

**ALASKA RURAL SYSTEMIC INITIATIVE**

sponsored by the

Alaska Federation of Natives  
University of Alaska  
National Science Foundation  
Alaska Department of Education and Early Development



**Final Report**  
**Phase II**  
**2000-2005**

Submitted to  
National Science Foundation

April 3, 2006

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**AKRSI Final Report: Phase II**  
**2000-2005**

Submitted by  
Frank Hill  
Oscar Kawagley  
Ray Barnhardt

**Executive Summary**

The following is the Final Report on the rural school reform initiatives implemented during Phase II of the Alaska Rural Systemic Initiative (2000 – 2005). The focus of the AKRSI-Phase II builds on the successes of the initiatives that were implemented in Phase I, with the locus of activity in the same 20 rural school districts that have served as partners in the original initiatives since 1995. The primary differences during Phase II have been in the concentration of effort and increased emphasis on sustainability of the initiatives that have been implemented.

The Alaska Rural Systemic Initiative completed its tenth year with a full complement of rural school reform initiatives in place stimulating a reconstruction of the role and substance of schooling in rural Alaska. The educational reform strategy we have chosen — to foster connectivity and complementarity between the formal education system and the indigenous knowledge systems in communities being served in rural Alaska — continues to produce an increase in student achievement scores, a decrease in the dropout rate, an increase in the number of rural students attending college, and an increase in the number of Native students choosing to pursue studies in fields of science, math and engineering. The AKRSI school reform initiatives have demonstrated the viability of introducing strategically placed innovations that can serve as catalysts around which a new, self-organizing, integrated educational system can emerge which shows signs of producing the quality of learning opportunity that has eluded schools in Native communities for over a century. The substantial realignments that are evident in the increased interest and involvement of Native people in education in rural communities throughout Alaska, as reflected in the various indicators summarized in this report, point to the applicability of locally driven strategies in shaping reform in Alaska’s educational systems. As the environment in which we operate evolves, we have sought to evolve accordingly, refining and adapting our initiatives to fit the conditions that emerge.

While the NSF funding of the Alaska RSI initiative has been the catalyst for the core reform strategy, we have been fortunate to acquire substantial supplementary support from other sources to address areas for which the RSI funds were not suitable, such as indigenous curriculum materials development (from USDOE), and implementing comparable initiatives to those of AKRSI in the areas of social studies, fine arts and language arts (from the Rural School and Community Trust). All of these initiatives combined provided an opportunity to address the

issues facing schools in Native communities throughout rural Alaska in a truly comprehensive and systemic fashion.

### **Impact on Student Performance**

The performance indicators of the effects of the ten years of implementation of the AKRSI initiatives show a steady net gain between AKRSI partner schools over non-AKRSI rural schools in the percentage of students who are in the upper quartile on 8<sup>th</sup> grade standardized achievement tests in mathematics, as well as a steady gain in mathematics proficiency levels on state standards-based assessments for both 8<sup>th</sup> and 10<sup>th</sup> grade students in AKRSI partner schools. In addition to the state benchmark data, we also have norm-referenced test results for 9<sup>th</sup> grade students who have been taking the Terra Nova/CAT-6 since 2002. Though the differential gains for each group between 2002, 2003 and 2004 remain small, the AKRSI students do show a slight increase in performance, while the non-AKRSI students reflect a small decrease in their performance over the three years of available data. The most notable data are the significant increases in AKRSI student performance for all grade levels between 2000 and 2005. While the 8<sup>th</sup> grade AKRSI students showed significant progress in closing the achievement gap with their non-AKRSI counterparts from 20 to 17 percentage points, the 10<sup>th</sup> grade students in both groups showed a substantial gain from 2000 to 2005, leaving the achievement gap largely intact. The consistent improvement in academic performance of students in AKRSI-affiliated schools over each of the past ten years leads us to conclude that the cumulative effect of utilizing the Alaska Standards for Culturally Responsive Schools to promote increased connections between what students experience in school and what they experience outside school appears to have a significant impact on their academic performance.

## **Section I – Overview of the System**

The underlying purpose of the Alaska Rural Systemic Initiative has been to implement a set of initiatives to systematically document the indigenous knowledge systems of Alaska Native people and develop pedagogical practices and school curricula that appropriately incorporate indigenous knowledge and ways of knowing into the formal education system. The central systemic reform focus of the AKRSI strategy has been the fostering of connectivity and complementarity between two functionally interdependent but historically disconnected and alienated complex systems — the indigenous knowledge systems rooted in the Native cultures that inhabit rural Alaska, and the formal education systems that have been imported to serve the educational needs of rural Native communities. Within each of these evolving systems is a rich body of complementary scientific and mathematical knowledge and skills that, if properly explicated and leveraged, can serve to strengthen the quality of educational experiences and improve the academic performance of students throughout rural Alaska.

### **Demographics**

The following chart summarizes the demographic data associated with the 20 partner rural school districts and schools that have participated in the Alaska Rural Systemic Initiative.

20 Partner Sch. Dist.	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05
# Schools	176	176	176	176	184	184	184	184	185	185
# All teachers		1806	1814	1821	1782	1704	1599	1599	1605	1586
# Math & Science Teachers	105	118	118	122	128	128	128	128	130	122
# Students	17,422	18,308	18,808	19,462	20,791	20,690	20,844	19,767	19,794	19,855

The number of schools participating in the AKRSI showed an increase of eight in 1999, however, that was a function of counting elementary, middle and high schools separately in the larger communities where they operated out of more than one facility. The declining number of teachers between 1999–2005 was a function of legislative actions that increased the minimum enrollment for maintaining a school in a community from eight to ten. The total number of students reflected a slight decrease the last three years, with the teacher/student ratio at a relatively modest 12.4:1. The overall ethnic makeup of the 20 districts remained stable, with a predominance of over 90% Alaska Native, and with the remaining 10 % made up primarily of white, Asian and Black students associated with the larger regional centers in each region (Kodaik, Bethel, Nome, Kotzebue, Barrow).

## Participating Schools:

The most critical salient feature of the context in which this work has taken place has been the vast cultural and geographical diversity of the state of Alaska. The following map outlines the five major cultural regions around which the AKRSI initiatives were organized (Alutiiq and Aleut were combined), with twenty participating rural school districts evenly distributed across the five regions:



These 20 school districts continued as the focus of the AKRSI activities throughout the ten years of the project, involving a total of 185 rural schools serving 19,855 predominately Alaska Native students, along with 30 associated Native organizations, state agencies, rural campuses, professional organizations, etc. The remaining 28 rural school districts (103 rural schools serving mostly non-Native communities) served as a comparison group for assessing the impact of the AKRSI initiatives. The five rural districts that served as the AKRSI “focal districts” contained a total of 9,342 students in 61 schools served by 711 certificated staff. The remaining rural school districts and students throughout the state were also impacted, however, through participation in AKRSI-sponsored activities such as professional development workshops (e.g., the Alaska Science and Math Consortia), Native science fairs, Alaska Native Science Education Coalition activities, science camps, Leadership Institutes, etc., as well as changes in state policies and the utilization of culturally-aligned curriculum resources generated by AKRSI and made available through the Alaska Native Knowledge Network. By the end of Phase II in 2005, the Alaska Rural Systemic Initiative had implemented a series of school reform initiatives that directly or indirectly impacted all the 287 rural schools (and most of the urban schools) in the state, serving a total of 38,080 rural students with a professional staff of 2628.

## B. Teachers Reached:



The 20 rural school districts directly involved with AKRSI initiatives employed a total of 1605 certified teaching personnel, constituting 60% of the certified personnel serving in rural schools. However, only 6% of those personnel were Alaska Native (even though one district has reached over 30%). Given the 30+% turnover rate for teachers in many rural schools, as well as a growing teacher shortage in general, the emphasis of AKRSI was on those initiatives that would bring about a higher degree of stability and continuity in the professional personnel in those schools, and particularly on the preparation of more highly qualified Alaska Native teachers and administrators (especially in the areas of math and science). While non-Native teachers were directly involved in many of the AKRSI professional development initiatives, the demographics associated with the annual turnover of rural educators made it clear that even a concentrated effort at upgrading the capacity of those teachers would have little lasting impact on the quality of math and science instruction in rural schools, because we would have to repeat the process every three years on the average to sustain a minimum level of impact. All rural teachers were impacted by the work of the AKRSI, however, as the licensing requirements, professional development initiatives and the curriculum and policy changes that were implemented at the federal and state levels extended out to the hiring and retention practices of rural school districts. This capacity-building function was reinforced by an NSF-funded Teacher Leadership Development Project (TLDP) which was linked to the larger AKRSI school reform strategy for a period of three years. The Alaska Department of Education matched the TLDP funding for those three years to provide additional support for rural teacher recruitment and retention activities, particularly in the area of cultural orientation programs for new teachers. The latter programs were based on the "Guidelines for Cross-Cultural Orientation Programs" that were developed in 2001 by the AKRSI/TLDP, and are now a component of a proposed "Cross-Cultural Specialist" endorsement for certificated teachers to be made available by the State. In addition, in 2003 the University of Alaska established a Future Teachers for Alaska Program as a result of the TLDP to assist rural schools in attracting more local people into the teaching profession.

