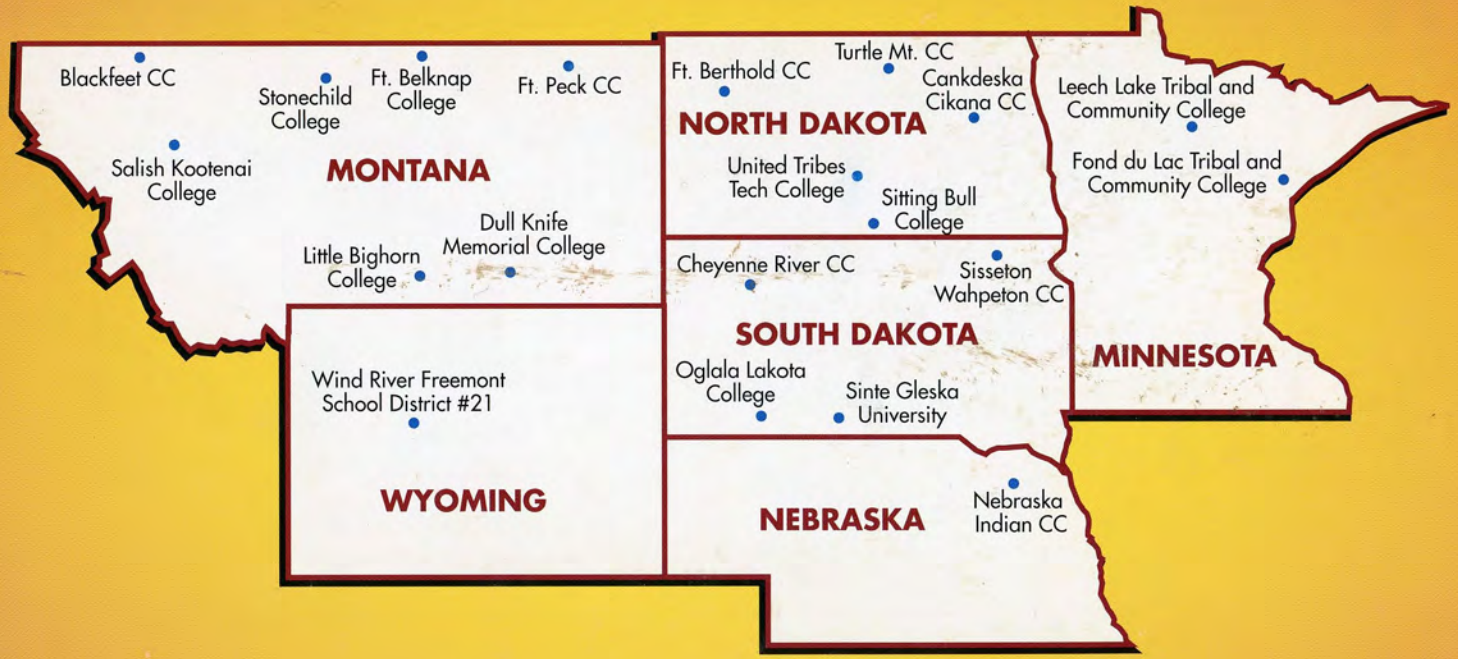
organizations for the promotion and improvement of Indian education at all levels K-12 through higher education. He hold the position, Director for American Indian Student Services, University of Montana, Missoula.

Mr. Larry LaCounte, Turtle Mountain Chippewa has been the recipient of national and state awards, National Indian Educator of the Year, 1986 and Cultural Diversity Recognition at the University of Montana, Missoula, 1996. His extensive background experiences in Indian Education include director, teacher, professor, consultant, evaluator and writer.

Dr. Janine Pease is the Vice President for American Indian Affairs at Rocky Mountain College, Billings, Montana and an enrolled member of the Crow Tribe, from the Valley of the Chiefs. Lodge Grass District, Montana. Dr. Pease served as president of Little Big Horn College for eighteen years, from 1982 to 2000 during which time, LBHC became accredited, founded a comprehensive curriculum around the Crow Indian language, culture and knowledge and expanded the campus facility.

Mr. Gene Meier, Crow Creek Sioux Tribe worked with the Tribal College Rural Systemic Initiative as a Regional Site Coordinator located out of Wind River, Wyoming. Expertise in administering educational programs that promote systemic improved change have earned Gene an excellent reputation as teacher, administrator, evaluator and consultant. He currently heads up a Virtual High School Project at Fort Washakie, Wyoming.

Tribal College Rural Systemic Initiative



Six State Region