A wide array of Alaska RSI-sponsored professional development opportunities were offered at both the district and statewide levels in the State. These included statewide conferences for math/science educators, regional and statewide curriculum workshops, a regional Scientist-in-Residence program, the Alaska Native Science Education Coalition, Native science and cultural camps for teachers, a regional Academy of Elders for Native educators, Cultural Orientation Programs for new teachers, and various district-level workshops around specific initiatives. School districts provided release time for individual teachers and devoted district inservice time and travel funds to these efforts. Based on a successful AKRSI initiative in the Interior Athabaskan region during Phase I, we sponsored in each of the five regions a process we referred to as an "Academy of Elders." Each Academy was made up of Native teachers, Elders and practicing scientists and science teachers, all of whom gathered for a week or more at a camp or village site where the Elders and scientists passed on their knowledge in reference to some aspect of the local environment to the teachers. The teachers were then responsible for developing curricular applications for what they had learned, checking with the Elders and scientists for its accuracy, and then pilot testing it in the classroom to determine how effective it was with students. These refined curriculum units were then compiled and put onto the AKRSI web site and into publication form for distribution to other teachers and schools. Since July, 2000, the Association of Interior Native Educators has been utilizing a \$1.3 million federal grant (renewed in 2003) to assemble the curriculum materials that were generated from the ten Interior

Academy's for distribution to all eight rural school districts in the Interior, and to provide on-site professional development for the teachers. In addition, they have provided workshops related to their work at the tri-annual World Indigenous Peoples Conference on Education and the National Indian Education Association annual convention.

This curriculum and professional development process was coupled with the AKRSI sponsorship of a series of regional Native Educator Associations, one function of which was to host the regional Academies as well as an annual meeting in which the work of the teachers was shared with school board members, superintendents, teachers, teacher aides and students. In Feb., 2005, the eighth statewide Native Educator's Conference (NEC) was held in Anchorage, hosted by the Native Educator Associations under AKRSI sponsorship. In addition to the presentations and sharing of the products of the previous years work among the 200+ attendees, work sessions were convened to address issues of general concern.

In 1998, the Native educators produced the Alaska Standards for Culturally Responsive Schools, which were subsequently adopted by the State Board of Education and are now in use in schools throughout the state. The Cultural Standards embodied the reform strategy of the AKRSI and continue to have ripple effects in urban as well as rural schools throughout Alaska and beyond. Subsequently, NEC work sessions focused on the development of "Guidelines for the Preparation of Culturally Responsive Teachers," which are now being put to use in pre-service and inservice programs around the state, as well as a set of "Guidelines for Respecting Cultural Knowledge," "Guidelines for Nurturing Culturally Healthy Youth," "Guidelines for Strengthening Indigenous Languages," and Guidelines for Culturally Responsive School Boards (the latter were adopted by the Alaska Association of School Boards). At the 2003 NEC, a set of "Guidelines for Cross-Cultural Orientation Programs" was adopted by the Native Educator Associations, which is now being used as a basis for cultural orientation programs in districts across the state. These guidelines were all designed to assist teachers in the appropriate integration of indigenous knowledge in their teaching.

Following is a list of the Native Educator Associations that emerged in response to AKRSI initiatives over the past ten years:

- Ciulistet Education Association
- Association of Interior Native Educators
- Southeast Native Educators Association
- North Slope Inupiaq Educators Association
- Association of Native Educators of the Lower Kuskokwim
- Association of Northwest Native Educators
- Native Educators of the Alutiiq Region
- Association of Unangan/Unangas Educators
- Southcentral Alaska Native Education Association
- Alaska Native Education Student Association
- Alaska Native Education Association
- Alaska First Nations Research Network
- Alaska Indigenous Literary Review Board/Honoring Alaska's Indigenous Literature

Consortium for Alaska Native Higher Education  
Kuspuk Native Educators Association

The main function of the AKRSI Teacher Leadership Development Project was to strengthen and make sustainable the role of the Native Educator Associations and their members in implementing the math/science initiatives that drove the AKRSI educational reform effort. AKRSI contracted with an educational entity in each of the five cultural regions to assist in the development of leadership capacity in their respective region and to establish formal mechanisms to sustain the implementation of the reform initiatives independent of the AKRSI resources by 2005. In an effort to provide a statewide voice and advocacy role for the regional Native Educator Associations, a statewide Alaska Native Educator Association has been formed and is now seeking funding to provide support for the work of the regional associations.

**C. Students Reached:**

The following charts summarize the number of students who participated in AKRSI sponsored activities such as science camps, science fairs, math/science curriculum initiatives, Elders programs, cultural atlases, etc., as well as the number of additional students who participated in the AKRSI initiatives implemented throughout the 20 partner rural school districts.

20 Partner Sch. Dist.	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03	03-04	04-05
# Students Directly Involved in AKRSI Act.	155	288	510	517	492	605	777	648	672	669
Total # Students impacted in Rural AK	17,422	18,308	18,808	19,462	20,791	20,690	20,844	19,767	19,794	19,855

The number of students directly involved in AKRSI-sponsored activities does not include all the students in the schools implementing initiatives under contract with the AKRSI, but only those who were directly involved with activities organized by AKRSI staff. The total number of students impacted by AKRSI refers to all the students who were impacted in the schools/districts that were MOA partners over the past ten years.

**Section II – Evidence of Systemic Reform**

The following section addresses actions that provide evidence of progress related to the systemic reform change indicators outlined by NSF, along with a recap of the initiatives that relate to each of the indicators (taking into consideration the drivers and the cross-cutting variables).

The Alaska Rural Systemic Initiative implemented a series of major initiatives over the past ten years focused on supporting high quality standards-based, culturally aligned science and math curricula at the statewide as well as the regional levels. On the statewide level, we worked closely with the Alaska Department of Education and Early Development to develop science and math performance standards and assessment measures for ages 5-8, 8-10, 10-14 and 14+, which served as benchmarks for student performance on the state content standards. This was followed with a coordinated multi-year effort between AKRSI, the Alaska DOE, the school districts and the University of Alaska, building sample performance assessments/rubrics and developing/field testing in-depth science and math curriculum units, based on the Alaska Curriculum Frameworks which were developed during the first two years of AKRSI as part of a state-initiated school reform process patterned after the national movement for educational accountability. In 2005, the state engaged in a process of updating the Alaska Science Standards and reviewing the performance standards in preparation for the development of a Science Assessment Instrument to comply with the requirements of the No Child Left Behind Act. Staff of the AKRSI have been actively involved in the committees engaged in this process, which is expected to go into effect in 2007.

The second major AKRSI initiative in the area of curricula was the creation of a curriculum clearinghouse to identify, review and catalog appropriate national and Alaska-based curriculum resources suitable for rural/Native settings and make them available throughout the state via the AKRSI web site. This has been expanded with a CD-ROM collection of the best materials in various thematic areas relevant to schools in rural Alaska. A curriculum specialist assembled materials from all over the state and established a searchable database of curriculum resources on the Alaska Native Knowledge Network web site at <http://www.ankn.uaf.edu>. Requests for curricular materials listed in the ANKN database has grown steadily, with an average of over 1,000,000 “hits” from 65,000 different individuals recorded on the web site each month. Following are some of the thematic areas in which curriculum units were developed demonstrating the educational potential of linking local knowledge with state cultural standards in areas related to science, math and technology:

- |                                    |   |
|------------------------------------|---|
| Weather forecasting                | Terminology/concepts/place names                  |
| Animal behavior                    | Counting systems/measurement/estimation           |
| Navigation skills                  | Clothing design/insulation                        |
| Observation skills                 | Tools/technology                                  |
| Pattern recognition                | Building design/materials/construction techniques |
| Seasonal changes/cycles            | Transportation                                    |
| Edible plants/diet/nutrition       | Genealogy   |
| Food preservation/preparation      | Waste disposal                                    |
| Rules of survival/safety           | Fire/heating/cooking                              |
| Medicinal plants/medical knowledge | Hunting/fishing/trapping                          |
| Star knowledge/constellations      | Weapons technology                                |

The knowledge and skills derived from thousands of years of careful observation, scrutiny and survival in a complex ecosystem readily contributed to the in-depth study of basic principles of biology, chemistry, physics and mathematics, particularly as they related to areas such as botany,

geology, hydrology, meteorology, astronomy, physiology, anatomy, pharmacology, technology, engineering, ecology, topography, ornithology, fisheries and other applied fields. The ANKN curriculum clearinghouse continues to develop and disseminate resource materials, as it works toward becoming a permanent fixture at the University of Alaska supported by a consortium of rural school districts.

A third major AKRSI initiative was the development of a set of “Alaska Standards for Culturally Responsive Schools,” including sections on cultural standards for students, educators, curriculum, schools and communities. These standards provide guidelines for teachers, schools and districts seeking to develop curricula and instructional strategies that are responsive to the indigenous knowledge systems and ways of knowing in rural/Native communities, while at the same time addressing high quality state and national standards. The Cultural Standards were formally adopted by the Alaska State Board of Education and distributed throughout the state for implementation. The Alaska Department of Education also included them in the Alaska Math/Science Curriculum Frameworks document for use by all schools. Professional development opportunities to guide teachers in the use of the Cultural Standards have become a major focus of inservice activities in the area of standards-based curriculum, building on national research reports calling for greater attention to the context in which teaching and learning is situated. In addition, the University of Alaska system has taken a lead role in providing a variety of pre-service teacher preparation programs and a Future Teachers for Alaska program aimed at encouraging more Alaska Natives to pursue careers in teaching and administration, including the “Rural Educator Preparation Partnership” program at the University of Alaska Fairbanks, the “Alaska Native Curriculum and Teacher Development Project” at the University of Alaska Anchorage and the “Preparing Indigenous Teachers for Alaska’s Schools” program at the University of Alaska Southeast, all of which have drawn upon the work of the AKRSI.

An unanticipated development in 2003 was the incorporation of the Alaska Standards for Culturally Responsive Schools as the foundation on which a new “Indigenous Higher Education Accreditation System” was developed by the World Indigenous Nations Higher Education Consortium., for use in evaluating Indigenous higher education programs and institutions around the world. Also, the American Educational Research Association has initiated a process for developing a set of “Social and Environmental Justice Standards” based on the model of the Alaska Standards for Culturally Responsive Schools. A pre-conference work-session and follow-up symposia were held at the 2003, 2004 and 2005 AERA Annual Meetings, with the initiative to be completed at the annual meeting in 2006. In addition, the American Association for Colleges of Teacher Education is reviewing the Alaska Cultural Standards as a model for a “Language and Culture Policy” to serve as a guide for the review of teacher education programs for accreditation purposes. An article describing these efforts was published in the September, 2003 issue of the AACTE Briefs. In addition, UNESCO published a book on “The Challenge of Indigenous Education” which included a chapter devoted to the Alaska Rural Systemic Initiative and the Cultural Standards. Finally, the international magazine, Cultural Survival Quarterly, featured a photo from one of the 2003 AKRSI-sponsored science/cultural camps near Fairbanks on the cover of its Winter, 2004 issue, which included an article by two of the Co-Directors describing the AKRSI educational reform strategy.

## **Driver I. Standards-based Curriculum:**

### **1.a. Standards-based curriculum implementation:**

One of the major AKRSI initiatives in the area of standards-based curricula was the creation of a curriculum clearinghouse to identify, review and catalog appropriate national and Alaska-based curriculum resources suitable for rural/Native settings and make them available throughout the state via the AKRSI/ANKN web site. This was expanded in Phase II with a CD-ROM collection of the best materials in various thematic areas most relevant to schools in rural Alaska. A curriculum specialist continues to assemble materials from all over the state and has established a searchable database of curriculum resources on the Alaska Native Knowledge Network web site at <http://www.ankn.uaf.edu>. Requests for materials listed in the ANKN database has grown steadily, and it is the ready availability of these resources that has given the school districts the impetus to revamp their curricula to integrate the standards-based model that was championed through AKRSI. The curriculum clearinghouse will continue to develop and disseminate resource materials, as it works toward becoming a permanent fixture at the University of Alaska supported by a consortium of rural school districts. The CD versions of “Village Science,” “Native Science,” and the “Handbook for Culturally Responsive Science Curriculum” have been instant hits and are being used extensively in professional development programs throughout the state.

The integration of the curricular and pedagogical changes outlined above were fostered in three ways. The first was through the promotion of indigenous “organizers” as the basis for bringing all the elements of the educational experience together in a framework that is grounded in the cultural and physical environment in which the schools are situated. Guidelines and models to assist teachers and districts in such development were included in the Alaska Math/Science Curriculum Frameworks document. The adoption of the AKRSI-sponsored Alaska Standards for Culturally Responsive Schools by the State Board of Education and their incorporation in the state Curriculum Frameworks document provided teachers with explicit guidelines for the implementation of a culturally aligned, standards-based curriculum in their classrooms. In addition, the Alaska Staff Development Network developed, under contract with the AKRSI, two distance-delivered three-credit graduate courses for teachers and administrators on “Creating Culturally Responsive Schools,” which have enrolled over 2500 teachers and principals since they became available in 2000. A regional version of these courses was offered through the Rural Academy for Culturally Responsive Schools in Dillingham in May, 2001, in Nome in May, 2002, in Fairbanks in May, 2003, a Southeast Academy in Juneau in May, 2004, and an Alutiiq Academy in Kodiak in 2005. Teachers from rural schools from throughout Alaska participated in these five-day programs. Through these courses, the math and science curricular resources and pedagogical practices promoted by the AKRSI were disseminated directly to teachers and put to use in their classrooms. The courses also fulfilled the state requirement for three credits in “multi-cultural education” that teachers and administrators must complete to receive a permanent teaching license.

One of the vehicles for bringing coherence to the ideas imbedded in the initiatives promoted by the AKRSI is a framework that was developed by AKRSI staff for purposes of organizing all the

curricular and cultural resources that emerged from the schools as a result of the various initiatives. Work on the “Spiral Pathway for Integrating Rural Learning” (SPIRAL), which is structured around 12 themes and a compilation of associated cultural values, continues to identify/develop curriculum resources for the various themes and grade levels, and to link the resources to Alaska standards in all subject areas. These resources have been made available to teachers on-line through the ANKN web site as they are assembled (<http://www.ankn.uaf.edu>). A promising new opportunity for implementing the curriculum model outlined above was the initiation of a new Tribal Charter School in Interior Alaska, which has been constructed around the AKRSI SPIRAL curriculum model. The Effie Kokrine Charter School opened in Fairbanks in the Fall of 2005 and is now completing its first year of operation.

Another area in which AKRSI promoted infrastructure changes impacting student/teacher/curriculum interactions was in the use of technology to extend and deepen learning opportunities for rural students. The AKRSI staff provided training in implementing the “Cultural Atlas” CD-ROM/web site development project, in which students researched their community/region and assembled the information through the use of technology. Requests from rural schools for workshops to help set up a Cultural Atlas program has grown beyond the point where the AKRSI staff can keep up, so UAF will begin offering a graduate level course on “Developing Cultural Atlases” through its distance education system in the Fall, 2006. The AKRSI staff member responsible for the Cultural Atlas initiative was invited to attend a UNESCO-sponsored conference on “Multimedia and Invisible Culture” in Bogata, Columbia in March, 2002.

#### **1.b. Hands-on, inquiry-based instruction:**

The primary vehicle for promoting hands-on, inquiry-based instruction was the development of curriculum materials that guided teachers into the use of the local environment and cultural resources as a foundation for teaching math and science, both of which are implicitly inquiry-based and hands-on. A second incentive for such instructional practices was the sponsorship of Alaska Native Science Camps and Fairs in which students develop projects illustrating the use of science in everyday life in their community and environment. This is an area in which the teachers and students were eager and willing participants, and they developed judging criteria to insure that the projects that were recognized incorporated culturally appropriate and scientifically significant principles and practices. We have numerous examples of integrated science/culture camps which clearly illustrate the ways in which an extended period of hand-on inquiry in a traditional camp environment can serve as the stepping stone toward in-depth standards-based science and math curriculum and instruction back in the classroom. The success and promise of these initiatives attracted the interest of a Japanese doctoral student from the University of Edinburgh who focused her doctoral research on documenting the educational efficacy of the AKRSI-sponsored initiatives. Following is a brief excerpt from her doctoral dissertation describing the effects of this approach in one of the partner schools that she chose for her research.

#### ***Contribution to Academic Skills***

*Some parents suggested that the outdoor programmes appeared to contribute to the children’s academic skills. A few mothers noticed that the quality of their writing became better.*

As explained in Section 6-2-2, their outdoor activities were tied in with other academic classes at junior high school. Their products on the web and essays they wrote in social study classes indicated that once the students started to experience the environment out of the village, many issues especially linked to animals and the natural environment became more relevant to them.

I obtained two sets of exam results of the junior high students and both showed significant improvement in their academic scores during 2001-03. The charts below were the class average results for 7<sup>th</sup> and 8<sup>th</sup> graders from spring of 2001 to spring of 2003 of an exam on reading, writing and math. The exam was developed by their school district to measure progress in standards-based curriculum. According to the principal, and from the results of another exam, this average is a fair indicator of general progress with some exceptional progress among individuals. It is worth noting that the general trend in the state showed lower scores among 8<sup>th</sup> graders than among 6<sup>th</sup> graders, whereas Russian Mission students' growth was steady.

Chart 6-1 Exam results on Russian Mission 7<sup>th</sup> graders during 2001-03

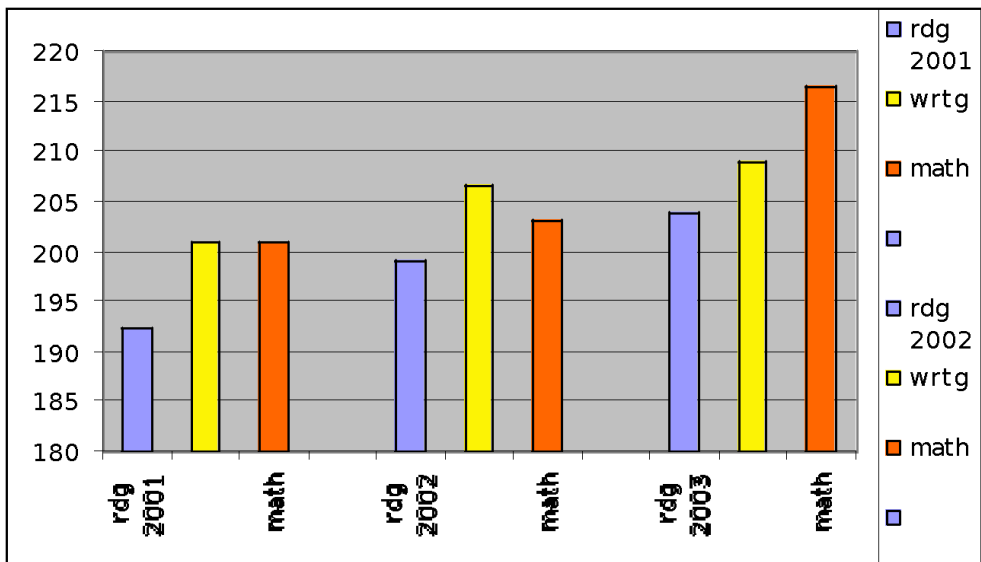
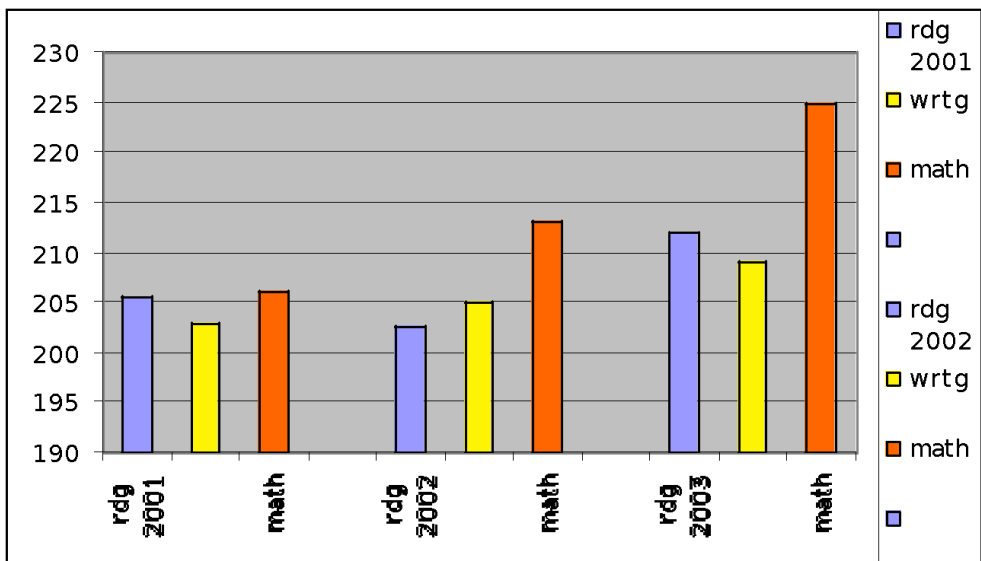


Chart 6-2 Exam results on Russian Mission 8<sup>th</sup> graders during 2001-03





*The exam result was not proof that the integration of outdoor education was the definite and sole cause of the academic improvement among students. However, the school's approach to get closer to the students' world and their needs seems likely to be one of the contributors to the significant improvement of their academic scores. During conversations teachers and parents suggested that their children had been thought not able to write, but they did write well when they had something to write about. Moreover some people suggested that the improved relationship between school and the community would have affected students' attitude toward school. Outdoor activities seemed to have brought different, often positive, relationships between teachers and students. It would be safe to say that if the students felt positive and happy about being at school, they were more likely to accept being taught and to learn better than otherwise (from Takako Takano doctoral dissertation, University of Edinburgh, 2004).*

### **1.c. Quality of Professional Development**

The most comprehensive indicator of the professional development activity associated with the Alaska Rural Systemic Initiative is the [Handbook for Culturally Responsive Science Curriculum](#), which continues to serve as the primary reference document for AKRSI-sponsored inservice training. This document is coupled with the publications, [Translating Standards Into Practice: Science Performance Standards](#), [Village Science](#), [Native Science](#) and [Alaska Standards for Culturally Responsive Schools](#), which were developed jointly by AKRSI and the Alaska Department of Education. All five documents (and many related materials) can be accessed on-line at [www.ankn.uaf.edu](http://www.ankn.uaf.edu).

Another significant addition to our professional development arsenal of resources was a set of “Guidelines for Cross-Cultural Orientation Programs,” which were also developed jointly by the AKRSI Teacher Leadership Development Project and the Alaska Department of Education Teacher Recruitment and Retention Project. These guidelines grew out of a statewide meeting held in Nome in May, 2002 to develop strategies to address the lingering problem of excessive staff turnover rates in rural schools/districts. Additional resources are now being made available to rural school districts and communities by the Alaska Department of Education to develop cultural orientation and mentoring programs for new staff to better prepare them to implement the educational practices that have grown out of the AKRSI activities over the past ten years.

### **1.d. Assessment:**

We have continued to work with the Alaska DOE to develop a up-dated set of science performance standards and assessment measures aligned with the state standards, that will serve as the basis for a statewide science assessment system for implementation in 2007, as mandated by current federal legislation. Currently, the state-mandated assessment system requires students to be tested each year in math, reading and writing, alternating between norm-referenced standardized tests (CAT-6), and criterion-referenced tests based on state performance standards, the results of which are reported at the local, district and statewide levels (teachers have access to individual student results).

The most significant contribution of the AKRSI to the assessment effort was to engage Native educators in the process of developing assessments for the science performance standards that are culturally appropriate and aligned with the cultural standards. The assessment results from the first state benchmark tests attracted school district interest in the role of AKRSI initiatives in producing higher test score results in those schools that were most directly involved with the project. The Yukon-Koyukuk School District initiated discussions with AKRSI staff when they noticed that the students in those schools most intensively participating in the AKRSI initiatives were out-performing the students in other schools in the district. Consequently, one of the AKRSI Co-Directors was invited to join an accreditation review team to visit the district schools to take a closer look at what was happening. This was followed by an inservice program for district staff to help the district follow up on the implications of the test score results, and to prepare teachers to build on their successes. The earlier account from the Russian Mission School indicates the benefits that can accrue with a comprehensive approach to standards-based curriculum and performance-based assessment.

Most recently, one of the AKRSI Co-Directors was invited by the U.S. Office of Indian Education and Educational Testing Service to join a Technical Review Team to assist in the implementation of a special National Indian Education Study associated with the 2005 administration of the National Assessment of Educational Progress (NAEP). Alaska has been included in an expanded sample of schools serving Native American students in which the NAEP is administered, to be supplemented by a special survey to identify linguistic and cultural characteristics associated with the participating schools. The intent of the study is to identify characteristics of schools that can be associated with high-performing vs. low-performing students. A draft report has been prepared and is now under review in preparation for release.

### **1.e. Student support:**

The whole thrust of the Alaska RSI was to build bridges between the vastly different worlds that students are caught between, so when they come to school they don't have to deny who they are, but rather can build on the knowledge, traditions, world view and ways of knowing they bring with them (as illustrated above in the Russian Mission article). Then western knowledge and ways of knowing (as reflected in the study of science and math, for example) can be learned in a value-added way, and not detract from what they and their ancestors already know. It was such considerations that prompted the Alaska State Board of Education to adopt the student section of the Alaska Standards for Culturally Responsive Schools into state regulations. Organizations such as the Native Educator Associations and the Alaska Native Science and Engineering Society have served as strong reinforcements and support structures for bridging the two systems and validating the knowledge and identity that make today's Alaska Native students into confident adults. It was these considerations that led to the development and adoption of a set of "Guidelines for Nurturing Culturally Healthy Youth," which have been distributed statewide by AKRSI/ANKN. It was also these considerations that prompted the Directors of Alaska's libraries to take the initiative to develop their own set of "Guidelines for Culturally Responsive Alaska Public Libraries," which encourage and assist all libraries to "examine how they are responding to the specific informational, educational and cultural needs of their Alaska Native

users and communities.” And it is these same considerations that led to the incorporation of the Alaska Cultural Standards model into the Indigenous Higher Education Accreditation System established by the World Indigenous Nations Higher Education Consortium.

## **Driver II: Policy Changes**

While Alaska has adopted demanding math and science standards, these will be of little consequence without support for schools in implementing programs that meet those standards. To that end, AKRSI worked with various state and national organizations to strengthen the curricular and instructional base for rural schools. The most significant policy-related initiative in that regard was the preparation of a report through a \$120,000 grant from the Rural School and Community Trust to assist a coalition of rural school districts in their efforts to build a legal case for more equitable funding of rural schools in Alaska. A follow-up report resulting from that initiative was released in 2004 titled “Tools for Success: What is an Adequate Education,” which reinforced the educational reform strategies championed by the AKRSI. With an expanding state population, a fiscally conservative legislature, and a tangle of new federal mandates emanating from the No Child Left Behind legislation, the policy debates are many and heated, and they are not likely to cool down anytime soon, especially in rural Alaska.

AKRSI collaborated with the First Alaskans Institute, through a newly formed Alaska Native Policy Center, in the sponsorship of a statewide Native Education indicator survey and policy analysis. Two recent reports titled “Our Lives, Our Future” and “Alaska Native Student Vitality” have been aimed at the many key stakeholders to examine the consequences of recent policy initiatives related to Native education, based on a survey of Alaska Native households regarding their views on the most critical educational issues facing their schools and communities. One of the outcomes of these analyses was a prioritized set of policy recommendations on which Native people and organizations have focused their efforts over the ensuing years. These recommendations and others have also served to shape Alaska’s input into the USDOE advisory process for reconstituting its federal regional comprehensive technical assistance centers. One of the AKRSI Co-Directors (Ray Barnhardt) served on the Northwest Regional Advisory Council to help guide the needs assessment process for the NW and Alaska regions.

Two ways in which the AKRSI addressed Driver II were in the on-going offering of a distance education course on “Leadership for Culturally Responsive Schools,” that has been provided through the Alaska Staff Development Network as a way to meet state certification requirements, and in two projects (USDOE and Gates Foundation funded), also in collaboration with the ASDN, providing support to sponsor training aimed at increasing the management skills of school administrators in rural Alaska. The latter is intended to help administrators develop a more systemic approach to the integration of culture and technology in schools throughout the state.

Another addition to the AKRSI policy arena was the involvement of the Alaska Council of School Administrators and the Alaska Association of School Boards with AKRSI in the development of a set of “Guidelines for Culturally Responsive School Boards.” These

guidelines are intended to assist the management and policy makers of school districts in the implementation of the Alaska Standards for Culturally Responsive Schools. The Alaska School Boards Association annual meetings in November have featured these guidelines for the past four years and AKRSI staff have provided appropriate training for their members.

### **Driver III: Resource Convergence**

The Alaska Rural Systemic Initiative has served as a guiding and synergizing link across the many elements that impact the quality of education in schools in rural Alaska. Through the Alaska Native/Rural Education Consortium, representatives from the rural school districts, State Department of Education, University campuses, Native organizations, Elders, and other related agencies and professional organizations were brought together yearly to be briefed on the status of AKRSI initiatives, to report on their own work related to those initiatives, and to coordinate their efforts in ways that would maximize the impact. The resources of the AKRSI were contracted out to these partners in ways that capitalized on the role and strengths that each brought to the undertaking, and then their contributions were passed on to the other partners and built upon as each initiative shifted from one region to the next on a rotating basis. In this way, AKRSI served as a catalyst to initiate change that was constructive, coherent and coordinated.

Year Nine brought an expanded opportunity to exchange ideas and insights when AKRSI was asked to host the annual National RSI PI/PD meeting in May, 2004. We took advantage of the opportunity to address several related themes and link up with other events that were taking place in Fairbanks at the same time, including an Indigenous higher education colloquium and an Indigenous curriculum fair. The PI/PD Conference brought over 200 people to Fairbanks and provided an opportunity for productive exchange of strategies for reform and lessons learned through the RSI experience. Two DVD's were compiled capturing some of the main events associated with the conference. Subsequently, AKRSI was awarded additional funds by NSF to support the preparation of a report by Paul Boyer on the long-term impact of the RSI's nationally.

In addition to working with the partner schools/districts in the reallocation of federal Title I, Indian Education and Johnson-O'Malley funds to support the AKRSI initiatives (such as science camps, fisheries studies, forestry inventories, ocean current monitoring, water sampling, sanitation studies, increasing involvement of Elders as knowledge resources, use of technology to record and analyze data, etc.), efforts were made to re-direct school district core funding in the areas of staff development and curriculum development toward direct support for the AKRSI school reform initiatives. Several partner districts sponsored major curriculum revisions to integrate the AKRSI-sponsored science performance standards into their science programs. Alaska's designation as an EPSCoR state opened up new opportunities to link science and research initiatives with the curricular needs of schools, leading to increased collaboration with several organizations in the application of public and private resources to address education needs in rural Alaska. These included funding support from IBM for computer equipment, a Kellogg Foundation grant to support the Tribal College initiative in Alaska, a NOAA grant to assist with a local mapping and place name projects, and a joint initiative with the Alaska Staff Development Network and the Gates Foundation for upgrading the technological proficiency of

school administrators. Together, these external resources have totaled well over \$2,000,000 per year for the past three years.

The AKRSI was closely aligned with the Yup'ik Math Curriculum Project (also funded by NSF), as well as the Alaska Indigenous People's Academy, funded under the USDOE Alaska Native Education Equity Act, and the Native Educator Research Project funded by USDOE under the American Indian/Alaska Native Research Grant Project. The latter project was a national initiative examining the impact of Title II of the Higher Education Act and No Child Left Behind on the preparation of American Indian and Alaska Native educators. Co-Director Oscar Kawagley served as a member of the national research team.

One of the most successful features of the AKRSI was encouraging the establishment of Alaska Native Science Camps in which teachers and students learned along side one another under the tutelage of knowledgeable Elders. Follow-up data on student achievement indicates a strong carry-over in subsequent academic studies in the school as a result of participation in a science camp program (see the earlier Russian Mission excerpt as an example). In the Academies of Elders (several of which are now sponsored by local Native organizations and schools), the Native educators took the knowledge gained from the Elders in a traditional setting and developed curriculum units in which they integrated the math and science concepts and skills called for in the State standards in such a way that students could see the two systems as complementary to one another, each adding insights to the other. The most successful of these regional efforts was the Association of Interior Native Educators, which received a second \$1.3 million grant from the USDOE to draw together the curriculum materials and teaching strategies that were developed through the AKRSI-sponsored Academies of Elders in the region and to provide on-going workshops for teachers on site in each of the schools in the Interior Athabaskan Region. This initiative provided the impetus for the AKRSI Teacher Leadership Development Project to assist other Native Educator Associations in implementing similar programs in their respective regions.

#### **Driver IV: Partnerships**

Partnerships were formed with contributors from across the spectrum of entities impacting education in rural Alaska, with approximately 70% of the AKRSI funding from NSF being distributed annually through subcontracts to multiple partner organizations. In addition to the partnerships established directly through subcontracts with school districts, Native organizations, non-profit service organizations, university campuses, state agencies, etc., the AKRSI received support from over 20 businesses in the form of sponsorships of students to attend the ANSES science camp and travel for community participation in various meetings and workshops, Native corporations in the form of collaboration on the use of in-house resources for curriculum materials development, higher education in the form of the establishment of the Rural Educator Preparation Partnership as a primary vehicle for increasing the number of Native teachers in rural schools, the Alaska Department of Education in the form of a joint position for rural/Native education in the Commissioner's office, and Native community members in the form of parent and Elder involvement in all aspects of AKRSI implementation.

Further partnerships were formed with the scientific community through joint curriculum initiatives with the Geophysical Institute and College of Science, Math and Engineering at UAF, through the traditional knowledge documentation efforts of the Alaska Native Science Commission, through national linkages to resources offered by places like Los Alamos, and through the Arctic science education resources of the Arctic Research Consortium of the U.S. All of the above was buttressed with a \$2,000,000 NSF TCUP grant to extend the work of a Tribal College Consortium in collaboration with the AKRSI to promote the development of a Tribal College System in Alaska, thus providing a wholly new institutional infrastructure through which to carry on many of the initiatives established through the AKRSI. As a result of this support, Ilisagvik College, the lead institution with the TCUP initiative, has recently been formally recognized as a Tribal College by the Bureau of Indian Affairs.

Building on a joint research partnership with the Northwest Regional Educational Laboratory that resulted in seven detailed case studies forming a report on “Alaska Rural Systemic Reform,” the AKRSI staff has developed a new research initiative aimed at linking the AKRSI emphasis on indigenous knowledge and Native ways of knowing to emerging literature on “pedagogy of place.” Oscar Kawagley, the Co-PI on whose past research much of the AKRSI reform strategy was based, has established a collaborative relationship with one of the AKRSI rural sites that has been at the forefront of integrating local knowledge and practice into the curriculum. He has begun an in-depth study of the teaching/learning processes utilized inside and outside of the local school, from which we hope to see a more systematic approach to the development of curricular and pedagogical practices that are well suited to the cultural and physical environment of Native people in rural Alaska. This will be a long-term cooperative research endeavor that takes advantage of the new (but old) approaches to education that are emerging in rural schools as an outgrowth of the Alaska Rural Systemic Initiative. Co-Director Kawagley took advantage of a sabbatical leave in the Fall of 2003 to conduct parallel research among the Maori in New Zealand and the Inuit in Greenland. This research was augmented by the doctoral research mentioned previously, completed in 2004 by the Japanese doctoral candidate from Scotland. In July, 2003, UAF hosted a national conference on “Science in Service to Native Communities,” which brought together over 100 people from around the country involved in the articulation of Western and Native science traditions. A report from the conference was published in 2005. Also, two case studies derived from the AKRSI educational reform endeavors have been published, one in the Winter, 2004 issue of Cultural Survival Quarterly and another in a new book on “The Challenge of Indigenous Education” published by UNESCO. Most recently, a research team from Georgia Tech Research Institute visited Alaska and gathered information on the AKRSI as part of an NSF-funded study of “Partnership Influences on STEM Educational Outcomes.”

### **Section III: Outcomes and Outputs of the System**

Given the need for in-depth data to be able to adequately examine the issues associated with systemic reform and the labor-intensive nature of gathering such data from widely diverse and geographically dispersed schools, we concentrated our efforts on selected schools, districts and initiatives in each region, focusing on those which represent the range of characteristics exhibited by all schools in rural Alaska. In this way, we sought to achieve a greater depth of impact on the

most needy schools and communities in rural Alaska, as well as a deeper understanding of what does or does not make a difference in rural school reform efforts. In addition, the core data elements submitted to NSF and the RKID data set provided to Systemic Research, Inc. for their review of the NSF's RSI's provided a source of in-depth data for longitudinal comparison of the impact of the AKRSI initiatives. All school-related data were acquired through collaboration with the Alaska Department of Education and Early Development.

#### **Driver V: Student Achievement**

The first challenge of the AKRSI in this area was to encourage and assist school districts in the establishment of higher-level math and science courses, so that students would have the option to enroll in them. For many rural students, the highest level of math and science courses offered in their school was algebra and general science respectively. As students saw greater relevance for linking the study of math and science to the needs of their communities, their level of expressed interest increased, and several districts developed higher level courses that are being offered in a variety of forms. One district is taking the approach of offering the basic science disciplines of physical, biological and earth sciences on a three-year rotational schedule, so students across three grade-levels can make up a sufficient enrollment to justify full-blown courses, and all students have an opportunity to take all three courses, though in different sequences. Other districts have established positions of "itinerant specialists," so that qualified science and math teachers move from school to school on a rotational basis to make advanced courses available to students. A third approach has been to adopt courses in interdisciplinary areas that integrate standards-based science and math subject matter in applied fields of relevance to the local area (ecology, fisheries, bio-chemistry, computer science, and variations on applied technology). A fourth approach being pursued by an increasing number of districts involves investing in two-way video technology, so that teachers with expertise in certain subject areas can teach students throughout the respective region, with tutorial support from the teacher on site in each village school. The most recent initiative aimed at making available advanced math and science courses is coming from the University of Alaska, which has established a partnership between the rural campuses and adjacent rural school districts to offer entry-level university courses (focusing on calculus, chemistry and physics) in such a way that they can also be taken as "advance placement" or Early College High School courses by interested high school students. The availability of and enrollment in advanced math and science courses is largely limited to the larger schools in the regional centers.

The most promising avenue for achieving increased interest in advanced level courses was the establishment of local math and science initiatives associated with the Alaska Native Science and Engineering Society. Three ANSES-related initiatives were implemented in the school districts serving the Inupiaq Eskimo region, four in the Athabascan region, three in the Aleut/Alutiiq region, two in the Southeast region, and two in the Yup'ik/Cup'ik region. Each region has sponsored at least one Alaska Native Science Fair this past year and sent students to participate in statewide and national AISES fairs. Students begin to prepare for the fairs while participating in the various ANSES Science Camps held in the summer and fall.

As we wind up Phase II, the tracking of student academic performance has shifted a bit due to

the establishment of a new testing regime by the State. Instead of selected grade levels taking the CAT-5 every year as had been the case up through 1999, now all students annually take either a state standards-based test for even-numbered grade levels, or the Terra Nova (CAT-6) standardized test for odd-numbered grade levels (though the latter was not administered in 2005). For purposes of assessing the impact of Phase II initiatives on student performance, we used the year 2000 as the baseline year, since that is the first year for which results of the State benchmark tests and High School Graduation Qualifying Exam were available (see graphs under Driver VI).

Since a science assessment system is still in the pilot stage of development, no reliable data on student achievement in science is currently available. However, the current regimen of norm- and criterion-referenced tests does include mathematics, so the data reported here represents results from each of those tests in the area of mathematics, comparing the performance of students in the 20 AKRSI school districts with that of students in 28 non-AKRSI rural school districts. The national standardized CAT-5/6 test and state benchmark exams serve as indicators of the effects of implementation of the AKRSI initiatives. The data show a steady net gain between AKRSI partner schools over non-AKRSI rural schools in the percentage of students who are in the upper quartile on 8<sup>th</sup> grade standardized achievement tests in mathematics, as well as a steady gain in mathematics proficiency levels on state standards-based assessments for both 8<sup>th</sup> and 10<sup>th</sup> grade students in AKRSI partner schools. In addition to the state benchmark data, we also have norm-referenced test results for 9<sup>th</sup> grade students who have been taking the Terra Nova/CAT-6 from 2002-2004. Though the differential gains for each group between 2002, 2003 and 2004 remain small, the AKRSI students do show a slight increase in performance, while the non-AKRSI students reflect a small decrease in their performance over the three years of available data. The most notable data are the significant increases in AKRSI student performance for all grade levels between 2000 and 2005, with a significant spike in the proficiency of 10<sup>th</sup> grade students the last year. While the 8<sup>th</sup> grade AKRSI students showed significant progress in closing the achievement gap with their non-AKRSI counterparts from 20 to 17 percentage points, the 10<sup>th</sup> grade students in both groups showed a substantial gain from 2000 to 2005, leaving the achievement gap largely intact. The consistent improvement in academic performance of students in AKRSI-affiliated schools over each of the past ten years leads us to conclude that the cumulative effect of utilizing the Alaska Standards for Culturally Responsive Schools to promote increased connections between what students experience in school and what they experience outside school appears to have a significant impact on their academic performance.

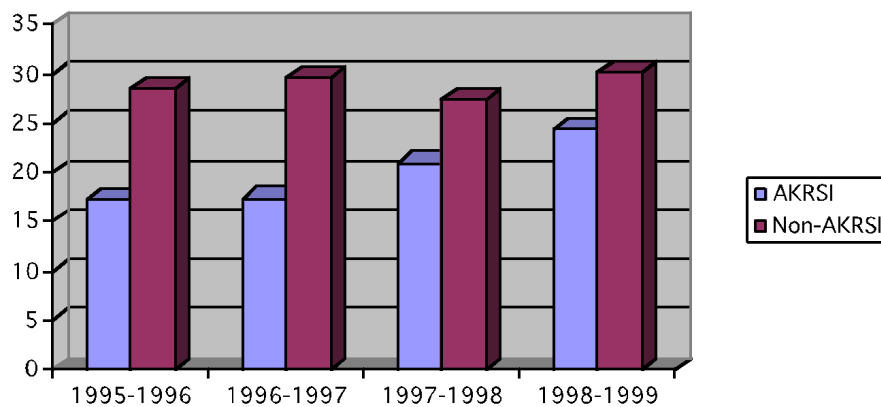
The beneficial academic effects of putting students in touch with their own physical environment and cultural traditions through a guided experience did not go unnoticed by school districts and other Native organizations around the state. One AKRSI school district urged all of its schools to start the school year with a minimum of one week in a camp setting, combining cultural and academic learning with parents, Elders and teachers all serving in instructional roles. One school in the district (the Russian Mission School) has built in to their program a series of camp experiences for the middle school students, with a well-crafted curriculum addressing both the state Content Standards as well as the state-adopted Cultural Standards. The beneficial effect of such strategies on student achievement is reported in the article included earlier under Driver I.b.



**Driver VI: Elimination of Student Achievement Gaps**

The indicators of the effects of the first phase of implementation of the school reform initiatives in the 20 AKRSI school districts (which have historically had the lowest student achievement levels in the state and nation) pointed to a differential gain between AKRSI partner schools and non-AKRSI rural schools of 5.9 percentage points between 1995 and 1999 in the percentage of students who were in the top quartile on the 8th grade standardized achievement test in mathematics. A corresponding decrease of 2.2 percentage points was documented for students in the bottom quartile for AKRSI partner schools over non-AKRSI rural schools.

**EIGHTH GRADE MATHEMATICS PERFORMANCE – 1995/96, 1996/97, 1997/98, 1998/99**  
**% Rural Students in Top Quartile on CAT-5**

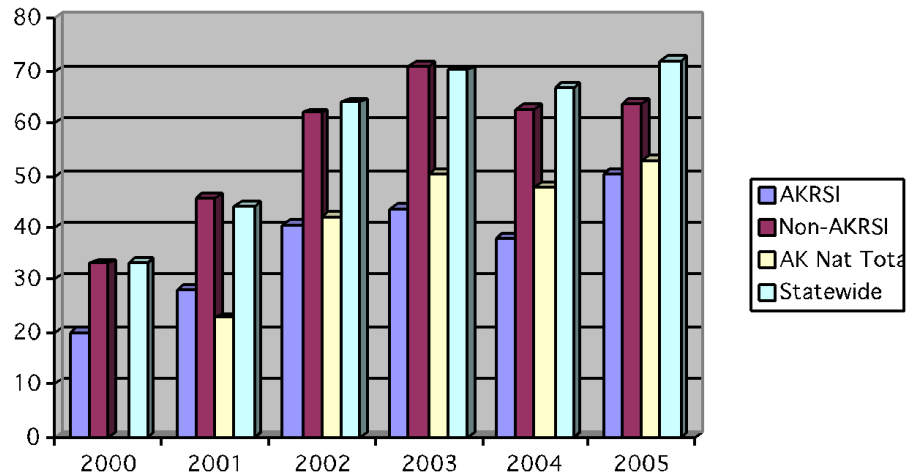


With the advent of the state standards-based Benchmark tests and the High School Graduation Qualifying Exam in 2000, we now have five years of State data on student performance in the 8<sup>th</sup> and 10<sup>th</sup> grade math exams, which allows us to make further comparisons between AKRSI and non-AKRSI rural districts for those two grade levels. Following are two graphs showing the percentage of students performing at the “advanced” or “proficient” levels on those exams.

**EIGHTH GRADE MATHEMATICS BENCHMARKS – 2000/2001/2002/2003/2004/2005**  
**% Rural Students as Advanced/Proficient**

**TENTH GRADE MATHEMATICS HSGQE – 2000/2001/2002/2003/2004/2005**

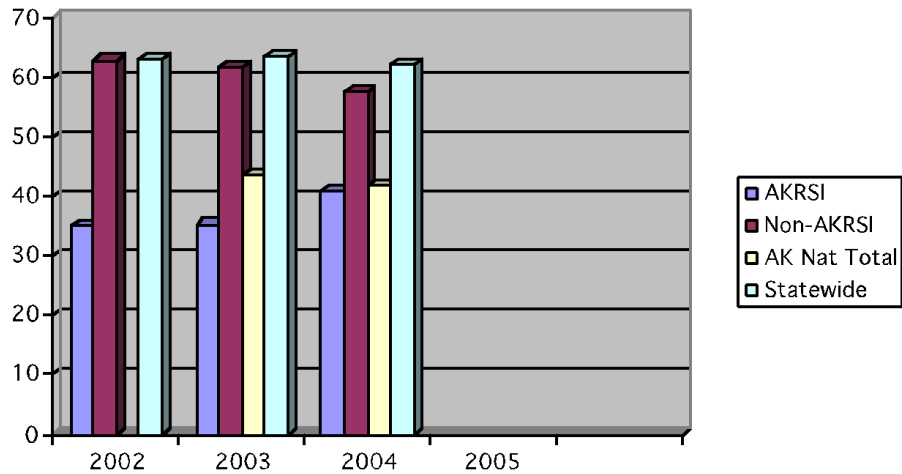
*% Rural Students as Advanced/Proficient*



The most notable features of these data are the significant increases in AKRSI student performance for both grade levels each year between 2000 and 2005. The 8<sup>th</sup> grade AKRSI students showed a slight improvement in 2004 in closing the achievement gap over the other categories. The 10<sup>th</sup> grade students in all groups showed a substantial gain from 2000 to 2003, but all students declined somewhat in 2004. However, the AKRSI students posted a lower decline than students in non-AKRSI rural schools and thus achieved a slight reduction in the achievement gap, which was then further reduced with a significant increase in performance in 2005. The overall decline in 2004 is largely attributable to a reset of the cut scores for the HSGQE, which impacted all student scores.

**NINTH GRADE MATHEMATICS TERRA NOVA/CAT-6 – 2002/2003/2004**

*% Rural Students Scoring in Third and Fourth Quartiles*

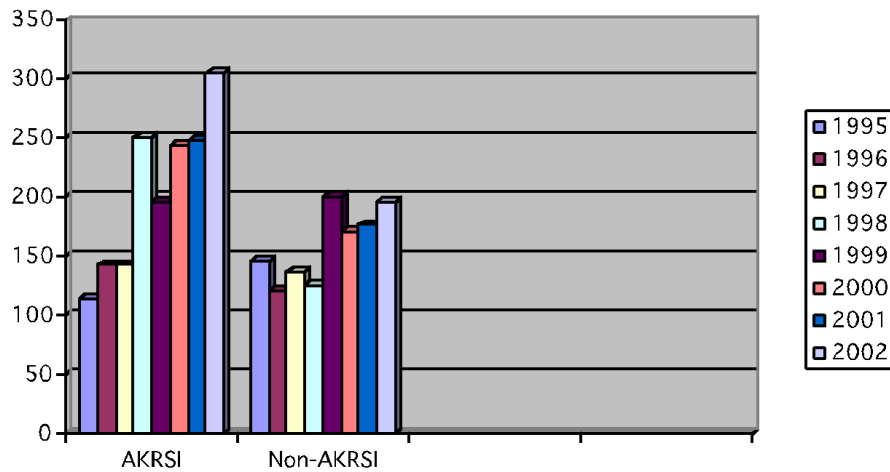


In addition to the state benchmark data, we also have norm-referenced test results for 9<sup>th</sup> grade students who took the Terra Nova/CAT-6 in 2002, 2003 and 2004. Though the differentials for each group between 2002 and 2003 remain small, the AKRSI students do show a significant increase in performance in 2004, while the non-AKRSI students reflect a small decrease in their performance over the three years.

The consistent improvement in academic performance of students in AKRSI-affiliated schools over each of the ten years leads us to conclude that the cumulative effect of utilizing the Alaska Standards for Culturally Responsive Schools to increase the connections between what students experience in school and what they experience outside school appears to have a significant impact on their academic performance.

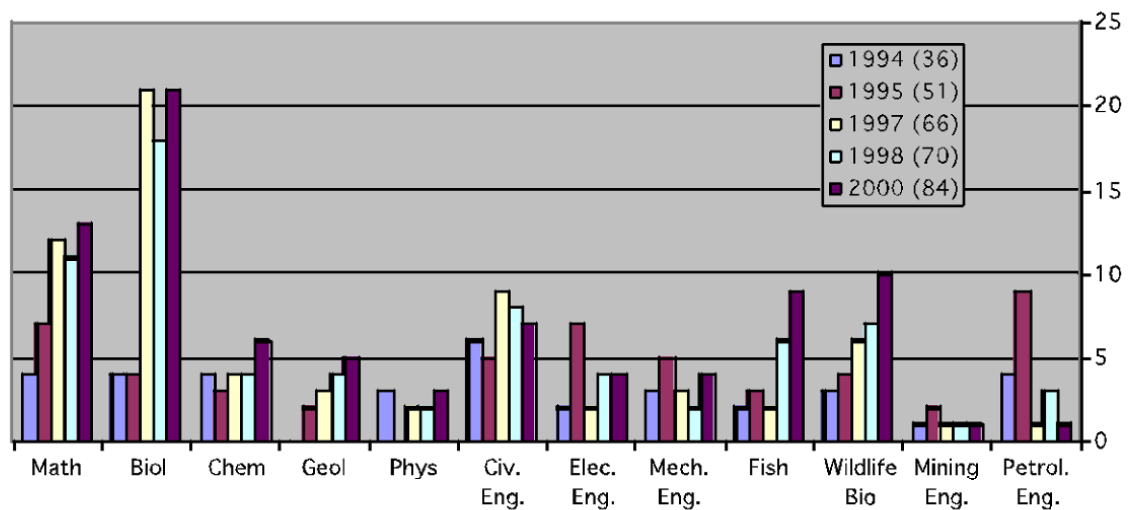
A comparison of the enrollments of first-time freshmen rural students at the University of Alaska indicates that the number of students from the 20 AKRSI districts increased by 19% in 1996, held steady in 1997 and then increased again in 1998 through 2002, while the enrollment of new rural students from non-AKRSI rural districts in Alaska decreased by 12% in 1996, and then rebounded by 9% in 1997, held fairly steady in 1998, and then jumped again from 1999 to 2002. While these are significant differences, it should be noted that a major factor influencing the jump in enrollments from both AKRSI and non-AKRSI schools in 2000 was the implementation of the Alaska Scholars program by the University of Alaska that year. The top 10% of each graduating class can now enroll in the UA system tuition free, and that has attracted an additional cohort of students that may not have chosen to attend UA otherwise.

**UA RURAL STUDENT FIRST-TIME ENROLLMENTS – 1995 – 2002**



Since the University of Alaska Fairbanks is the primary higher education institution in Alaska emphasizing the sciences, and since it is the institution that has historically been responsible for serving rural Alaska, we used the level of Alaska Native enrollment in UAF math, science and engineering majors as the primary indicator of shifts in rural student choices in pursuing careers in those fields. The following chart indicates that, of the 12 major fields available at UAF, the percent of Alaska Native student enrollment increased significantly in most fields over the years up to 2000 (data for subsequent years are not available at this time). It has been especially encouraging to see the steady increase in overall enrollments of Native students in math, science and engineering fields, from 36 in 1994 to 84 in 2000, a trend which appears to be continuing up to the present.

**% ALASKA NATIVE STUDENT ENROLLMENTS AT UAF IN MATH/SCIENCE MAJORS  
1994, 1995, 1997, 1998, 2000**



It is noteworthy to point out the substantial increase in the enrollment of Alaska Native students

in the life/biological science fields (especially biology, fisheries and wildlife biology), since that is consistent with the interests shown by younger students as they select topics for developing a project to enter into the AKRSI-sponsored science fairs. It also reflects strong practical considerations, since the increases in Native enrollments are in those fields for which job opportunities are most likely to be available in rural communities. In addition, these are the majors that are most consistent with the areas of expertise that have been at the heart of the survival of indigenous cultures and traditional knowledge systems over the years.

**Data utilization:** The school district data collection and utilization related to the goals of the AKRSI were coordinated through the assessment office at the Alaska DOE, to avoid duplication of effort and to bring AKRSI goals and considerations into the state-level assessment planning and implementation process that impacts all schools in the state. Since the implementation of NCLB, the state has released school-by-school level reports of student achievement on benchmark and high school graduation exams that are implemented each year. These data are now being utilized at the school as well as the district level to identify what is working and what is not, and to help identify where changes need to be made.

### **Summary of Progress**

One of the biggest challenges facing rural schools today is to retain a sense of efficacy in a political environment that tends to prefer simple solutions to complex problems, and thus often overrides local considerations. While the long-term consequences of the No Child Left Behind legislation remain to be seen, the immediate effect has been to create a state of great confusion, uncertainty and frustration. The AKRSI sought to assist rural schools in finding ways to reconcile the sometimes conflicting agendas between local and national aspirations, and to use the current period of bureaucratic chaos to seek a new basis for building an educational system that is second to none in addressing the educational needs of students in rural Alaska.

Our experience over the past ten years is such that we are confident in the route we chose to initiate substantive reforms in rural schools serving Alaska's Native communities, and while we expected to encounter plenty of problems and challenges along the way, we capitalized on a broadly supportive climate to produce changes that have benefited not only rural schools serving Native students, but have been instructive for all schools and all students. We greatly appreciate the generous support of the National Science Foundation and the RSI program staff in providing the latitude and opportunity to explore these ideas and find ways to strengthen and renew the educational systems serving people and communities throughout our society.

## **Additional Outputs of the System: Products and Publications**

The following items represent publications and multimedia products that have been published or are under development through the Alaska Rural Systemic Initiative, Alaska Native Knowledge Network:

***Sharing Our Pathways*** - a bi-monthly newsletter with a circulation of over 3000 that provides an up-to-date account of the initiatives and events associated with the AKRSI

***Old Minto Camp*** - a 40 minute video of the “cross-cultural orientation program” week-long camp experience for teachers associated with the “Native ways of knowing” initiative

***Nutemllaput: Our Very Own*** - a 40 minute video depicting ways in which Yup’ik language and culture are being incorporated in the schools in the Yup’ik region of the AKRSI

***To Show What We Know*** - a 40 minute video documenting the activities associated with AISES Science Camps and Native Science Fairs

***Passing On*** - a 30 minute video documenting role and contributions of Alaska Native Elders to the in- and out-of-school education of Alaska Native children

***Alaska Natives and Science*** - a five-part radio series depicting ways in which Alaska Native people are engaged in various fields of science in Alaska, including a curriculum for its use in schools. The radio series was recently picked up by the Voice of America for broadcast around the world to an audience of 10,000,000 people and has been broadcast nationally on NPR/PRI. A curriculum guide is under production to accompany the use of the tapes in the classroom.

***Translating Standards to Practice: Science Performance Standards and Assessments*** – a resource document prepared by science teachers from throughout the state under the guidance of Peggy Cowan and Cyndy Curran, for use by the Alaska Department of Education, the Alaska Science Consortium and all science teachers (also available on the ANKN web site)

***Inuksuk: Northern Koyukon, Gwich’in & Lower Tanana, 1800-1901*** – a reference document for Alaska studies teachers drawing together knowledge from oral tradition and historical documents to reconstruct the lives of northern Athabascan people in the 19<sup>th</sup> century (includes a detailed map supplement)

***Mentasta Remembers*** - a book and poster depicting the subsistence life as practiced by the Athabascan people of the village of Mentasta

***Gwich’in Elders: Not Just Knowledge, But a Way of Looking at the World*** - a monograph by Shawn Wilson describing the role of Elders in shaping educational practices in a region, including drawing the distinction between an “Elder” and an elderly person

***Village Science*** - a teachers handbook prepared by Alan Dick offering an extensive compendium of ideas for ways in which to connect the teaching of basic science concepts as reflected in the state standards using examples immediately at hand in a village setting

***Northern Science*** - a sequel to *Village Science* with additional examples drawn from across the Arctic region

***Handbook for Developing Culturally Responsive Science Curriculum*** - a concise teachers guide developed in conjunction with the Alaska Science Consortium to provide assistance to teachers in the development of locally relevant science units

***AISES Chapters/Camps/Fairs Handbook*** – a series of resource documents to assist teachers and school districts in sponsoring K-12 chapters of AISES, which in turn sponsor Science Camps and Native Science Fairs

***Alaska Alive*** - a compendium of Arctic science projects for students to consider in preparing for an AISES Science Fair

***Aurora Alive*** – A CD-ROM on the aurora from a Western science and Alaska Native perspective being prepared by Kathy Berry, UAF Geophysical Institute.

***Glacier Power*** - A CD-ROM on glacier science prepared by Chip McMillan of the UAF School of Education

***Snow Science*** - a curriculum handbook outlining ways to integrate traditional knowledge and western science around the theme of “snow”

***Village Math*** - a teachers handbook prepared by Alan Dick offering an extensive compendium of ideas for ways in which to connect the teaching of basic math concepts as reflected in the state standards using examples immediately at hand in a village setting

***Carnegie Cognitive Tutor Math: Alaska Story Problems*** - a sampling of Alaska-based story problems have been developed by math teachers from throughout the state as a supplement to the Carnegie Cognitive Tutor math curriculum

***Aleut/Alutiiq Cultural Atlas*** - a multimedia collection of local Alutiiq and Aleut knowledge compiled by students from interviews with Elders and published on a CD-ROM

***Tlingit/Haida Cultural Atlas*** - a multimedia collection of local Tlingit and Haida knowledge compiled by students from interviews with Elders and published on a CD-ROM

***Yup'ik Education Philosophy*** - a statement of Yup'ik education philosophy that came out of graduate class on Yup'ik education and published as a poster for use in schools throughout the Yup'ik region

***Athabascan Values*** – a poster displaying the list of values to which Athabascan people in the Interior region subscribe, as articulated by Denakkanagga Elders

***Bristol Bay Yup'ik Values*** – a poster displaying the list of values to which Yup'ik people in the Bristol Bay region subscribe

***Kodiak Alutiiq Cultural Values*** – a poster displaying the list of values to which Alutiiq people in the Kodiak region subscribe

***Unangan Cultural Values*** – a poster displaying the list of values to which Unangan people in the Aleutian region subscribe

***Southeast Region Native Values*** – a poster displaying the list of values to which Tlingit, Haida and Tsimshian people in the Southeast region subscribe, as articulated by Southeast Native Elders

***Minto Flats Cultural Geography Map*** - a multimedia collection of local Athabascan knowledge on the geography of the Minto Flats compiled by students in cooperation with Elders and published on a CD-ROM (under production)

***Alaska Native Knowledge Network web site*** - a comprehensive site on the world wide web containing a vast array of information related to all aspects of education in rural Alaska, as well as indigenous education worldwide.

***S.P.I.R.A.L. Curriculum Resources data base*** - a data base on the ANKN web site that contains over 2500 entries of curriculum resources for rural schools in Alaska, organized in a way to make the materials readily accessible to teachers at all grade levels

***Subsistence Curriculum CD-ROM*** – a collection of curriculum resources for all grade levels around the theme of “subsistence”

***Alaska Standards for Culturally Responsive Schools*** (booklet and poster) - a set of standards for students, teachers, curriculum, schools and communities offering guidelines for meeting the cultural needs of Alaska Native students. The standards were adopted at a meeting of Native educators in February, 1998 and subsequently adopted by the Alaska State Board of Education

***Guidelines for Preparing Culturally Responsive Teachers for Alaska's Schools*** – a set of guidelines for teacher preparation programs, school districts and Alaska Department of Education outlining areas of expertise that teachers need to acquire to be effective at implementing the Alaska Standards for Culturally Responsive Schools

***Guidelines for Respecting Cultural Knowledge*** – a set of guidelines that address issues of concern in the documentation, representation and utilization of traditional cultural knowledge as they relate to the role of various participants, including Elders, authors, curriculum developers, classroom teachers, publishers and researchers



***Guidelines for Nurturing Culturally Healthy Youth*** – a set of guidelines that address the role of traditional child-rearing and parenting practices in contemporary school and community contexts

***Guidelines for Strengthening Indigenous Languages*** – a set of guidelines intended to assist Native communities and schools to address the issues surrounding the revitalization and perpetuation of heritage languages

***Guidelines for Culturally Responsive School Boards*** – a set of guidelines that address the role of school boards and administrators in implementing the Alaska Standards for Culturally Responsive Schools

***Guidelines for Cross-Cultural Orientation Programs*** – a set of guidelines to assist pre-service and in-service entities in providing culturally responsive orientation programs for all educators.

***Tlingit Math*** - a booklet of math problems utilizing themes from the Tlingit region and presented in both Tlingit and English

***Tlingit Moon and Tides Curriculum Guide*** - a set of standards based curriculum units drawing on both Tlingit and Western knowledge of the moon and tides

***Tlingit Place Name/Clan Map*** - a poster detailing clan names and traditional territories in Southeast Alaska

***Will the Time Ever Come: A Tlingit Source Book*** – A resource handbook containing detailed information on traditional Tlingit knowledge and worldview, prepared by Andy Hope, AKRSI regional coordinator

***I Am Salmon Curriculum*** - a collection of curriculum resources assembled around the theme of salmon migration throughout the Pacific Rim region. Prepared in conjunction with One Reel and contributors from Washington, Oregon, British Columbia, Alaska, Russia and Japan

***Soos Koyukon Curriculum Model*** - a curriculum model and guide based on the design of a traditional Soos, a form of food cache used by Koyukon Athabascan people

***Native Educator Associations Handbook*** - a detailed description of the formation of five Native educator associations, which serves as a model for new associations that are forming

***Education Indigenous to Place: Western Science Meets Native Reality*** - an article addressing some of the underlying themes associated with the AKRSI, to be published by SUNY Press in the book, Ecological Education in Action (1998)

***Indigenous World Views: Science Education in Indigenous Communities*** – an article prepared by Oscar Kawagley and colleagues and published in Journal of Research in Science Education

***Culture, Chaos and Complexity: Strategies for Educational Renewal in Rural Alaska*** – an article articulating the school reform strategy employed by the Alaska Rural Systemic Initiative, based on the theory of complex adaptive systems (published in Winter, 2004 issue of Cultural Survival Quarterly,

and to be included in a new book, System Thinkers in Action: A Field Guide for Effective Change Leadership in Education.

***Culture, Community and Place in Alaska Native Education*** – an article published in ” Democracy and Education, Spring, 2006, 16(2).

***Creating a Place for Indigenous Knowledge in Education: The Alaska Native Knowledge Network*** – an article to be published in a new book, Local Diversity: Place-Based Education in the Global Age

***Indigenous Knowledge Systems and Alaska Native Ways of Knowing*** – an article published in Anthropology and Education Quarterly, March, 2005 (Vol. 36, No. 1) pp. 8-23.

***The Implementation of a World Indigenous Accreditation Authority***. An article to be published in L. S. Warner & G. Gipp (Eds.), Traditions and Culture in the Millennium: Tribal Colleges and Universities. Greenwich, CT: InfoAge Publishers

***Alaska Standards for Culturally Responsive Schools*** – an article to be published in a new book, Social Justice, Peace and Environmental Education: Standards and Guidelines for Students, Teachers, Schools and Curriculum

***Teaching/Learning Across Cultures: Strategies for Success*** – an article for new teachers preparing to move into a teaching position in a new cultural environment

***Indigenous Education Around the World*** – a collection of articles and workshop papers from presenters at the Fourth World Indigenous People’s Conference on Education held in Albuquerque in June, 1996

***Native Ways of Knowing*** - a section included in the Alaska Curriculum Frameworks document providing guidelines to school districts on the integration of indigenous knowledge in curriculum development (also published on CD-ROM)

***Growing Up Native in Alaska*** – a collection of 27 interviews with young Native leaders from throughout the state, published in book form

***Yup’ik Journalism*** - a curriculum handbook and teachers guide focusing on engaging students in cultural journalism as a way to enhance their writing skills

***Bird Traditions of the Dena’ina Athabascan*** – an illustrated ethno-ornithology book describing all the characteristics and uses of birds among the Dena’ina of the Lime Village/Stony River area.

***WINHEC Accreditation Handbook*** – a handbook outlining the higher education accreditation process established by the World Indigenous Nations Higher Education Consortium, utilizing the Alaska Standards for Culturally Responsive Schools.

***Education Indigenous to Place*** – A pair of DVD’s that capture the main events associated with the 2004 RSI PI/PD Conference held in Fairbanks.

***Oral History Collection*** – A CD-ROM collection of over 200 audio recordings with Native Elders in the early 1970's documenting cultural knowledge from the Interior and Inupiaq regions.

***Building Community: Reforming Math and Science Education in Rural Schools*** – a report prepared by Paul Boyer documenting the impact of the NSF Rural Systemic Initiative program on rural schools.